Clarksville PARKING STUDY

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Howard County
MARYLAND

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ENGINEERS · ARCHITECTS · PLANNERS EST. 1915

EXECUTIVE SUMMARY

The Ten Oaks Parking Lot located on the southeast corner of the MD 108 at Auto Drive/Signal Bell Lane intersection currently provides parking for Park and Ride patrons, Ten Oaks Ballroom patrons, and Fifth District Volunteer Fire Department staff and visitors. This report documents existing and latent parking demand at the parking lot, identifies alternatives to provide additional parking accommodations, summarizes the projected traffic impacts associated with the proposed expansion of the parking facilities, and evaluates roadway improvements to mitigate adverse traffic impacts. Currently, 204 parking spaces are shared by Park and Ride users and Ten Oaks Ballroom event patrons and 32 parking spaces are provided within a designated area for the fire department.

To determine existing parking demand for Ten Oaks Ballroom events, WR&A personnel observed three separate events held at the Ten Oaks Ballroom during September/October 2014. The parking lot serving the Park and Ride, Ten Oaks Ballroom, and Fifth Volunteer District Fire Department as well as nearby off-site parking lots used as overflow lots during events (i.e., River Hill Shopping Center, Riverhill Station, and Walgreens parking lots) were observed to determine existing parking usage. The Ten Oaks Ballroom can currently accommodate 400 patrons for a banquet-style event (with tables and chairs). However, the Ballroom can accommodate a maximum of 854 occupants in a theater-style seating event. Based on an evaluation of geometric, right-of-way, and zoning constraints and existing and projected parking demand, three parking expansion alternatives were identified for the Ten Oaks Parking Lot. A maximum of 614 parking spaces (shared by Park and Ride users and Ten Oaks Ballroom patrons), which would represent an increase of 410 parking spaces, was assumed; this limit is based on the maximum size of parking structure which can fit on the site in compliance with current Howard County zoning regulations. Based on observations and a review of industry standards, 614 parking spaces would accommodate an event of 605 to 695 patrons (based on the assumed parking demand rate) while maintaining the current Park and Ride location. For the purposes of the traffic analyses associated with the proposed parking lot expansion, evaluating the capacity of the surrounding roadway network assumed the parking lot will be expanded to provide 614 total parking spaces as a maximum (i.e., Alternative A). While not all events will fill the proposed parking capacity and have event arrivals and departures that overlap with the peak hours of the adjacent roadway network, evaluating these scenarios is a conservative approach. Additionally, capacity analyses were performed to identify the impacts associated with 429 parking spaces. (i.e., Alternative B) and 302 parking spaces (i.e., Alternative C). Each of these alternatives could continue to allow Park and Ride use of the property, with approximately 100 parking spaces of demand during weekdays; or, the Park and Ride could be relocated to another location to accommodate an additional 100 on-site parking spaces during Ballroom events.

Capacity analyses were performed at the five signalized intersections along MD 108 from Ten Oaks Road to Great Star Drive and two unsignalized intersections along Great Star Drive at Signal Bell Lane/Daybreak Circle (west) and Daybreak Circle (east) to evaluate the impacts of the additional traffic generated by the proposed Ten Oaks Parking Lot expansion. Roadway improvements were identified to mitigate adverse traffic impacts associated with the proposed parking lot expansion. Improvements include widening the westbound Signal Bell Lane approach to MD 108 to provide three approach lanes (i.e., a left-turn lane, a shared through/left-turn lane, and a right-turn lane) and constructing channelization to prohibit northbound through and left turns at the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection to reduce the number of conflict points and the potential for angle crashes. The selected

design year for the project was 2025; therefore, traffic volumes for the future year scenarios were established using traffic forecasts established in the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* (Sabra, Wang & Associates, August 2014). Design year 2025 scenarios with both the existing roadway geometry and proposed roadway improvements for all three parking structure alternatives were evaluated.

Based on *Synchro* (HCM methodologies) analyses, all study intersections except for the MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane intersections are projected to operate at level of service (LOS) 'F' with future 2025 conditions without the expansion of the Ten Oaks Parking Lot (and without an event at the Ten Oaks Ballroom). With 2025 conditions with all three parking lot expansion alternatives and with vehicles departing from an event at the Ten Oaks Ballroom, all study intersections will operate at LOS 'F' under the build condition during the PM peak hour except the MD 108 at Auto Drive/Signal Bell Lane intersection, which will operate at LOS 'E', 'D', and 'C' with Alternative A, Alternative B, and Alternative C parking structures, respectively.

With the proposed roadway improvements, the MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'D', 'D', and 'C' during the PM peak hour under future build conditions with the Alternative A, Alternative B, and Alternative C parking structures, respectively, and a Ten Oaks Ballroom event. Additionally, operations at the existing unsignalized intersections along Great Star Drive at Daybreak Circle (east) and Signal Bell Road/Daybreak Circle (west) during build conditions are projected to improve as compared to existing conditions (if a traffic signal is installed at Great Star Drive at Daybreak Circle (east) and channelization is constructed at Great Star Drive at Signal Bell Road/Daybreak Circle (west) in the future).

Constructing additional travel lanes along MD 108 to improve capacity as recommended as part of the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* study was also evaluated; however, the MD 108 at Ten Oaks Road, MD 108 at eastbound MD 32 ramps, MD 108 at westbound MD 32 ramps, and MD 108 at Great Star Drive intersections are still projected to operate at LOS 'F' with these improvements under the future build scenarios except for the MD 108 at Ten Oaks Road intersection with the Alternative C parking structure. Based on the capacity constraints, constructing a third eastbound Ten Oaks Road left-turn lane at MD 108 was also considered since three receiving lanes will be provided along MD 108 with the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* improvements. This improvement will result in the MD 108 at Ten Oaks Road intersection operating at LOS 'D' and 'E' during the AM and PM peak hours, respectively, with all three parking structure alternatives. While widening MD 108 at the MD 32 interchange would increase capacity and improve LOS, this improvement would require widening of the MD 108 bridge over MD 32 and is beyond the scope of this study.

Based on discussions with Howard County Department of Public Works and Fifth District Volunteer Fire Department, pursing construction of a single-story parking deck structure (i.e., Alternative C) and maintaining the Park and Ride is recommended for both financial and aesthetic reasons, which would provide 302 parking spaces on the property. While Alternative C was conceived as a single-story deck with an off-structure ramp, the County stated a preference for a two-level garage that could be expanded to three stories if parking demand and funding made future expansion reasonable. While traffic generated by this option (Alternative C-1) would be similar to Alternative C, the garage layout would be similar to

Alternative A. Additionally, widening the westbound Signal Bell Lane approach to MD 108 to provide a left-turn lane, shared left-turn/through lane, and a right-turn lane, modifying the signal phasing on the eastbound Auto Drive and westbound Signal Bell Lane approaches to MD 108 from concurrent phasing with permissive left turns to split phasing, and constructing channelization to permit right-in/right-out/left-in only operations on the south leg of the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection is recommended.

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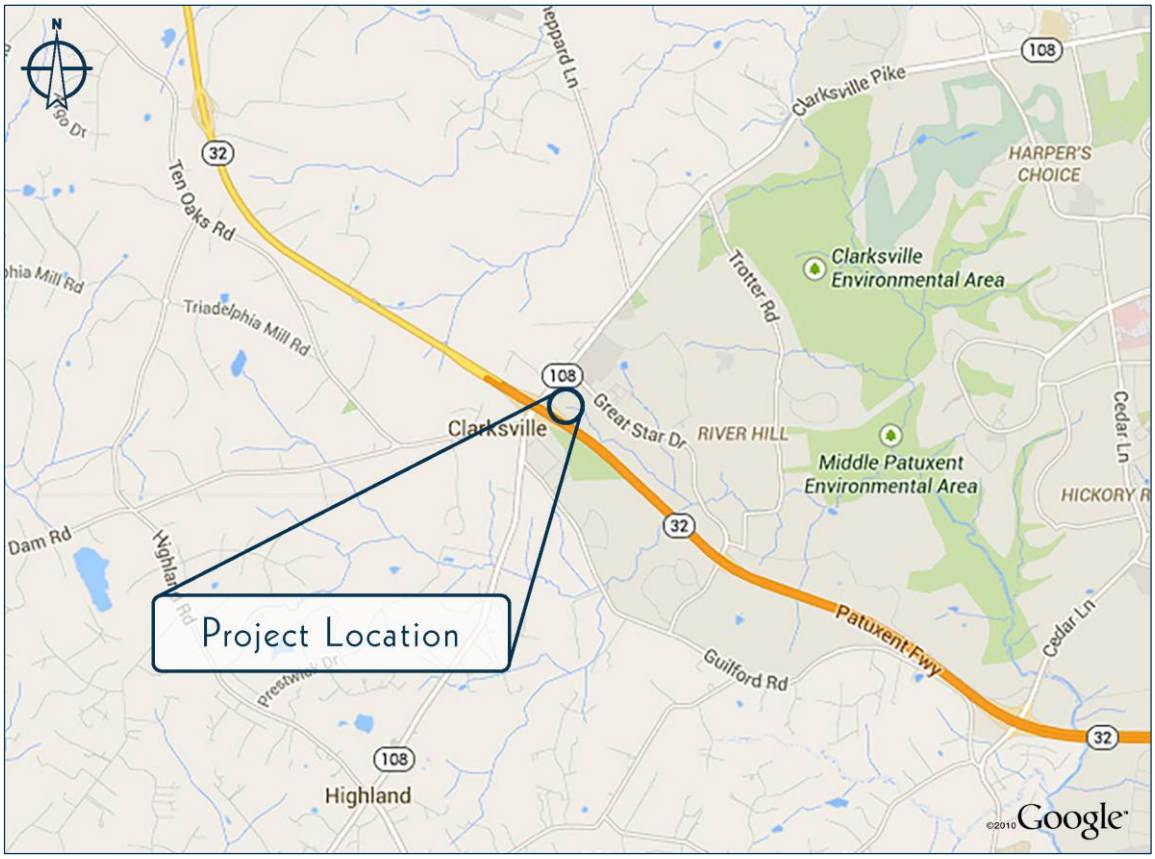
I. INTRODUCTION

Howard County requested that Whitman, Requardt & Associates, LLP (WR&A) conduct observations of the parking lot located on the southeast corner of the MD 108 (Clarksville Pike) at Auto Drive/Signal Bell Lane intersection in Clarksville, Maryland (see **Figure 1**) to identify existing and latent parking demand and evaluate options to provide additional parking. Currently, the Ten Oaks Parking Lot provides parking for Park and Ride patrons using MTA Commuter Route 335, vanpools, and carpools; Ten Oaks Ballroom patrons; and Fifth District Volunteer Fire Department staff and visitors. This study was conducted to identify the existing parking demand; project future parking demand; evaluate the traffic impacts associated with parking lot expansion, including analyses of existing and future traffic volumes; and recommend traffic mitigation improvements.

For the purposes of this study, MD 108 (Clarksville Pike) is assumed to run in a north-south direction and MD 32, Auto Drive/Signal Bell Lane, and Great Star Drive are assumed to run in an east-west direction. Additionally, the parking lot located on the southeast corner of the MD 108 at Auto Drive/Signal Bell Lane intersection will be referred to as the Ten Oaks Parking Lot; however, the lot includes parking for the Clarksville Park and Ride, Ten Oaks Ballroom, and the Fifth District Volunteer Fire Department.

Figure 1 – Site Location Map



RELEVANT STUDIES

To evaluate traffic mitigation options associated with future developments (including the former Gateway School property located west of MD 108 between Great Star Drive and Clarksville Square), a traffic study was completed in June 2012. The study, by Sabra, Wang & Associates, proposed installing traffic signals (with crosswalks) at MD 108 at Linden Linthicum Lane and MD 108 at Clarksville Square. The study recommended that MD 108 at the proposed Gateway Site driveway (located north of Great Star Drive) operate as a right-in/right-out intersection. Additional recommendations included widening MD 108 between Linden Linthicum Lane and Sheppard Lane to provide two travel lanes per direction, modifying the existing two-way center left-turn lane along MD 108 between Great Star Drive and Clarksville Square to allow northbound left-turns only at Clarksville Square, constructing an additional through lane along southbound MD 108 between Clarksville Square and Great Star Drive, and realigning the mainline left-turn lanes at MD 108 at Great Star Drive.

An August 2013, the *Clarksville Parking Garage Study* completed by Arris, a Design Studio, Inc. identified three parking garage layout options (by Walker Parking Consultants) to increase parking capacity at the Ten Oaks Parking Lot. Their study recommended a four-level parking garage structure (i.e., three supported levels above grade) with 344 to 582 parking spaces. Additionally, the study recommended performing a traffic engineering study to evaluate the impacts to adjacent roadways and intersections, specifically MD 108 at Signal Bell Lane.

Additionally, the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* along MD 108 from Guilford Road to Meadow Vista Way/Trotter Road was completed in August 2014. The study, performed by Sabra, Wang & Associates, recommended short-term improvements to address deficiencies to existing pedestrian and bicycle facilities. Long-term improvements include constructing an additional lane on southbound MD 108 between eastbound MD 32 ramps and Ten Oaks Road, widening the east side of MD 108 (i.e., along northbound MD 108) between Guilford Road and the eastbound MD 32 ramps, constructing medians along MD 108 from the westbound MD 32 ramps to Broad Meadow Lane to restrict turning movements from driveways, widening MD 108 between Linden Linthicum Lane and Sheppard Lane, and constructing sidewalk and/or a multi-use path. Additionally, the report recommends constructing sidewalk connections along both sides of MD 108 to provide continuous sidewalk along both sides of MD 108 from the MD 32 overpass to Linden Linthicum Lane, and bike lanes along Great Star Drive east of MD 108.

The *River Hill Village Center Community Plan* (December 2013) identified potential solutions to address traffic operational and safety issues at several of intersections located within the study area of this report. A summary of these potential solutions are summarized below by location.

- Great Star Drive at Signal Bell Lane/Daybreak Circle (west) – Consider modifying the intersection to provide left-in/right-in/right-out operations on the south leg and/or restricting the eastbound Great Star Drive left-turn movement onto Daybreak Circle (east).
- Great Star Drive at Daybreak Circle (east) - Consider installing a traffic signal or modern roundabout at the intersection.

- MD 108 at Great Star Drive – Improve pedestrian accommodations at the intersection and consider eliminating the existing two-way left-turn lane along MD 108 north of Great Star Drive and constructing designated left-turn lanes.
- MD 108, Auto Drive/Signal Bell Lane to Linden Linthicum Lane – Consider consolidating driveways, installing a pedestrian-activated hybrid beacon across MD 108 north of Great Star Drive, and constructing sidewalks along MD 108.
- Ten Oaks Parking Lot – Improve bicycle and pedestrian facilities, consider constructing a parking garage, and improve Park and Ride options.

II. EXISTING CONDITIONS

SITE DESCRIPTION

The Ten Oaks Parking Lot is located in Clarksville, Maryland on the southeast corner of the MD 108 at Auto Drive/Signal Bell Lane intersection (see **Figure 1**). The study parking lot is rectangular in shape and is bounded by MD 32 to the south, MD 108 to the west, and Signal Bell Lane to the north. The site is zoned B-2 (Office/Commercial), with dual ownership; portions of the lot are owned by Howard County, and portions are owned by the Fifth District Volunteer Fire Department. The Fifth District Volunteer Fire Department's station and offices and the Ten Oaks Ballroom building are located on the property. As shown in **Figure 2**, there are currently 204 total parking spaces provided for shared use by event patrons and staff for the Tens Oaks Ballroom and Clarksville Park and Ride users. Existing parking for the fire department (i.e., 32 parking spaces) is provided immediately adjacent to the fire department building in a designated area separate from the rest of the parking lot provided for the Ballroom and Park and Ride. The existing MTA bus stop for the Clarksville Park and Ride (serving commuter bus line 335) is located in front of the Ten Oaks Ballroom entrance as shown in **Figure 2**.

Figure 2 – Ten Oaks Parking Lot Existing Layout

The site is served by electric, telephone, natural gas, public water, and public sewer connections. The location of existing utilities as identified from record drawings and site visits can be found in Appendix B. No utility designation or subsurface exploration of utilities was performed. Stormwater Management for the property is currently provided by a stormcepter device located at the east end of the property. A drainage ditch runs parallel to the MD 32 westbound off-ramp, along the rear access drive to the fire department garage. A storm drain crosses the northwest corner of the Ten Oaks Ballroom parking lot.

In November 2014, a site assessment was conducted to note key environmental concerns on the Fifth District Volunteer Fire Department property and the immediately adjacent Columbia Association open space property to the east. General drainage of the property flows to two stormwater outfalls located along the southeast corner of the parcel. These two outfalls have eroded away at the soils in the area and created deeply incised stream bank/beds. While the outfalls started as ephemeral channels they quickly started to exhibit characteristics typical of intermittent streams, which may be deemed as "jurisdictional" by the Maryland Department of the Environment's (MDE) Waterways Division and the US Army Corps of Engineers (USACE). The forest in this area is an early successional green ash (Fraxinus pennsylvanica), black cherry (Prunus serotina), black locust (Robinia pseudoacacia), and red maple (Acer rubrum) dominant forest. The forest stand has a percentage of invasive species the most prevalent being Japanese honeysuckle (Lonicera japonica) and Napalese Browntop (Microstegium vimineum). This forest stand has a significant amount of dead standing trees and fallen woody debris.

STUDY AREA

MD 108 (Clarksville Pike) from Ten Oaks Road to Linden Linthicum Lane (i.e., north of the study area) is a four-lane roadway and is classified as minor arterial. A center two-way left turn lane is provided along MD 108 from Auto Drive/Signal Bell Lane to Linden Linthicum Lane. The posted speed limit on northbound and southbound MD 108 is 35 miles per hour within the study area. According to SHA's *Internet Traffic Monitoring System* (I-TMS), the 2013 AADT and AAWDT along MD 108 is approximately 19,300 and 20,800, respectively.

Signal Bell Lane is a two-lane roadway that extends from the MD 108 at Auto Drive/Signal Bell Lane intersection to the Great Star Drive at Signal Bell Lane intersection. Signal Bell Lane provides access to the Ten Oaks Ballroom and Fifth District Volunteer Fire Department, Riverhill Station Center, and a Sunoco gas and auto mechanic station. No posted speed limit is provided along Signal Bell Lane.

Great Star Drive is a two-lane roadway with center left-turn lanes from MD 108 to Gate Keeper Lane. The posted speed limit on eastbound and westbound Great Star Drive is 35 miles per hour within the study area. Great Star Drive provides access to the River Hill Shopping Center, Fieldstone condominiums, and Summerfield at River Hill condominiums within the study area. Additionally, several other residential communities are located further east along Great Star Drive. Great Star Drive extends from MD 108 to Guilford Road (a partial interchange is provided at Great Star Drive at MD 32 east of the MD 108 at MD 32 interchange). The partial interchange serves westbound MD 32 off-ramp traffic to Great Star Drive and eastbound on-ramp traffic from Great Star Drive. Unsignalized crosswalks are provided across Great Star Drive approximately 200 feet east of Signal Bell Lane/Daybreak Circle (west) and 200 feet east of Daybreak Circle (east).

Five signalized intersections along MD 108 and two unsignalized intersections along Great Star Drive are included as part of this study (see **Figure 3**). The signalized intersections along MD 108 within the study area operate actuated/coordinated. A brief description of the lane configurations and traffic operations at each intersection is provided below. The lane configurations associated with each of the study intersections is shown in **Figure 4**.

- ***MD 108 at Ten Oaks Road*** is a signalized intersection located just south of MD 32. Due to the horizontal curve located along MD 108 at Ten Oaks Road, the eastbound Ten Oaks Road approach intersects MD 108 at a skew. The driveway serving the Exxon gas station located along the east side of MD 108 forms the westbound approach to the signal (vehicle detection is provided on the approach). The intersection operates with concurrent phasing and permissive left turns on the northbound and southbound MD 108 approaches and split phasing on the eastbound Ten Oaks Road and westbound Exxon driveway approaches. The northbound MD 108 approach includes an 80-foot left-turn lane and a shared through/right-turn lane (the northbound stop lines are set back to allow ingress/egress movements at the northernmost driveway for the Oral and Maxillofacial Surgery Dental Implant Center located just south of the Exxon.) The southbound MD 108 approach includes shared through/left-turn lane and a separate right-turn lane. The eastbound Ten Oaks Road approach includes a left-turn lane, shared left-turn/through lane, and a right-turn lane (a painted channelizing island and stop line are provided). No lane markings are provided on the westbound Exxon driveway approach; however, the approach operates as a single shared left-turn/through/right-turn lane.

- ***MD 108 at Eastbound MD 32 Ramps*** is a four-legged, signalized intersection. The intersection operates with protected/permissive left-turn phasing (with flashing red arrow indications) on the southbound MD 108 approach. The northbound MD 108 approach includes a shared through/right-turn lane and a separate right-turn lane (tubular markers delineate the right-turn lane). The southbound MD 108 approach includes a 325-foot left-turn lane and two through lanes. The eastbound MD 32 off-ramp approach includes a left-turn lane and a shared left-turn/through/right-turn lane. The east leg of the intersection serves as the eastbound MD 32 on-ramp from MD 108 and is one-way away from the intersection. Crosswalks are provided across the north, east, and west legs of the intersection.

- ***MD 108 at Westbound MD 32 Ramps*** is a four-legged, signalized intersection. The intersection operates with protected/permissive left-turn phasing on the northbound MD 108 approach. The northbound MD 108 approach includes a 325-foot left-turn lane and two through lanes. The southbound MD 108 approach includes a through lane and a shared through/right-turn lane. The westbound MD 32 off-ramp approach includes a left-turn lane, shared left-turn/through lane, and a right-turn lane. Westbound right turns on red are prohibited via signage. The west leg of the intersection serves as the westbound MD 32 on-ramp from MD 108 and is one-way away from the intersection.

- ***MD 108 at Auto Drive/Signal Bell Lane*** is a four-legged, signalized intersection. The intersection operates with protected/permissive left-turn phasing on the northbound and southbound MD 108 approaches and concurrent phasing with permissive left turns on the eastbound Auto Drive and westbound Signal Bell Lane approaches. The northbound and southbound approaches include a left-turn lane, through lane, and shared through/right-turn lane. The eastbound Auto Drive approach includes a shared left-turn/through lane and a right-turn lane. Lane use pavement markings are not provided on the east leg; however, the westbound Signal Bell Lane approach generally operates as a left-turn lane and a shared through/right-turn lane. Based on queuing and lane-usage observations performed during the AM and PM peak hours in November 2014, the westbound Signal Bell Lane approach to MD 108 operates as a left-turn lane and a 75-foot shared through/right-turn lane (a left-turn queue greater than 4 vehicles blocks right-turning vehicles; however, this infrequently occurs during non-event departure periods). Crosswalks are provided across the west and south legs of the intersection.

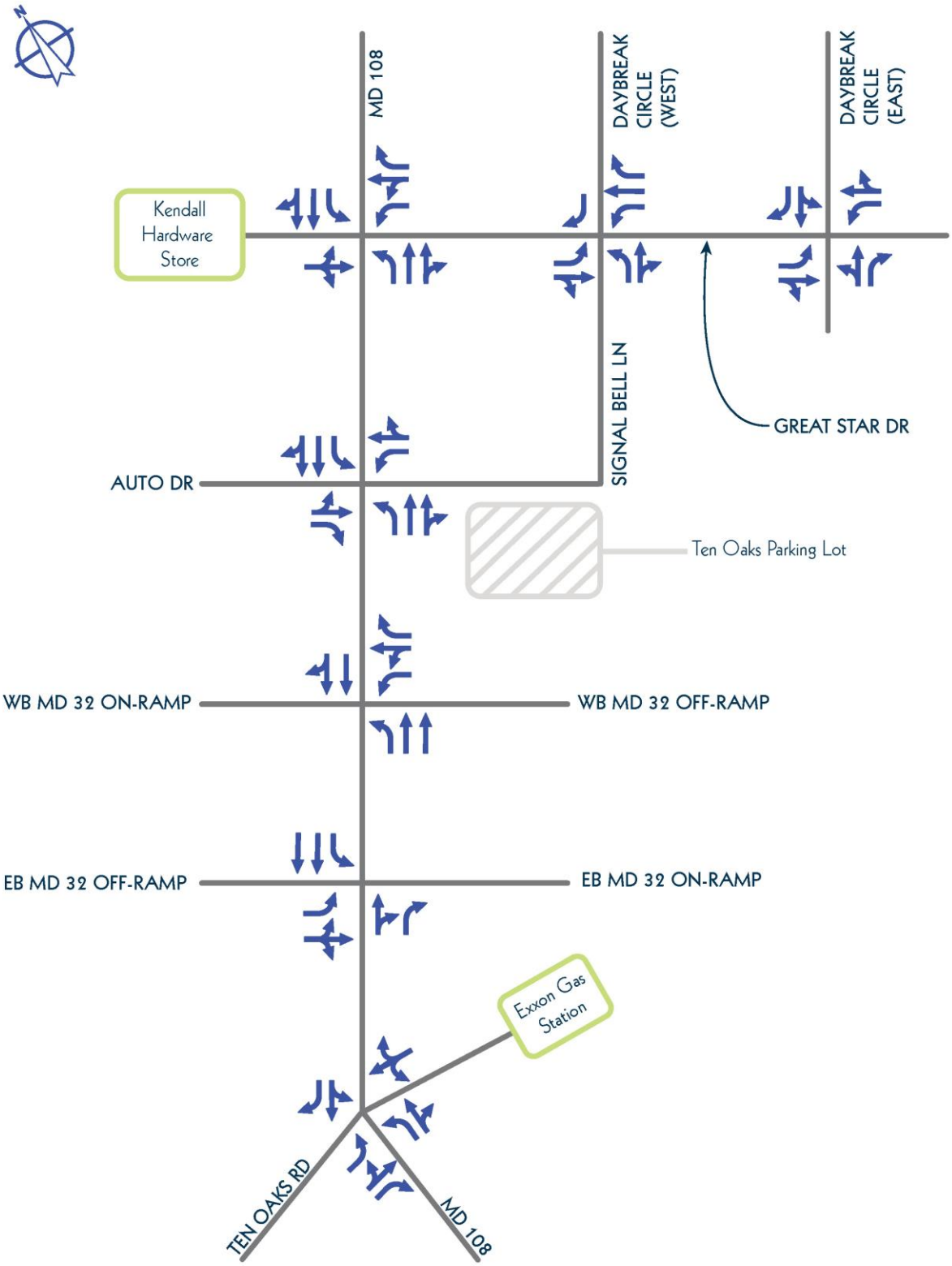
- ***MD 108 at Great Star Drive*** is a four-legged, signalized intersection. The intersection operates with protected/permissive left-turn phasing on the northbound and southbound MD 108 approaches and split phasing on the eastbound Kendall Hardware driveway and westbound Great Star Drive approaches. The northbound and southbound approaches include a left-turn lane, through lane, and a shared through/right-turn lane. The eastbound approach includes a single shared left-turn/through/right-turn lane. The westbound approach includes a left-turn lane, shared left-turn/through lane, and a right-turn lane. Crosswalks are provided across the north and east legs of the intersection.

- ***Great Star Drive at Signal Bell Lane/Daybreak Circle (west)*** is a four-legged, unsignalized intersection. The intersection operates under stop control (with STOP signs) on the northbound Signal Bell Lane and southbound Daybreak Circle (west) approaches. The northbound Signal Bell Lane approach includes a left-turn lane and a 150-foot through/right-turn lane. The southbound Daybreak Circle (west) approach includes a channelized right-turn lane (through and left-turning movements are prohibited). The eastbound Great Star Drive approach includes a 105-foot left-turn lane and a shared through/right-turn lane (the shared lane is approximately 20 feet wide; therefore, through and right-turning vehicles generally form separate lanes). The westbound Great Star Drive approach includes a 140-foot left-turn lane and a shared through/right-turn lane (the lane is approximately 19 feet wide; therefore, through and right-turning vehicles generally form separate lanes). Crosswalks are provided across the north and south legs of the intersection.

- ***Great Star Drive at Daybreak Circle (east)*** is a four-legged, unsignalized intersection. The intersection operates under stop control (with STOP signs) on the northbound and southbound Daybreak Circle (east) approaches. The south leg of the intersection serves Fieldstone condominiums. The eastbound and westbound Great Star Drive approaches include a left-turn lane (150 and 115 feet in length, respectively) and a shared through/right-turn lane. No lane use pavement markings are provided on the northbound and southbound approaches; however, both approaches operate as a shared left-turn/through lane and a right-turn lane. A crosswalk is provided across the north leg.

Figure 3 – Study Area and Study Intersections

Figure 4 – Existing Lane Configurations



EXISTING TRAFFIC VOLUMES

Turning movement counts at the MD 108 at Ten Oaks Road, MD 108 at the eastbound MD 32 ramps, MD 108 at the westbound MD 32 ramps, and MD 108 at Great Star Drive intersections were obtained from SHA's *Internet Traffic Monitoring System* (counts were performed in December 2012). Additionally, turning movement counts were performed from 6:00 AM to 9:00 AM, 11:00 AM to 1:00 PM, and 3:00 PM to 7:00 PM on Tuesday, September 9, 2014 at the MD 108 at Auto Drive/Signal Bell Lane, Great Star Drive at Signal Bell Lane/Daybreak Circle (west), and Great Star Drive at Daybreak Circle (east) intersections. Turning movement counts at the study intersections were reviewed to identify consistent AM and PM peak hours 8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM, respectively. Balanced existing traffic volumes are shown in **Figure 5.**

PEAK HOUR OBSERVATIONS

The following peak hour observations were noted in November 2014.

AM PEAK HOUR

- Northbound MD 108 queues approaching Ten Oaks Road frequently extend beyond Wake Forest Road, occasionally extending to the upstream traffic signal at Guilford Road and do not consistently clear every cycle. Queues from the downstream signal at the MD 32 ramp intersections extend to Ten Oaks Road, reducing the effective capacity on the approach.

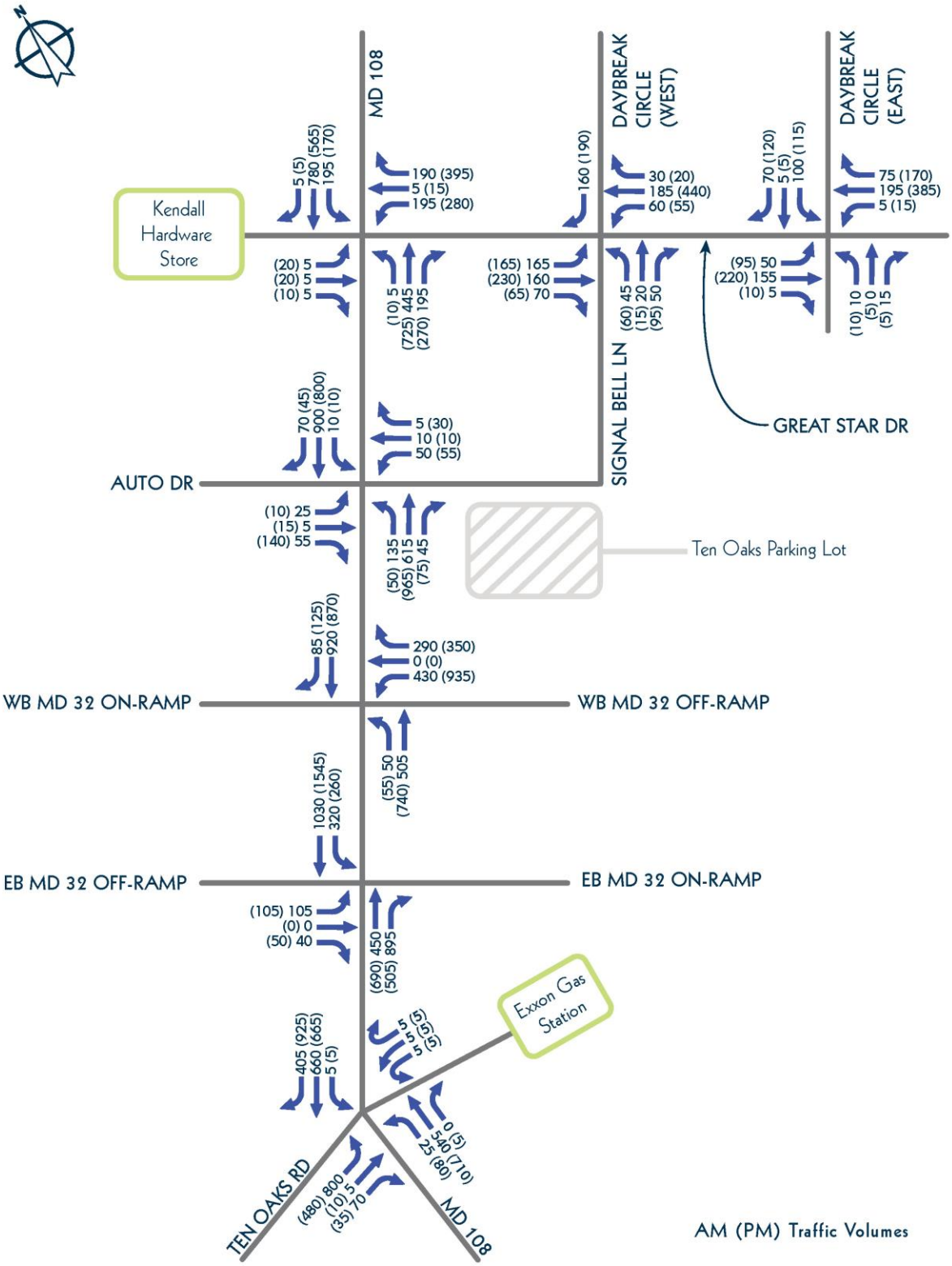
- Frequently, eastbound Ten Oaks Road queues approaching the MD 108 at Ten Oaks Road intersection extend beyond the right-turn lane and the start of the shared through/left-turn lane (located approximately 680 feet west of the signal) and often do not clear. Residual queuing occurs throughout the morning peak hour. A significant portion of eastbound Ten Oaks Road left-turning vehicles complete a subsequent northbound right turn onto the eastbound MD 32 on-ramp.

- Southbound MD 108 left-turn queues approaching the eastbound MD 32 ramps intersection frequently fill the available storage lane; however, queues clear every observed cycle.

- The southbound and westbound left-turning movements are heavy at the MD 108 at Great Star Drive intersection; however, all queues clear every observed cycle.

- Side street queues and delays at the Great Star Drive at Signal Bell Lane and Great Star Drive at Daybreak Circle unsignalized intersections are minimal.

Figure 5 – Existing Traffic Volumes



PM PEAK HOUR

- School dismissal between approximately 3:30 PM and 4:00 PM (i.e., prior to the PM peak hour) from the Saint Louis School (located along the west side of MD 108 south of Ten Oaks Road) generates a surge of traffic along the Ten Oaks Road and northbound MD 108 approaches to the MD 108 at Ten Oaks Road intersection; however, queues dissipate quickly.

- Similar to the morning peak hour, northbound MD 108 queues approaching Ten Oaks Road frequently extend beyond Wake Forest Road, occasionally extending to the upstream traffic signal at Guilford Road and do not consistently clear every cycle. Queues from the downstream signal at the MD 32 ramp intersections extend to Ten Oaks Road, reducing the effective capacity on the approach.

- Southbound MD 108 left-turn queues approaching the eastbound MD 32 ramps intersection frequently fill the available storage lane; however, queues clear every observed cycle.

- Southbound MD 108 rolling queues occasionally extend through the Auto Drive/Signal Bell Lane intersection.

- Westbound MD 32 off-ramp queues reach approximately 20 vehicles (however, queues do not extend onto MD 32 mainline). Occasionally, westbound left-turning vehicles extend through the intersection due to residual downstream queues along southbound MD 108; however, westbound left-turn queues clear every cycle.

- Westbound Great Star Drive left-turn queues occasionally extend beyond Signal Bell Lane/Daybreak Circle (west).

- Side street delays at the unsignalized intersections of Great Star Drive at Signal Bell Lane and Great Star Drive at Daybreak Circle (east) are relatively minimal; however, occasionally vehicles from Signal Bell Lane were observed turning through queues along Great Star Drive, creating the potential for conflict.

- Northbound MD 108 right-turning buses at Signal Bell Lane were observed crossing the center line along Signal Bell Lane to complete their turn. On one occasion, a stopped westbound left-turning vehicle temporarily shifted into the rightmost lane to allow space for a bus to turn.

EVENT OBSERVATIONS

The following event observations were obtained in September/October 2014.

- Ballroom staff direct patrons to double park and park along curbs (not using designated parking spaces) to increase the current capacity of the Ten Oaks Parking Lot (see **Photos 1 and 2)**

- Most vehicles departing the parking lot want to access MD 108 via the westbound Signal Bell Lane approach; however, queues and delays form quickly following an event, so motorists divert to northbound Signal Bell Lane to access Great Star Drive and MD 108.

- Westbound queues extend through the intersection at Signal Bell Lane at the Ten Oaks Parking Lot driveways, which obstructs northbound MD 108 right-turning vehicles onto Signal Bell Lane to turn onto Great Star Drive.

- Non-event motorists traveling along southbound/westbound Signal Bell Lane complete U-turns within the roadway to avoid anticipated delays at the MD 108 at Auto Drive/Signal Bell Lane intersection (see **Photo 3**).

- Westbound Signal Bell Lane left-turn queues occasionally queue within the MD 108 at Auto Drive/Signal Bell Lane intersection due to downstream queues on MD 108, reducing the effective capacity on the westbound Signal Bell Lane approach at MD 108 (see **Photo 4**).

- No event patrons were observed walking or bicycling to attend an event at the Ten Oaks Ballroom during all three observed events. During non-event observations performed for the Park and Ride usage, less than 5 pedestrians and/or bicyclists per day were observed using the Park and Ride lot; however, one group of approximately 20 to 25 bicyclists were observed using the Ten Oaks Parking Lot as a meeting location for a midday bicycle ride during observations performed on Thursday, October 16, 2014.

Photo 1 – Parking Along Curb in Ten Oaks Parking Lot

Photo 2 – Double Parking During Ten Oaks Ballroom Event

Photo 3 – Vehicles Completing U-turn on Signal Bell Lane

Photo 4 – Westbound Signal Bell Lane Left-turn Queues

CRASH HISTORY

Crash data from January 1, 2011 through December 31, 2013 for the MD 108 at Auto Drive/Signal Bell Lane intersection was obtained from *Maryland State Highway Administration's Office of Traffic and Safety*. Eight total crashes were reported during the three-year study period. Of the eight crashes, four (50 percent) crashes resulted in injuries and one (13 percent) crash occurred on wet roads. A summary of the crashes by type are listed below.

- 3 northbound left-turn crashes
- 2 southbound left-turn crashes
- 1 northbound/westbound angle crash
- 1 crash involving a northbound left-turning vehicle that struck a bicyclist on the northwest corner of the intersection
- 1 southbound rear end crash

Based on discussions with Howard County Police, two angle crashes involving northbound Signal Bell Lane vehicles and westbound Great Star Drive vehicles were reported at the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection during the most recent three-year period. There were no angle crashes reported at the Great Star Drive at Daybreak Circle (east) intersection during the same three-year period.

III. PARKING DEMAND

The Ten Oaks Parking Lot currently provides parking for Clarksville Park and Ride patrons (MTA Commuter Route 335, formal vanpools, and carpools), Ten Oaks Ballroom patrons, and Fifth District Volunteer Fire Department staff and visitors. Existing and projected parking demand for each of the three uses was evaluated separately to determine the overall parking demand for the parking lot. A discussion for each use is provided below.

TENS OAKS BALLROOM EVENTS PARKING DEMAND

To determine existing parking demand for Ten Oaks Ballroom events, WR&A personnel observed three separate events held at the Ten Oaks Ballroom during September/October 2014. The Ten Oaks Parking Lot serving the Park and Ride, Ten Oaks Ballroom, and Fifth District Volunteer Fire Department as well as nearby off-site parking lots used as overflow lots during events (i.e., River Hill Shopping Center, Riverhill Station, and Walgreens parking lots) were observed to determine existing parking usage. WR&A selected the Ten Oaks Ballroom events to observe based on discussions with Ballroom staff and caterers to identify larger events. A brief description of each observed event is provided below.

- **Friday, September 9, 2014** – This is a regular awards event held by Howard County and accommodated patrons generally familiar with the existing parking deficiencies. Patrons were advised in advance of the event to carpool and park in the River Hill Shopping Center parking lots located north of Great Star Drive, if overflow parking is needed. Based on conversations with Ballroom staff, approximately 400 patrons attended the banquet-style event.
- **Friday, October 17, 2014** – This all-day statewide occupational therapy professionals' conference included a mix of patrons with and without prior knowledge of the existing parking deficiencies. Based on discussions with some of the patrons, they were encouraged in advance of the event to carpool and park in the River Hill Shopping Center parking lots located north of Great Star Drive, if needed. According to a conference representative, 223 patrons attended the conference.
- **Wednesday, October 22, 2014** – Many of the patrons attending this all-day health professionals' seminar were first-time visitors to the Ten Oaks Ballroom. Based on discussions with several patrons, they were not encouraged in advance to carpool and park at the River Hill Shopping Center parking lots, unlike the first two observed events. Approximately 50 vehicles were observed entering the Ten Oaks Parking Lot, circling the lot, and departing to off-site parking when they were unable to find parking at the Ballroom. Of the three observed events, this was the only event where patrons were observed parking in the Riverhill Station Center parking lot (5005 Signal Bell Lane; signs are posted to discourage the use of this lot for overflow parking). This may be attributed to the lack of advance parking information to some patrons and/or the desire to park as close as possible to the Ballroom due to rainy weather conditions during the event arrival time.

A summary of parking demand rates for the three observed events is shown in **Table 1**. As shown, the observed parking demand rates ranged from 0.63 to 0.85 vehicles per patron. For comparison purposes, the parking demand rate for banquet/meeting rooms and convention facilities is 0.50 vehicles per patron according to *Shared Parking* by the Urban Land Institute. Additionally, the Institute of Transportation

Engineers' (ITE) *Transportation Planning Handbook, 3rd edition*, provides a summary of parking demand rates for various studies performed for convention centers throughout the United States. Parking demand rates from these studies ranged from 0.40 to 0.71 vehicles per person. It should be noted that this data range includes both national and regional events. National events would be expected to have a lower parking demand than local events where patrons drive and park for the day. The average (i.e., 0.74 vehicles per patron) and maximum (i.e., 0.85 vehicles per patron) observed parking demand rates are relatively conservative compared to industry standards.

Table 1 – Ten Oaks Ballroom Event Parking Demand Rate Summary

Date	Event Description	# of Vehicles			# of Patrons[1]	Parking Demand Rate (Average # of Vehicles/Patron)
		Ballroom Parking Lot	Off-Site Parking	Total		
Friday 9/5/14	Howard County Awards Banquet (with tables/chairs)	184	68	252	400[1]	0.63
Friday 10/17/14	Professional Conference (with tables/chairs)	188	1	189	223[2]	0.85
Wednesday 10/22/14	Professional Seminar (theater-style seating)	170	53	223	277[2]	0.81
Total of Three Observed Events		**542**	**122**	**664**	**900**	**0.74**
Urban Land Institute's *Shared Parking*						**0.50**
ITE's *Transportation Planning Handbook,* 3rd Edition						**0.40 – 0.71**

[1] The number of patrons is based on discussions with Putting on the Ritz Catering on guests that were expected
[2] The number of patrons is based on discussions with the event host on the actual number of registered patrons

PARK AND RIDE PARKING DEMAND

To determine existing parking demand for Park and Ride patrons, WR&A personnel observed operations at the Ten Oaks Parking Lot from 5:00 AM to 8:00 PM on Thursday, October 16, 2014 and from 5:00 to 9:30 AM and 3:30 to 8:00 PM on Wednesday, November 5, 2014. The October observations indicated relatively minimal parking fluctuations during the middle of the day; therefore, midday observations (i.e., from 9:30 AM to 3:30 PM) were not performed in November. During the November observations, a net change of one vehicle was noted at 9:30 AM (i.e., following morning observations) compared to at 3:30 PM (i.e., at the start of afternoon observations). WR&A selected Park and Ride observation dates based on discussions with Ballroom staff and caterers to ensure no events were held at the Ten Oaks Ballroom (i.e., Park and Ride occupancy would not be limited due to Ten Oaks Ballroom event parking).

On both days, the maximum number of occupied parking spaces observed was 90 parking spaces. Maryland Transit Administration (MTA) indicated that, from 2007 to 2014, the average daily ridership for the commuter bus was 60 trips. It should also be noted that there are no current plans to expand or increase bus service in the next ten years, based on recent conversations with MTA.

FIFTH DISTRICT VOLUNTEER FIRE DEPARTMENT PARKING DEMAND

Existing parking demand for the Fifth District Volunteer Fire Department was noted during the five days of observations performed at the Ten Oaks Parking Lot (i.e., three Ballroom event days and two non-event days to monitor Park and Ride occupancy). Fire department personnel were observed parking within a designated (signed) area within the property, immediately adjacent to the fire department. During all observations, non-fire department personnel did not park within this designated area (32 parking spaces are provided in the designated area). Based on discussions with Mr. Patrick Marlatt, Fire Chief for the Fifth District Volunteer Fire Department, the existing number of parking spaces adequately meets the existing and near-term future demands of the fire department.

TOTAL PARKING DEMAND

When determining the amount of parking spaces that are needed for a specific facility, it may be desirable to provide additional excess capacity to accommodate fluctuations in parking demand and to avoid the perception that parking supply is inadequate (i.e., motorists experiencing difficulty in locating the last few empty spaces). According to *The Dimensions of Parking, fifth edition*, "a parking facility operates most efficiently when occupancy is somewhere between 85 and 95 percent." These percentages are known as effective supply factors. Based on discussions with Ballroom personnel, some clients have chosen to not return to the facility due to parking issues that occurred during their last event; therefore, providing adequate parking spaces onsite in the future is desirable and critical to the long-term success of the Ballroom. Therefore, a 90-percent effective supply factor has been applied for the purposes of this study.

The Ten Oaks Ballroom can currently accommodate 400 patrons for a banquet-style event (with tables and chairs). However, the building can accommodate a maximum of 854 occupants in a theater-style seating event per the occupancy plaque posted in the Ballroom lobby. It should be noted that the Ballroom is planning to expand; however, based on conversations with Mr. Marlatt, the additional space will not increase capacity/occupancy of the building. **Table 2** shows the preliminary parking spaces required based on the number of event patrons at three levels (i.e., 400 patrons (low), 600 patrons (mid), and 854 patrons (high)) applying the average and maximum parking demand ratios and a 90-percent effective supply factor, as discussed above. Additionally, advantages and disadvantages of accommodating the low, mid, and high options are shown.

Table 2 – Ten Oaks Ballroom and Park and Ride Recommended Parking Spaces

Number of Event Patrons	Ten Oaks Ballroom Events[1]		Park & Ride Facility[1]	Total Number of Parking Spaces[2]	Benefits/Impacts
	Avg. Parking Demand Rate (0.74 patrons/veh)	Max. Parking Demand Rate (0.85 patrons/veh)			
400 (low)	329	378	100	429 – 478	✓ Lowest anticipated traffic impact ✓ Lowest anticipated cost ✗ Larger events not accommodated
600 (mid)	494	567	100	594 – 667	✓ Mid-level anticipated traffic impacts ✓ Mid-level anticipated cost ✗ The very largest events not accommodated
854 (high)	703	807	100	803 – 907	✓ Accommodates the largest events ✗ Largest anticipated traffic impacts ✗ Highest anticipated cost

[1] Assumes a 90-percent effective supply factor
[2] Does not include parking for the fire department, since their designated parking area is separate

IV. PARKING FACILITY ALTERNATIVES

Three different primary on-site parking alternatives have been developed to accommodate additional parking at the Ten Oaks Ballroom. The Ten Oaks parking lot is zoned B-2; according to Howard County zoning regulations, Section 119.0, for properties located within the Zoning District B-2 (Business: General), the minimum setback for parking uses is 10 feet from public street right-of-way. The B-2 Zoning regulations also state that the maximum height for structures shall be 40 feet, which limits the parking garage structures to a maximum of three above-grade levels.

The three parking garage layout options in the *Clarksville Parking Garage Study* completed by Arris have been evaluated and all three options were found to have the appropriate setbacks and structure heights as described above. Options 1 and 2 in the Arris Study restricts parking on the garage ramps and provides parking stalls on only level areas to maximize wayfinding and passive security. Arris Options 1 and 2 also use 90 degree, 9-foot wide, and 18-foot long parking stalls which comply with the dimensions provided in Appendix G in Volume III of the Howard County Design Manual. Option 3 in the Arris Study uses a combination of 60-degree, 70-degree, and 90-degree parking stalls and uses narrower drive aisles than in Options 1 and 2. Option 3 in the Arris Study also provides double-loaded parking on the ramps, which is not preferable for first-time guests to the Ballroom due to increased difficulty for wayfinding.

All three alternatives described below will require an existing 27-inch storm drain to be relocated along with an existing fire hydrant along MD 108. It is anticipated that, at a minimum, stormwater quality treatment for 50% of the existing and 100% of the net new impervious area within the project footprint of any alternative will be required in order to meet Howard County and MDE requirements. Due to the limited surface area available for on-site stormwater management facilities, it is anticipated that meeting the water quality requirements will necessitate implementation of a single, underground, structural facility such as a sand filter or proprietary cartridge-based system. It is anticipated that the underground facility will be located and connected to the

relocated 27-inch storm drain at the northeast corner of the site. Impacts to the adjacent water main at this location as a result of the underground stormwater management facility are not anticipated. The existing lighting within the parking lot will be impacted; however, no other existing utilities are located within the footprint of the proposed parking structures as shown in the Base Plan Sheet in Appendix B.

ALTERNATIVE A (614 PARKING SPACES)

Alternative A is a four-level parking garage structure similar to the preferred Option 1 in the *Clarksville Parking Garage Study* completed by Arris with a 10-foot setback from the existing right-of-way lines. Alternative A maximizes the number of parking spaces within the existing right-of-way while conforming to Howard County B-2 zoning regulations. The Alternative A parking structure is approximately 324-foot long by 162-foot wide and is oriented with the long side of the garage parallel to MD 108, as shown in Figure 6. The parking structure includes two elevators and two sets of stairs with the main stair and elevator tower located directly across from the ADA pedestrian ramp used to access the Ballroom. The vehicular exit and entrance into the garage is located just to the north of the main stair/elevator tower (as shown in Figure 6), which allows pedestrians to access the Ballroom without having to cross the main flow of traffic entering and exiting the parking garage. The maximum number of parking spaces that can be accommodated within the footprint of the Alternative A structure is 568 parking spaces. Fifteen (15) additional surface spaces, outside of the parking garage, can be added between the parking garage and the Ballroom to make a total of 583 proposed spaces in the western portion of the lot, for a net gain of 410 parking spaces. In addition to the 583 proposed spaces, there are 31 existing parking spaces located along the northeast side of the Ballroom; totaling 614 available on-site parking spaces for the Ten Oaks Ballroom under Alternative A. The estimated on-site cost of Alternative A is $12.5 million ($21,440/proposed space.) See Appendix E for an itemized conceptual cost estimate.

ALTERNATIVE B (419 PARKING SPACES)

Alternative B is a four-level parking garage structure similar to Option 2 in the *Clarksville Parking Garage Study* completed by Arris with a 30-foot setback from the existing right-of-way lines. The Alternative B parking structure is smaller than Alternative A, which creates opportunities for additional landscaping and stormwater management, as well as a less imposing structure as viewed from the public right-of-way. The Alternative B parking structure is approximately 276-foot long by 120-foot wide and is oriented with the long side of the garage parallel to MD 108 as shown in Figure 7. The parking structure includes two elevators and two sets of stairs with the main stair and elevator tower located directly across from the ADA pedestrian ramp used to access the Ballroom. The vehicular exit and entrance into the garage is located just to the north of the main stair/elevator tower (as shown in Figure 7), which allows pedestrians to access the Ballroom without having to cross the main flow of traffic entering and exiting the parking garage. The maximum number of parking spaces that can be accommodated within the footprint of the Alternative B structure is 345 parking spaces. On the ground floor of the parking garage, two exits can be established along the north side, which access 28 surface spaces along a one-way road around the perimeter of the garage. Fifteen (15) additional surface spaces, outside of the parking garage, can be added between the parking garage and the Ballroom to make a total of 388 proposed spaces and a net gain of 215 parking spaces. In addition to the 388 proposed spaces, there are 31 existing parking spaces located along the northeast side of the Ballroom; totaling 419 on-site available parking spaces for the Ten Oaks Ballroom

under Alternative B. The estimate on-site cost of Alternative B is $7.9 million ($20,360/ proposed space.) See Appendix E for an itemized conceptual cost estimate.

ALTERNATIVE C (302 PARKING SPACES)

Alternative C is a single story parking deck with a 10-foot setback from the existing right-of-way lines. A single story parking deck may provide a better fit with the surrounding buildings compared to the four-story parking structures in Alternatives A and B due to the lower building height. The construction duration of the Alternative C parking deck would be significantly shorter than Alternatives A and B and could be built in two stages. Half of the existing parking lot could remain open during the initial phase while the ramp up to the second level and half of the parking deck would be constructed. During the final phase of construction, the half of the parking deck that was constructed during the initial phase could be utilized for parking. The single story parking deck can accommodate 128 spaces. The ground level would remain relatively the same except for the south end of the existing parking lot, which would be used for the ramp up to the second level. The ground level parking lot would be resurfaced after the construction of the parking deck is complete. All of the ADA accessible spaces would be located on the ground level and pedestrians can access the Ballroom from the parking deck by use of two sets of stairs. The total number of proposed spaces is 271 with a net gain of 98 parking spaces. In addition to the 271 proposed spaces, there are 31 existing parking spaces located along the northeast side of the Ballroom; totaling 302 on-site available parking spaces for the Ten Oaks Ballroom under Alternative C. The estimated on-site cost of Alternative C is $4.5 million ($16,675/ proposed space.) See Appendix E for an itemized conceptual cost estimate. See Appendix F for a rendering of Alternative C.

ALTERNATIVE C-1 (317 PARKING SPACES)

Alternative C-1 is a one-level parking garage structure (one ground level and one elevated level) that is designed and built to accommodate an additional level or levels in the future. Under Alternative C-1, the structural elements, elevators shafts, and layout of the proposed parking structure will be designed and constructed to easily accommodate one or two additional parking levels in the future. The Alternative C-1 parking structure has the same layout and footprint as the Alternative A parking structure with a 10-foot setback from the existing right-of-way lines. See Figure 6 for the layout, footprint, and orientation of the Alternative A and C-1 parking structures. The maximum number of parking spaces that can be accommodated within the footprint of the Alternative C-1 structure is 271 parking spaces. Fifteen (15) additional surface spaces, outside of the parking garage, can be added between the parking garage and the Ballroom to make a total of 286 proposed spaces in the western portion of the lot, for a net gain of 113 parking spaces. In addition to the 286 proposed spaces, there are 31 existing parking spaces located along the northeast side of the Ballroom; totaling 317 available on-site parking spaces for the Ten Oaks Ballroom under Alternative C-1. The estimated on-site cost of Alternative C-1 is $6.7 million ($23,425/proposed space.) It was assumed that the unit cost per parking space on the first elevated level of the structure would be 20% higher than Alternative A due to the larger structural elements needed for future expansion of the parking garage. See Appendix E for an itemized conceptual cost estimate.

Table 3 – Parking Facility Alternative Summary

Parking Alternative	Total Proposed Spaces[1]	Total Ballroom Spaces[2]	Net Spaces Gained	Estimated Cost (Millions)	Estimated Cost per Prop. Space	Notes
Alternative A	583	614	410	$12.5	$21,440	Parking deck is three Levels above grade with a 10' setback from existing right-of-way to maximize the number of parking spaces
Alternative B	388	419	215	$7.9	$20,360	Parking deck is three Levels above grade with a 30' setback from existing right-of-way line
Alternative C	271	302	98	$4.5	$16,675	Single story parking deck with a 10' setback from existing right-of-way line
Alternative C-1	286	317	113	$6.7	$23,425	Parking deck is one level above grade but is designed and built to accommodate additional levels in the future – 10' setback from existing right-of-way line

[1] Number of parking spaces provided by the proposed parking structure
[2] Total number of parking spaces provided by the proposed parking structure AND 31 existing surface-level parking spaces located along the northeast side of the Ballroom

Figure 6 - Alternative A Concept

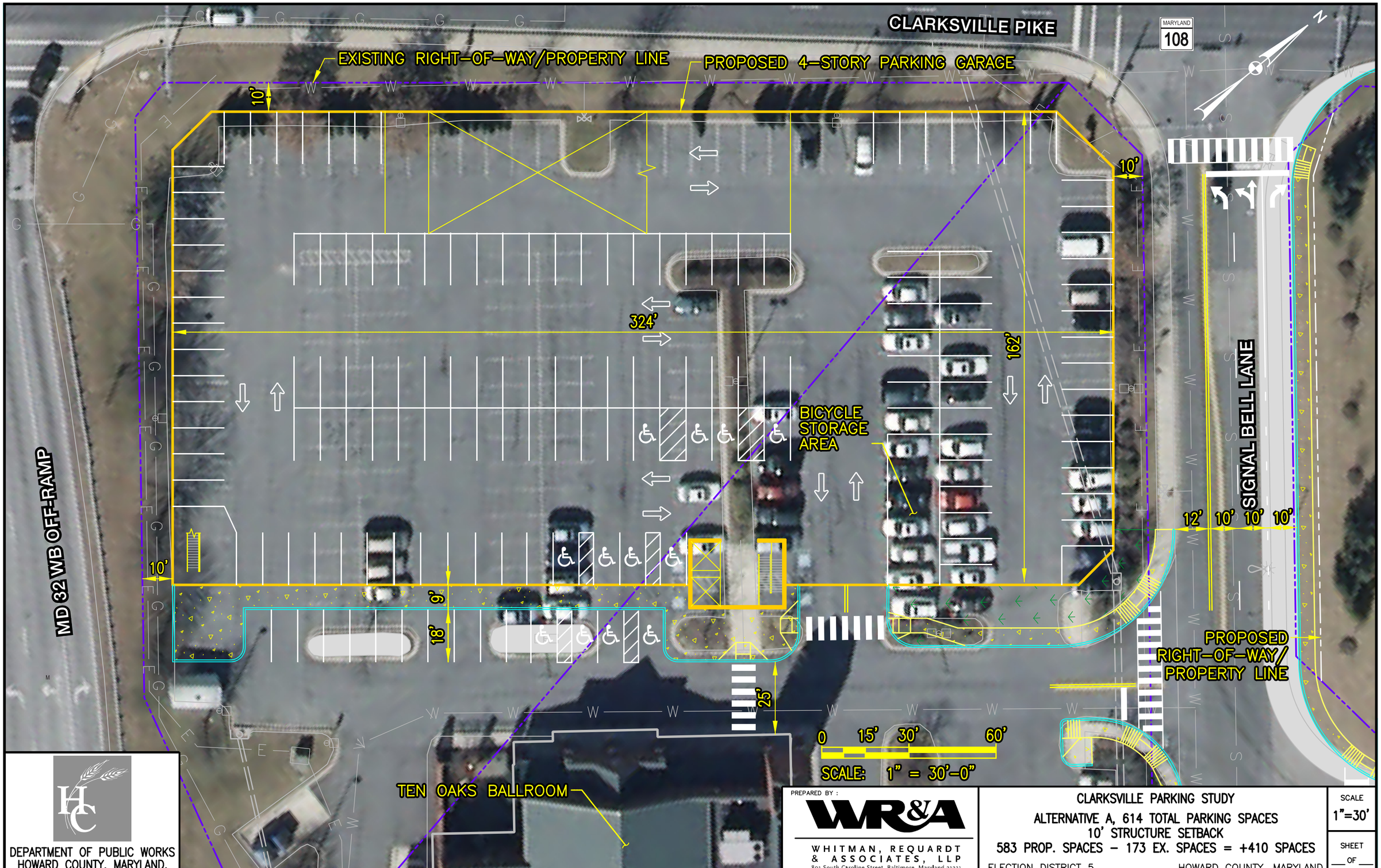


Figure 7 - Alternative B Concept

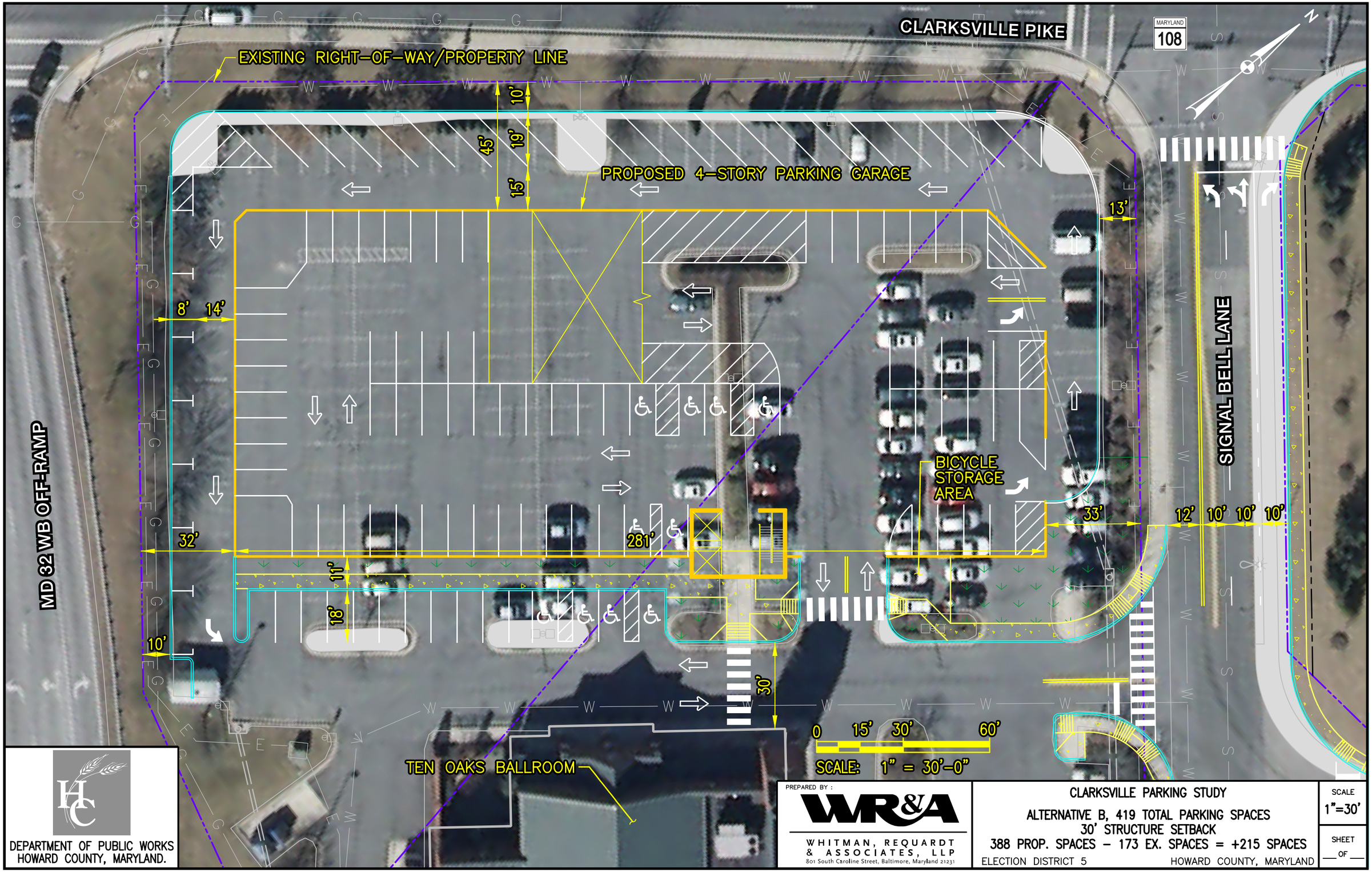
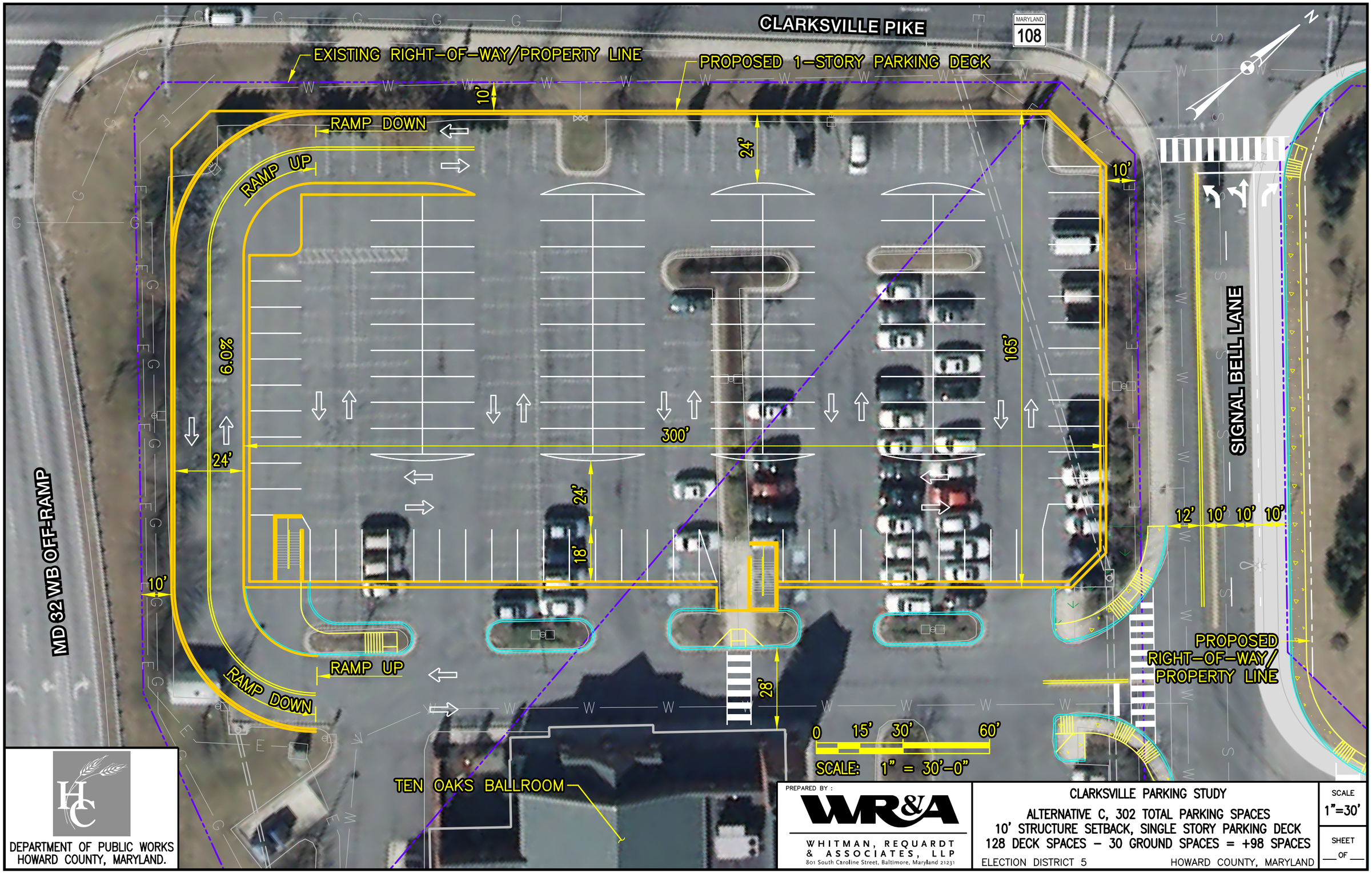


Figure 8 - Alternative C Concept



PARK AND RIDE RELOCATION

Given the physical constraints that restrict the expansion of the existing parking lot, consideration was given to relocating the park and ride function of the Ten Oaks Ballroom Parking Lot to one or more nearby locations. The parking observations indicated 90 spaces are currently used for the Park and Ride at the Ten Oaks Ballroom on weekdays; thus, a minimum of 100 spaces should be considered the appropriate size of a Park and Ride lot to accommodate existing demand. As previously discussed, discussions with MTA do not anticipate a significant increase in ridership in the next ten years. Relocation of the existing Park and Ride demand to another location would free those spaces for daytime events at the Ten Oaks Ballroom. Assuming the replacement spaces would be surface parking, the relocated spaces would be more economical than the additional on-site structured parking. As seen in **Table 4**, even implementing no improvements other than relocation of the Park and Ride would result in approximately doubling the available weekday daytime parking spaces available for events at the Ten Oaks Ballroom.

Table 4 – Parking Space Gain with Park and Ride Relocation

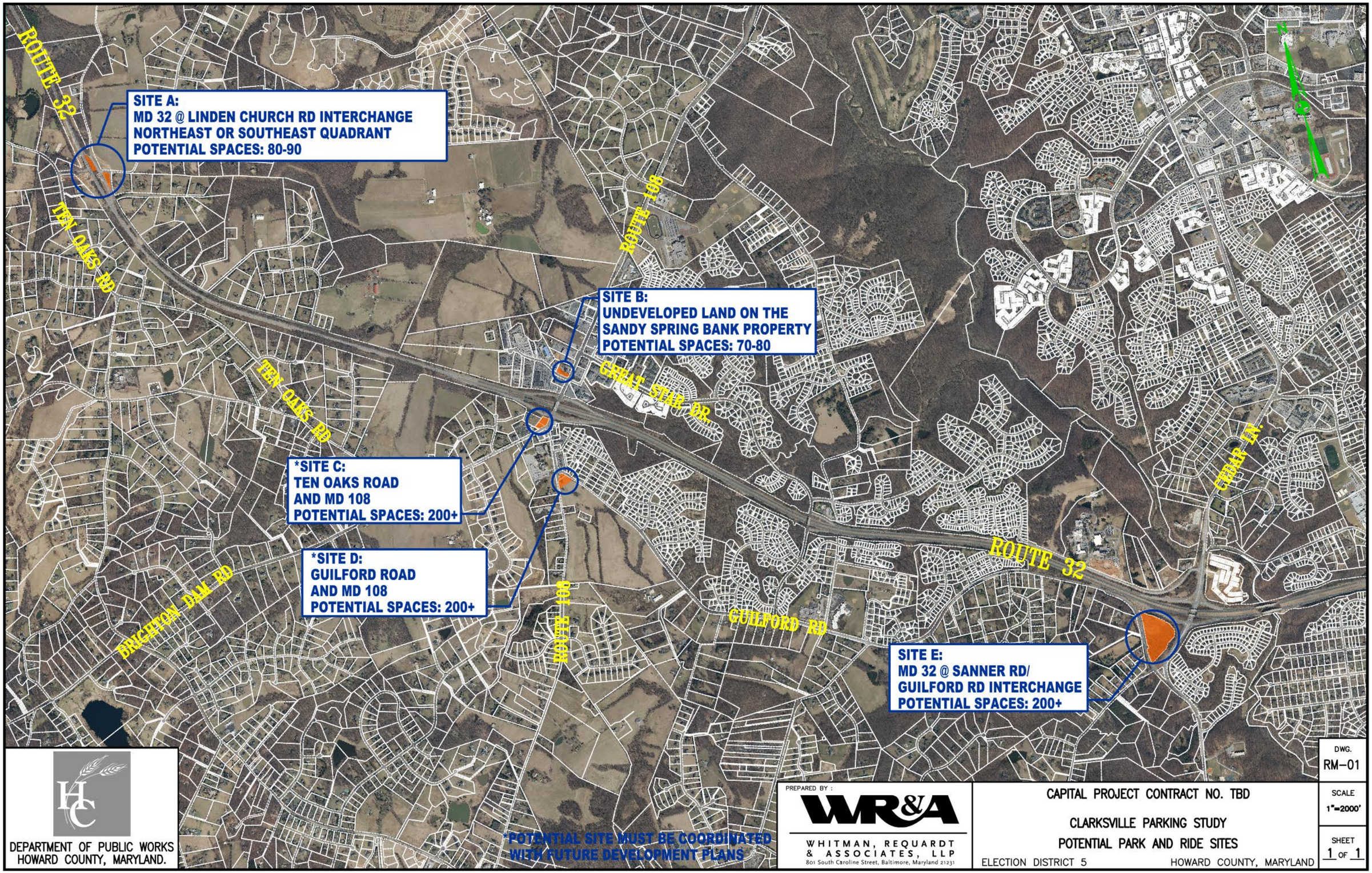
Parking Alternative	Total Public Lot Spaces	Parking Spaces with Park & Ride at Ten Oaks Ballroom			Parking Spaces with Relocated Park & Ride		
		Total Ballroom Spaces	Total Park & Ride Spaces	Net Ballroom Spaces Gained	Total Ballroom Spaces	Total Park & Ride Spaces	Net Ballroom Spaces Gained
Existing	204	114	90	--	204	0	90
Alternative A	614	524	90	410	614	0	500
Alternative B	419	329	90	215	419	0	305
Alternative C	302	212	90	98	302	0	188
Alternative C-1	318	228	90	114	318	0	204

Potential nearby locations are shown in **Figure 9**. Site observations indicate that few Park and Ride users arrive by a mode other than a single-passenger vehicle. A brief summary of considerations is included below in **Table 5**.

Table 5 – Park and Ride Potential Site Comparison

Location Option	Description	Potential Spaces	Remarks
Existing	Ten Oaks Ballroom	100	• Conflicts with Ten Oaks Ballroom use during events
Site A	MD 32 at Linden Church	80 - 90	• Larger lot may require acquisition of property • Smaller lot may be possible adjacent to northbound MD 32 off-ramp, within public right-of-way • Probable least-convenient replacement location
Site B	Sandy Spring Bank	70 - 80	• Privately-owned lot with mature trees • Convenient to existing location
Site C	Ten Oaks Road at MD 108	200+	• Property recently requested setback revision (J.A Ten Oaks, LLC, H16) • Would require coordination with development proposal • Convenient to existing location
Site D	Guilford Road at MD 108	200+	• Property recently held Presubmission Community Meeting (Hoddinott Property, R74) • Would require coordination with development proposal • Fairly convenient to existing location
Site E	MD 32 at Sanner Road	200+	• Publically-owned (SHA right-of-way) • Currently part of a Forest Conservation Easement • Less convenient for existing users

Figure 9 - Potential Park and Ride Sites



V. TRAFFIC ANALYSIS WITH EXISTING ROADWAY GEOMETRICS

As previously discussed, three parking expansion alternatives (low, mid, high) were identified for the Ten Oaks Parking Lot based on an evaluation of geometric, right-of-way, and zoning constraints and existing and projected parking demand. A maximum of 614, 429, and 302 parking spaces could be accommodated with Alternative A, Alternative B, and Alternative C parking structures, respectively. For the purposes of the traffic analyses associated with the proposed parking lot expansion, evaluating the capacity of the surrounding roadway network assumes that the parking lot would be 100 percent occupied for the Ballroom and Park and Ride. While not all events will fill the proposed parking capacity and have event arrivals and departures that overlap with the peak hours of the adjacent roadway network, evaluating these scenarios is a conservative approach. Based on observations, a review of industry standards, the assumed parking demand rate, and maintaining the current Park and Ride location, Alternative A would accommodate an event of approximately 605 to 695 patrons; Alternative B would accommodate an event of approximately 387 to 445 patrons; and Alternative C would accommodate an event of approximately 238 to 273 patrons.

Capacity analyses were performed at the seven study intersections to evaluate the impacts associated with the additional traffic generated by the expansion of the Ten Oaks Parking Lot and to identify the need for roadway improvements to mitigate any adverse traffic impacts. Existing, future no-build, and future build conditions were evaluated with existing roadway conditions. The assumed design year is 2025; therefore, the following scenarios were analyzed:

- Existing Conditions (i.e., without a Ten Oaks Ballroom event)
- 2025 No-Build Conditions (i.e., without a Ten Oaks Ballroom event)
- 2025 Build Conditions (i.e., with a Ten Oaks Ballroom event; Alternative A parking structure)
- 2025 Build Conditions (i.e., with a Ten Oaks Ballroom event; Alternative B parking structure)
- 2025 Build Conditions (i.e., with a Ten Oaks Ballroom event; Alternative C parking structure)

Capacity analyses using *Synchro 8* software (based on *Highway Capacity Manual (HCM)* methodologies) were performed to evaluate level of service (LOS), delays, and queue lengths for existing and future conditions at the seven study intersections. To be consistent with the other recent studies, *Synchro 8* files with existing signal timings developed by Sabra, Wang, & Associates for the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* were obtained. Lane configurations and signal phasing/timings were compared to existing field conditions. Turn lane lengths in the *Synchro 8* files were updated based on existing conditions, where needed. Existing peak hour factors (PHF) were used for Existing Conditions analysis and a 0.92 PHF was used for all future condition analyses, except where noted. Truck percentages were not included for all of the available turning movement counts at the study intersections. Based on the available data, a two-percent heavy vehicle percentage was applied to all intersections for the purposes of the traffic analyses. Existing signal timings in the *Synchro* files provided by *Sabra, Wang & Associates* were maintained for the existing condition analysis. Existing cycle lengths (i.e., 120 and 150 seconds during the AM and PM peak hours, respectively) were maintained for all future condition analyses (based on *Synchro*

optimization, longer cycle lengths were not recommended); however, signal splits and offsets were optimized using *Synchro* software.

Maryland State Highway Administration's (SHA) *Guidelines for Traffic Impact Reports/Studies* and the *Howard County Design Manual* require intersections to be analyzed using Critical Lane Volume (CLV) analyses. As such, CLV analyses were performed to supplement the *Synchro* (HCM methodologies) capacity analyses discussed throughout a majority of this study. CLV analyses are summarized in Section VIII – (Critical Lane Volume Traffic Analysis) of this report.

EXISTING CONDITIONS CAPACITY ANALYSIS

The *Synchro 8* files obtained from the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* study were updated with existing traffic volumes (see **Figure 5**) and peak hour factors. Existing signal timings provided in the *Synchro* 8 files from the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* were maintained for existing conditions analysis. A summary of delays, level of service (LOS), and 95th-percentile queue lengths for existing conditions and critical movements is shown in **Table 6**. As shown, the seven study intersections operate at LOS 'D' or better for both the AM and PM peak hours for existing conditions. The westbound Signal Bell Lane left-turning movement at MD 108 operates at LOS 'D' and 'E' during the AM and PM peak hours, respectively. However, several other left-turning movements throughout the study area operate at LOS 'F'. Eastbound Ten Oaks Road left-turn delays at MD 108 are approximately 87 and 66 seconds during the AM and PM peak hours, respectively. Southbound MD 108 left-turn delays at the eastbound MD 32 on-ramp are approximately 80 seconds during the AM peak hour. Northbound Signal Bell Lane left-turn delays onto Great Star Drive are approximately 51 and 365 seconds during the AM and PM peak hours, respectively. Southbound Daybreak Circle (east) left-turn delays onto Great Star Drive are approximately 96 seconds during the PM peak hour. All of these left-turning movements operate at LOS 'E' or 'F' under existing conditions.

Table 6 – Capacity Analysis Summary: Existing Conditions

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	36.1	D	EBL	87.4	F	552 ft[3] (675 ft observed)
	MD 108 at EB MD 32 Ramps	29.8	C	EBL	79.4	E	109 ft
				SBL	80.0	F	370 ft[3] (325 ft observed)
	MD 108 at WB MD 32 Ramps	21.3	C	WBL	32.6	C	220 ft
	MD 108 at Auto Drive/ Signal Bell Lane	13.1	B	WBL	49.9	D	66 ft
				SBL	4.3	A	5 ft[4]
	MD 108 at Great Star Drive	16.7	B	WBL	54.8	D	145 ft
				SBL	7.0	A	98 ft
	Great Star Drive at Signal Bell Lane	*Unsignalized*		EBL	8.3	A	12 ft
				WBL	8.0	A	4 ft
				NBL	50.8	F	58 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.0	A	3 ft
				SBL	15.3	C	34 ft
PM Peak	MD 108 at Ten Oaks Road	41.8	D	EBL	66.0	E	358 ft
	MD 108 at EB MD 32 Ramps	24.2	C	EBL	76.9	E	152 ft[3]
				SBL	72.2	E	333 ft
	MD 108 at WB MD 32 Ramps	31.0	C	WBL	51.1	D	652 ft[3] (600 ft observed)
	MD 108 at Auto Drive/ Signal Bell Lane	14.1	B	WBL	65.6	E	101 ft
				SBL	3.5	A	5 ft[4]
	MD 108 at Great Star Drive	44.2	D	WBL	73.1	E	252 ft[3] (250 ft observed)
				SBL	19.1	B	107 ft
	Great Star Drive at Signal Bell Lane	*Unsignalized*		EBL	9.3	A	16 ft
				WBL	8.2	A	5 ft
				NBL	364.6	F	193 ft (100 ft observed)
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	9.4	A	11 ft
				SBL	96.0	F	252 ft (100 ft observed)

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal

2025 NO-BUILD CONDITIONS

TRAFFIC VOLUMES (2025 No-Build Conditions)

Peak hour volumes for 2025 No-Build Conditions (i.e., without expansion of the Ten Oaks Parking Lot) were calculated by applying an annual growth rate to existing traffic volumes and adding new trips generated by proposed background developments (provided by Howard County). As part of the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)*, annual growth rates were extracted from the *Baltimore Metropolitan Council's* traffic demand model, indicating a 3.0 percent annual growth rate through 2016 followed by a 1.5 percent annual growth rate from 2016 through 2035. These growth rates were applied to all traffic volumes (mainline and side street approaches) at the seven study intersections to forecast 2025 traffic volumes.

New trips generated by the proposed developments within or adjacent to the study area were calculated using Institute of Transportation Engineers' (ITE) *Trip Generation Manual*. Additionally, ITE's *Trip Generation Handbook* was used to identify the number of pass-by trips for specific land uses. Pass-by trips are made as intermediate stops without a route diversion; therefore, impacts to adjacent roadways by a development can be reduced by the number of pass-by trips (i.e., pass-by trips are not new trips). Short-term (2016) and long-term (2035) background developments and total trip generation volumes were provided in the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)*. Based on discussions with Howard County, all short-term developments and long-term developments anticipated to be completed by 2025 were included in this study as well as two additional developments. A complete list of the planned developments included as background growth for the purposes of this study, as well as the number of generated trips by each development are included in **Table 7**. The locations of these developments are shown in **Figure 10**.

Trips from each development were distributed and assigned throughout the study network based on existing traffic patterns, land uses, and critical access points. For consistency, the trip distribution assumptions noted in the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* were maintained for background development (see **Table 8**). The total new peak hour trips generated by the background developments are shown in **Figure 11**. 2025 No-Build traffic volumes were calculated by adding the annual traffic growth (using the annual growth rates discussed above) and the net new trips generated by proposed background developments to the existing traffic volumes. 2025 No-Build traffic volumes are shown in **Figure 12**.

Table 7 – Background Developments/Trip Generation Summary

Source	Development	ITE Code[1]	Size	Size Variable	Non Pass-By Trips Generated [(XX) = Number of Pass-By Trips]			
					AM Peak		PM Peak	
					Entry	Exit	Entry	Exit
Short-Term Developments per draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)*	Garden Center	912: Drive-in Bank	3.5	1000 SF GFA[2]	24	18	23 (20)	22 (20)
		934: Fast-Food Restaurant with Drive-Through Window	4.2	1000 SF GFA[2]	49 (48)	48 (46)	35 (36)	33 (33)
		932: High Turnover (Sit-Down) Restaurant	4	1000 SF GFA[2]	24	19	13 (10)	9 (7)
	Commons Phase I	826: Specialty Retail Center	31	1000 SF GLA[3]	102	110	37	47
		932: High Turnover (Sit-Down) Restaurant	7	1000 SF GFA[2]	42	34	23 (18)	16 (12)
	Auto Dealership	841: Automobile Sales	20	1000 SF GFA[2]	29	9	25	37
	Pizza Hut Site Retail	826: Specialty Retail Center	7	1000 SF GLA[3]	23	25	8	11
	MD 108, south of study area	210: Single-Family Detached Housing	50	Dwelling Units	11	34	35	21
	Sheppard Lane Residential	210: Single-Family Detached Housing	160	Dwelling Units	31	91	101	59
	Trotter Road Residential	210: Single-Family Detached Housing	25	Dwelling Units	7	20	19	11
Long-Term Developments per draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike*	Commons Phase II	850: Supermarket	20	1000 SF GFA[2]	42	26	77 (44)	75 (41)
		710: General Office Building	15	1000 SF GFA[2]	37	5	16	79
	Guilford/MD 108 Subdivision	210: Single-Family Detached Housing	150	Dwelling Units	29	86	95	56
	Corner of MD 108/Ten Oaks Rd Retail	932: High Turnover (Sit-Down) Restaurant	4.7	1000 SF GFA[2]	28	23	16 (12)	10 (8)
		710: General Office Building	21	1000 SF GFA[2]	14	41	17	85
		942: Automobile Care Center	6	1000 SF GFA[2]	10	5	12	14
		820: Shopping Center	3.8	1000 SF GLA[3]	13	8	21 (11)	23 (12)
Howard County	Coleman Fiat	841: Automobile Sales	14	1000 SF GFA[2]	20	7	20	30
	Conscious Corner	820: Shopping Center	21.8	1000 SF GLA[3]	38	24	69 (35)	74 (38)
TOTAL TRIPS					**573 (48)**	**633 (46)**	**662 (186)**	**712 (171)**

[1] ITE Code as provided in ITE's *Trip Generation Manual, 9th Edition*
[2] SF GFA = Square Feet Gross Floor Area
[3] SF GLA = Square Feet Gross Leasable Area

Figure 10 – Proposed Developments

Table 8 – Trip Distribution Percentages

To/From	Land Use	
	Retail	Residential
MD 108, south of Ten Oaks Road	10 %	15 %
Ten Oaks Road, south of MD 108	10 %	-
MD 32, west of MD 108	15 %	4 %
MD 32, east of MD 108	10 %	66 %
Great Star Drive	25 %	-
MD 108, north of Great Star Drive	30 %	15 %
TOTAL	**100 %**	**100 %**

Source: draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)*

Figure 11 – 2025 Net New Trips Generated by Proposed Developments

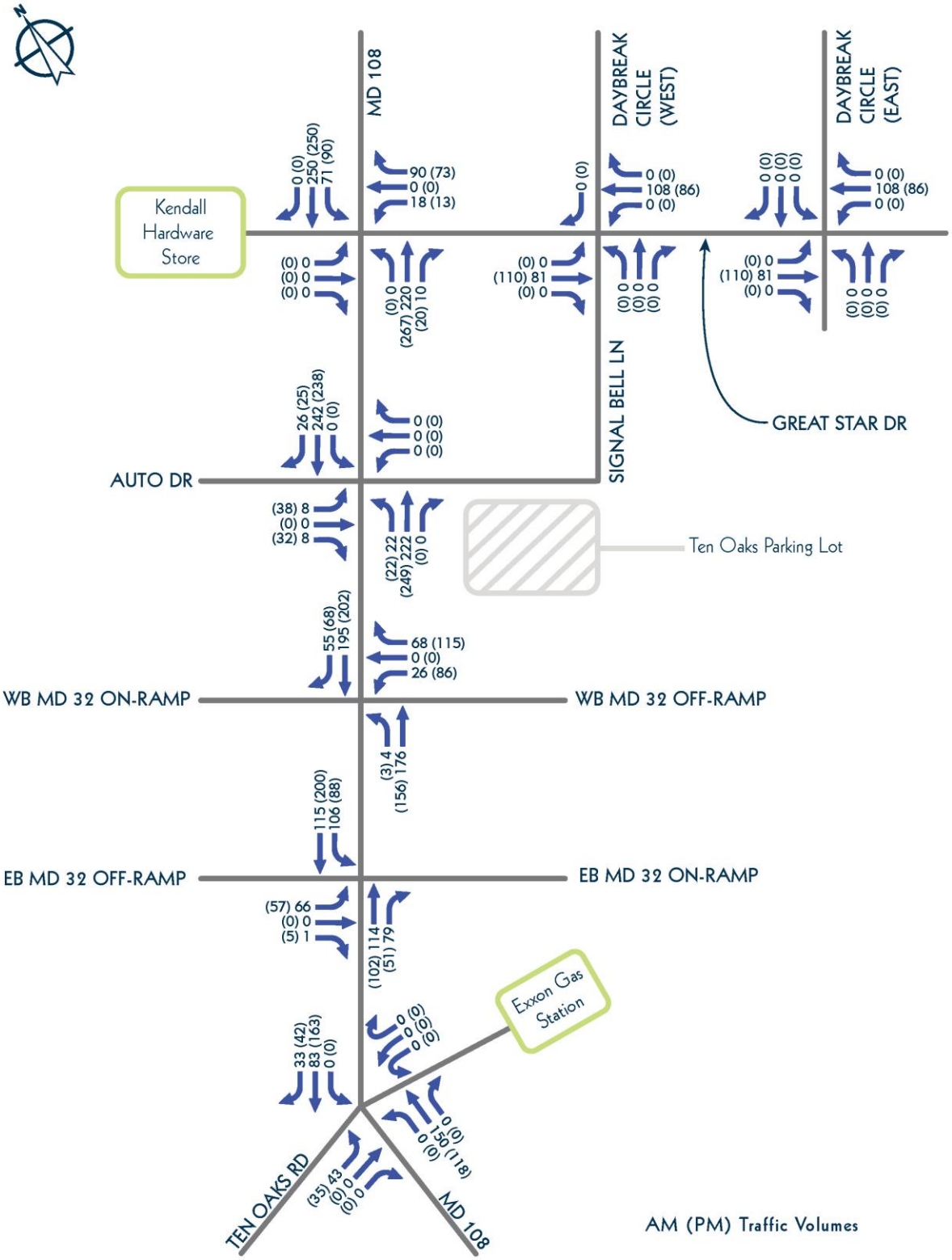
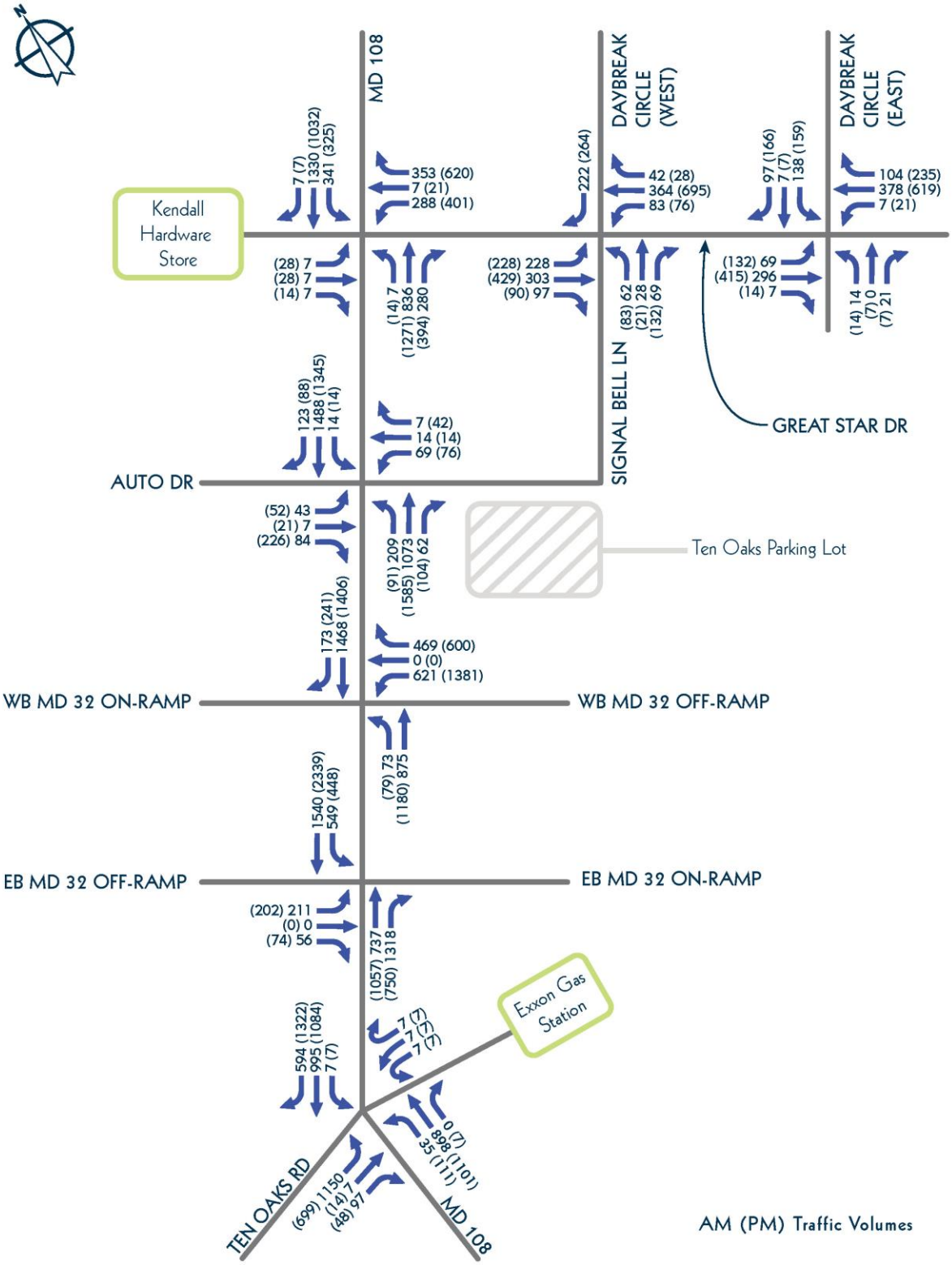


Figure 12 – 2025 No-Build Traffic Volumes



CAPACITY ANALYSIS (2025 No-Build Conditions)

Existing *Synchro 8* files were updated with 2025 No-Build traffic volumes (see **Figure 12**) and a network-wide 0.92 PHF. Intersection splits and offsets were optimized using *Synchro* software while maintaining the existing 120-second and 150-second cycle lengths during the AM and PM peak hours, respectively (*Synchro*-recommended cycle lengths match existing cycle lengths). A summary of delays, LOS, and 95th-percentile queue lengths for 2025 No-Build Conditions is shown in **Table 9**.

As shown, the MD 108 at Ten Oaks Road intersection is projected to operate at LOS 'F' during both the AM and PM peak hours. Eastbound Ten Oaks Road left-turn delays are projected to be approximately 222 and 242 seconds (LOS 'F') during the AM and PM peak hours, respectively. The MD 108 at eastbound MD 32 ramps intersection is projected to operate at LOS 'E' and 'F' during the AM and PM peak hours, respectively. Eastbound MD 32 off-ramp left-turn delays are projected to be approximately 307 and 311 seconds during the AM and PM peak hours, respectively. Southbound MD 108 left-turn delays at the eastbound MD 32 on-ramp are projected to be approximately 174 and 114 seconds during the AM and PM peak hours, respectively. The MD 108 at westbound MD 32 ramps intersection is projected to operate at LOS 'D' and 'E' during the AM and PM peak hours, respectively. Westbound MD 32 off-ramp left-turn delays are projected to be approximately 36 and 116 seconds (LOS 'D' and 'F') during the AM and PM peak hours, respectively. Additionally, westbound MD 32 off-ramp queues are projected to reach approximately 1,150 feet during the PM peak hour, which indicates that queues will extend to the physical gore for the off-ramp, creating the potential for queues to extend onto mainline westbound MD 32. Additionally, right-turning vehicles that unable to bypass left-turn queues would increase the number of vehicles within the left-turn queue.

The MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'B' during both the AM and PM peak hours. Westbound Signal Bell Lane left-turn delays at MD 108 are projected to be approximately 53 and 62 seconds (LOS 'D' and 'E') during the AM and PM peak hours, respectively. The MD 108 at Great Star Drive intersection is projected to operate at LOS 'C' and 'F' during the AM and PM peak hours, respectively. Westbound Great Star Drive left-turn delays at MD 108 are projected to be approximately 65 and 107 seconds (LOS 'E' and 'F') during the AM and PM peak hours, respectively. Southbound MD 108 left-turn delays at Great Star Drive are projected to be approximately 46 and 196 seconds (LOS 'D' and 'F') during the AM and PM peak hours, respectively.

During the AM peak hour, northbound Signal Bell Lane left-turn delays onto Great Star Drive are projected to be approximately 364 seconds (LOS 'F') and southbound Daybreak Circle (east) left-turn delays onto Great Star Drive are projected to be approximately 51 seconds (LOS 'F'). During the PM peak hour, anticipated delays for both of these unsignalized left-turn movements are beyond the acceptable ranges of the HCM methodologies; therefore, the *Synchro HCM* Reports are reporting "error" for the delays and queue lengths associated with these movements.

Table 9 – Capacity Analysis Summary: 2025 No-Build Conditions

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	93.3	F	EBL	222.1	F	920 ft[3]
	MD 108 at EB MD 32 Ramps	72.2	E	EBL	306.8	F	314 ft[3]
				SBL	173.6	F	564 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	38.3	D	WBL	36.2	D	345 ft
	MD 108 at Auto Drive/ Signal Bell Lane	11.8	B	WBL	52.5	D	106 ft
				SBL	4.4	A	2 ft[4]
	MD 108 at Great Star Drive	26.2	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.5	A	7 ft
				NBL	363.8	F	154 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.7	A	6 ft
				SBL	50.8	F	172 ft
PM Peak	MD 108 at Ten Oaks Road	100.4	F	EBL	241.6	F	755 ft[3]
	MD 108 at EB MD 32 Ramps	83.5	F	EBL	311.0	F	368 ft[3]
				SBL	113.7	F	507 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	75.0	E	WBL	116.0	F	1,156 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	13.2	B	WBL	62.1	E	126 ft
				SBL	1.8	A	2 ft[4]
	MD 108 at Great Star Drive	121.8	F	WBL	106.8	F	436 ft[3]
				SBL	196.3	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	F	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	F	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

2025 BUILD CONDITIONS: ALTERNATIVE A

TRAFFIC VOLUMES (2025 Build Conditions: Alternative A)

Peak hour traffic volumes for 2025 Build Conditions with the Alternative A parking structure were calculated by adding the maximum number event arrivals and departures (based on a maximum parking occupancy of 614 vehicles) with 2025 No-Build traffic volumes (see **Figure 12**). 2025 Build traffic volumes assume that event arrivals and departures overlap with the AM and PM peak hours (i.e., the worst-case scenario). The likelihood and frequency of this worst-case scenario to occur depends heavily on the size, type, and schedule of future events held at the Ten Oaks Ballroom. Existing traffic volumes represent traffic volumes without the presence of an event at the Ballroom; however, trips to/from the Ten Oaks Parking Lot generated by Park and Ride patrons are, in theory, included in the existing traffic volumes and do not need to be added to the study network. As noted previously, demand for the Park and Ride is not anticipated to significantly increase by the 2025 design year. As such, 2025 Build traffic volumes assume 100 parking spaces will be dedicated to Park and Ride patrons, reducing the maximum number of parking spaces available to event patrons to 514 with Alternative A parking structure. Therefore, 514 vehicle trips (i.e., 100 percent occupancy is assumed) were distributed through the study area during the AM and PM peak hours for event arrivals and departures, respectively, based on the existing counts performed during event departures.

Turning movement counts and origin-destination studies were performed at the intersections and roadways adjacent to the Ballroom during three event departures to identify destinations for vehicles departing the Ten Oaks Parking Lot during event departures. The average destination percentages from these three events were used to assign trips through the study intersections for vehicles departing a Ballroom event. Vehicles destined for southbound MD 108 south of Auto Drive/Signal Bell Lane were not tracked as part of the field studies; therefore, these vehicles were distributed to MD 32, MD 108, and Ten Oaks Road based on existing travel patterns during the PM peak hour. Existing travel patterns were determined from a review of the most recent tube counts available from SHA's *I-TMS* along the MD 32 ramps, MD 108 south of Ten Oaks Road, and Ten Oaks Road west of MD 108. During event departure observations, a portion of vehicles used Great Star Drive to access northbound and southbound MD 108 to bypass queues at the MD 108 at Auto Drive/Signal Bell Lane intersection. However, to develop 2025 Build traffic volumes, it was assumed that all of these vehicles would access MD 108 using the MD 108 at Auto Drive/Signal Bell Lane intersection. Vehicles arriving to the Ballroom during the AM peak hour were distributed to the study intersections following the same assumptions and methodology.

The net new trips generated by Ten Oaks Ballroom event arrivals and departures during the AM and PM peak hours, respectively, are shown in **Figure 13** for the Alternative A parking structure. 2025 Build Condition: Alternative A traffic volumes were calculated by adding the net new trips to 2025 No-Build traffic volumes and are shown in **Figure 14**.

Figure 13 – Trips Generated by Ten Oaks Ballroom Event Arrivals and Departures Alternative A (614 Parking Spaces)

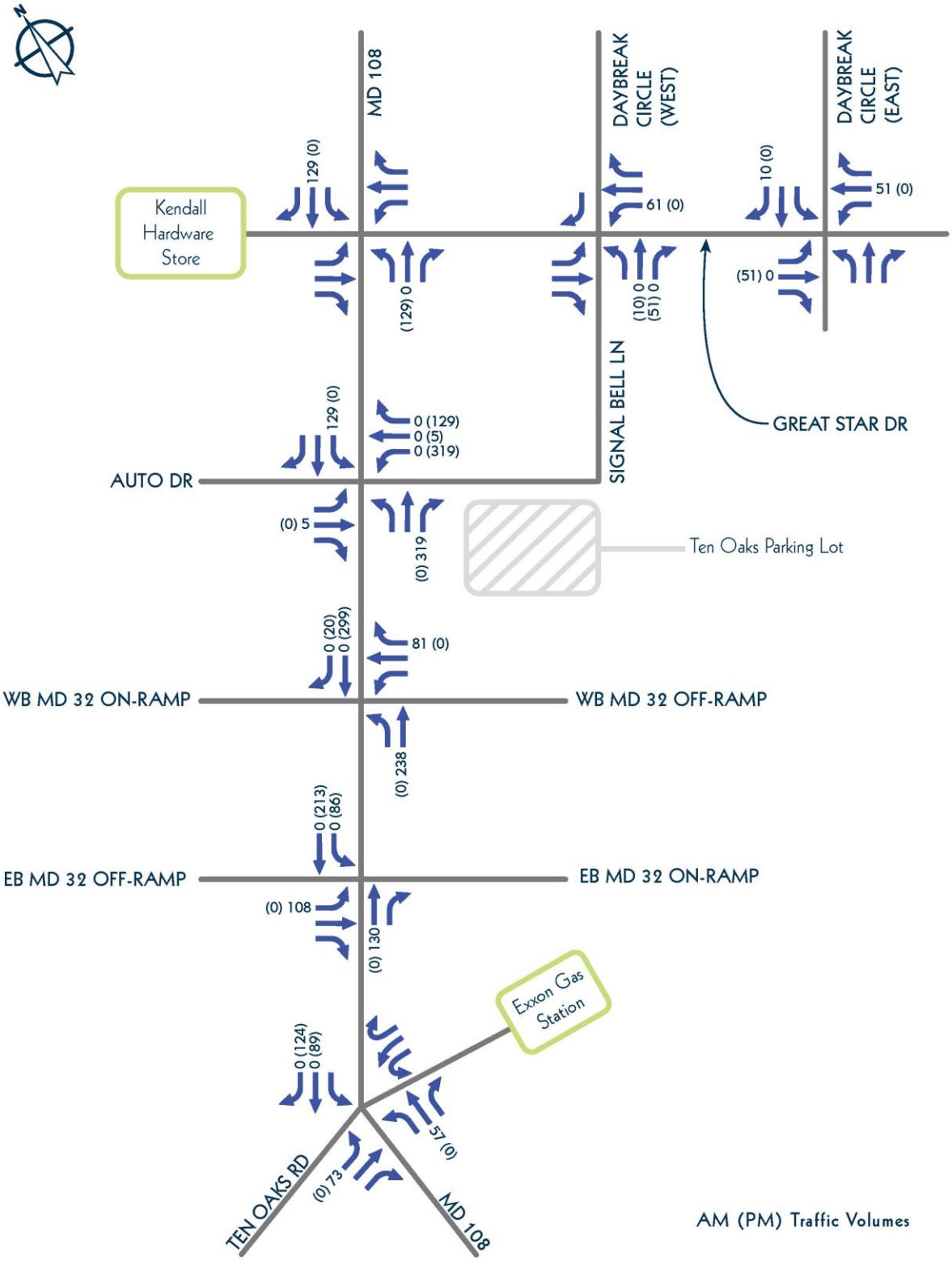
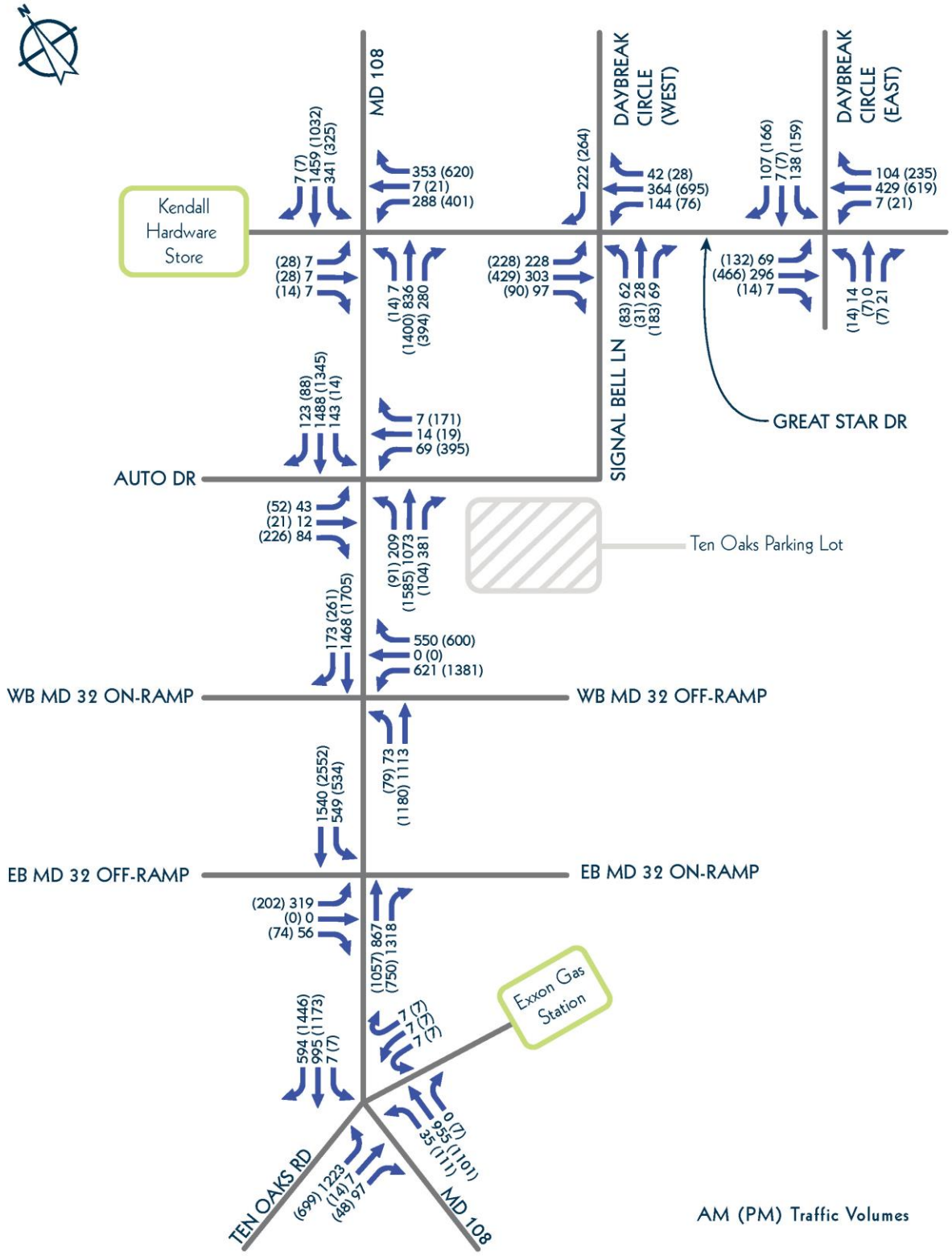


Figure 14 – 2025 Build Conditions with Alternative A Parking Structure (614 Parking Spaces) Traffic Volumes



CAPACITY ANALYSIS (2025 Build Conditions: Alternative A)

2025 No-Build *Synchro 8* files were updated with 2025 Build: Alternative A traffic volumes (see **Figure 14**) and intersection splits and offsets were optimized using the *Synchro* software while maintaining existing cycle lengths. *Synchro* traffic models analyze traffic operations for a one-hour period using 15-minute peak hour factors to account for variability in traffic operations throughout the hour. During event departures, vehicles enter the roadway network within a time period less than one hour (i.e., within a concentrated period immediately following the end of a Ten Oaks Ballroom event). Of the three observed events, the most concentrated event departure occurred during a 35-minute period, or during approximately 60 percent of a given hour. To more accurately and conservatively model impacts to the roadway network created by the surge in traffic created by an event departure, a 0.60 peak hour factor was applied to the westbound Signal Bell Lane approach to MD 108 during the PM peak hour. By adjusting the peak hour factor, actual delays are more accurately reflected. However, it should be noted that during future build conditions, the study network is projected to be oversaturated; therefore, "peak-spreading" is possible (i.e., departures from the parking lot will be spread over a longer period) and the peak hour factor would approach a higher value. During all three observed events, event patrons arrived throughout an approximately one-hour period; therefore, no unique adjustments were made to peak hour factors during the AM peak hour.

A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative A is shown in **Table 10**. As shown, overall intersection delays at the MD 108 at Ten Oaks Road intersection are projected to increase by approximately 63 and 24 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative A to 2025 No-Build Conditions. Similarly, overall intersection delays at the MD 108 at eastbound MD 32 ramps intersection are projected to increase by approximately 30 and 31 seconds during the AM and PM peak hours, respectively. Overall intersection delays at the MD 108 at westbound MD 32 ramps intersection are projected to increase by approximately 14 and 37 seconds during the AM and PM peak hours, respectively. Westbound MD 32 off-ramp queues are projected to increase approximately 6 percent during the PM peak hour, increasing the potential for queues to extend onto mainline westbound MD 32. Overall intersection delays at the MD 108 at Auto Drive/Signal Bell Lane intersection are projected to increase by approximately 2 and 51 seconds during the AM and PM peak hours, respectively. Additionally, the northbound Signal Bell Lane and southbound Daybreak Circle (east) left-turn movements onto Great Star Drive are projected to operate at LOS 'F' during both the AM and PM peak hours, similar to 2025 No-Build Conditions.

Eastbound Ten Oaks Road left-turn delays onto northbound MD 108 are projected to increase by approximately 128 and 24 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative A to 2025 No-Build Conditions. Similarly, southbound MD 108 left-turn delays onto the eastbound MD 32 on-ramp are projected to increase by approximately 92 and 77 seconds during the AM and PM peak hours, respectively. Westbound Signal Bell Lane left-turn delays at MD 108 are projected to increase by approximately 77 seconds during the PM peak hour. It should also be noted that queues are projected to reach 766 feet and extend beyond the Ballroom Parking Lot driveway.

During the AM peak hour, northbound Signal Bell Lane and southbound Daybreak Circle (east) left-turn delays onto Great Star Drive are projected to increase by approximately 211 and 16 seconds, respectively. Similar to 2025 No-Build Conditions, the anticipated delays for both of these unsignalized left-turn movements are beyond the acceptable ranges of the HCM methodologies during the PM peak hour;

therefore, the *Synchro HCM* Reports are reporting "error" for the delays and queue lengths associated with these movements.

Table 10 – Capacity Analysis Summary: Alternative A Parking Structure (614 Parking Spaces) 2025 Build Conditions

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	156.1	F	EBL	350.4	F	1,038 ft[3]
	MD 108 at EB MD 32 Ramps	102.2	F	EBL	284.2	F	426 ft[3]
				SBL	265.4	F	614 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	52.1	D	WBL	32.5	C	327 ft
	MD 108 at Auto Drive/ Signal Bell Lane	13.9	B	WBL	53.0	D	106 ft
				SBL	12.6	B	57 ft[4]
	MD 108 at Great Star Drive	24.2	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.7	A	12 ft
				NBL	575.0	F	178 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.9	A	6 ft
				SBL	66.4	F	209 ft
PM Peak	MD 108 at Ten Oaks Road	124.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	114.6	F	EBL	311.0	F	368 ft[3]
				SBL	190.7	F	689 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	112.3	F	WBL	169.3	F	1,228 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	64.6	E	WBL	138.9	F	766 ft[3,5]
				SBL	18.9	B	5 ft[4]
	MD 108 at Great Star Drive	131.1	F	WBL	118.2	F	445 ft[3]
				SBL	218.6	F	601 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	F	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	F	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

2025 BUILD CONDITIONS: ALTERNATIVE B

TRAFFIC VOLUMES (2025 Build Conditions: Alternative B)

Peak hour traffic volumes for 2025 Build Conditions with the Alternative B parking structure were calculated following the same methodology discussed for 2025 Build Conditions with the Alternative A parking structure. Similar to 2025 Build Conditions: Alternative A, 2025 Build: Alternative B traffic volumes assume 100 parking spaces will be dedicated to Park and Ride patrons, reducing the maximum number of parking spaces available to event patrons to 329. Therefore, 329 vehicle trips (i.e., 100 percent occupancy) were distributed through the study area during the AM and PM peak hours for event arrivals and departures, respectively, based on the existing counts performed during event departures and the methodology/assumptions discussed in the previous section for Alternative A. It should be noted that the extra 10 parking spaces required to accommodate a 400-person event while maintaining the Park and Ride can be provided via parallel parking along the east side of Signal Bell Road, between the Ten Oaks Ballroom and Great Star Drive. As such, the Alternative B analysis accounts for these 10 additional parking spaces outside the Ten Oaks Parking Lot.

The net new trips generated by Ten Oaks Ballroom event arrivals and departures during the AM and PM peak hours, respectively, are shown in **Figure 15** for the Alternative B parking structure. 2025 Build Condition: Alternative B traffic volumes were calculated by adding the net new trips to 2025 No-Build traffic volumes and are shown in **Figure 16**.

Figure 15 – Trips Generated by Ten Oaks Ballroom Event Arrivals and Departures Alternative B (429 Parking Spaces)

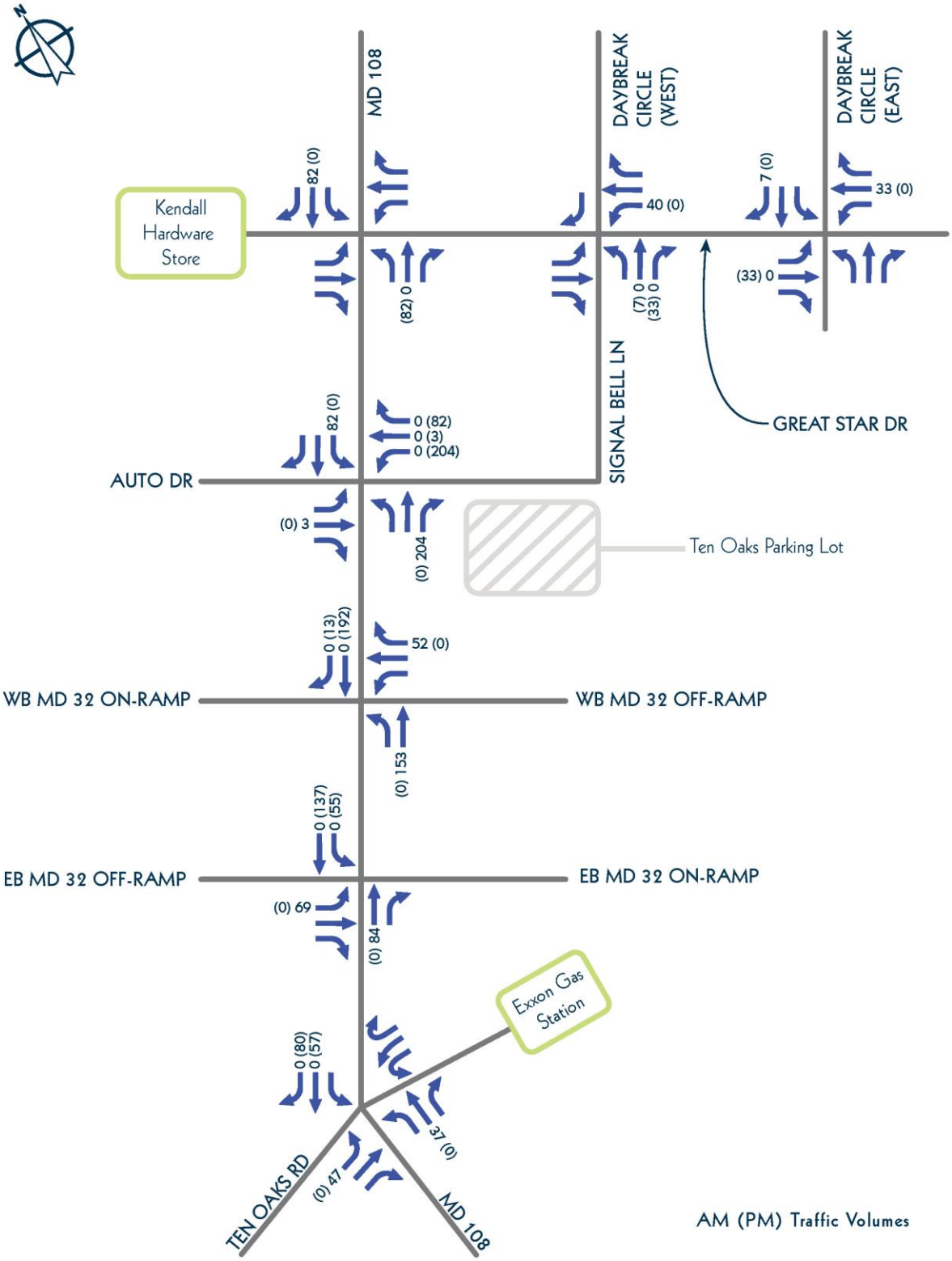
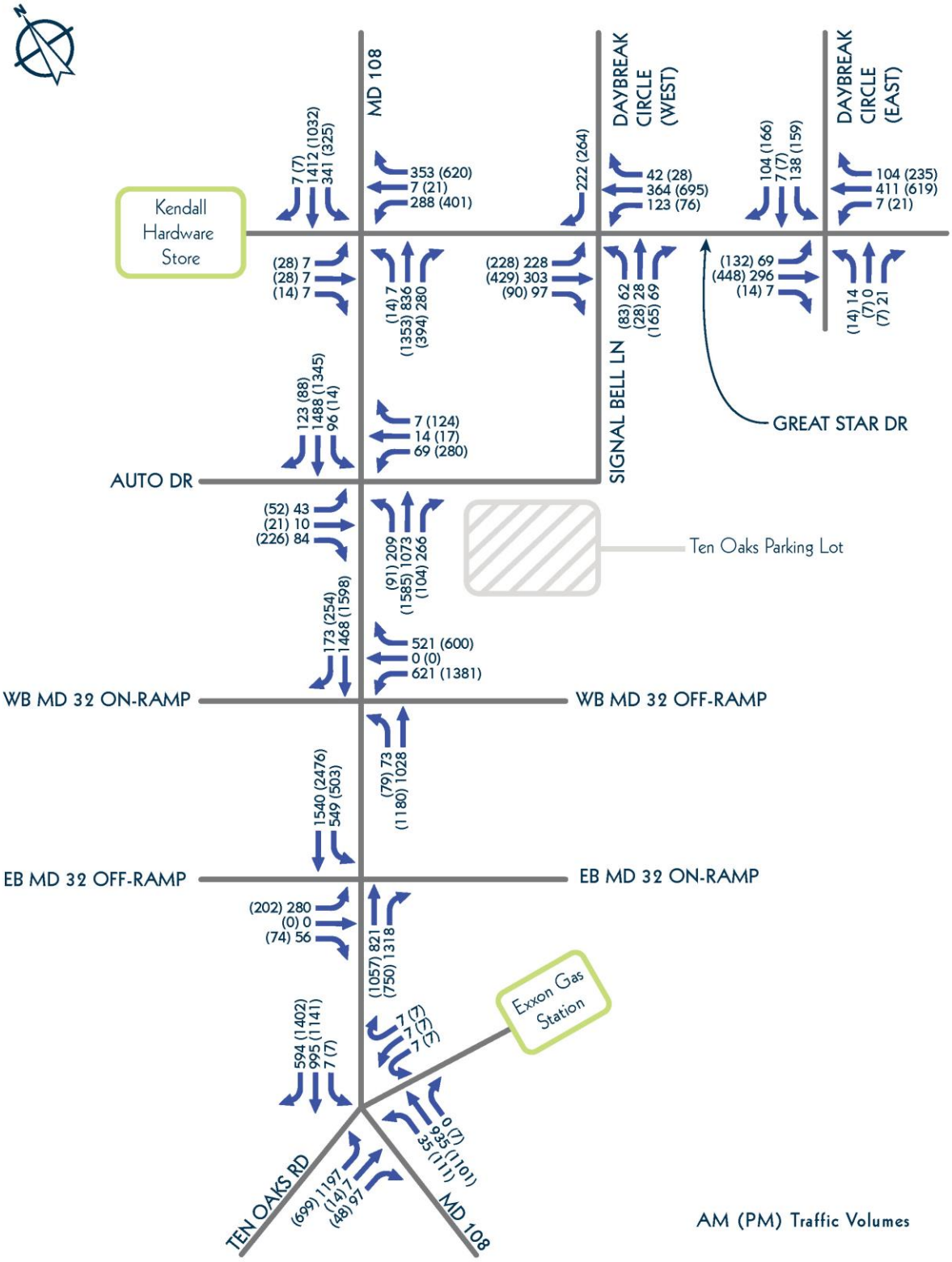


Figure 16 – 2025 Build Conditions with Alternative B Parking Structure (429 Parking Spaces) Traffic Volumes



CAPACITY ANALYSIS (2025 Build Conditions: Alternative B)

Capacity analyses were performed to determine the impacts of providing 429 parking spaces at the Ten Oaks Parking Lot (i.e., Alternative B), which is the minimum number of parking spaces needed for a 400 person event (see **Table 2**), following the same methodology discussed for 2025 Build Conditions with the Alternative A parking structure. It should be noted that 429 parking spaces can be accommodated with Alternative B (which includes 419 spaces within the property) if additionally parking spaces are provided via parallel parking along the east side of Signal Bell Road, between the Ten Oaks Ballroom and Great Star Drive. 2025 No-Build *Synchro* 8 files were updated with 2025 Build: Alternative B traffic volumes (see **Figure 16**) and intersection splits and offsets were optimized using the *Synchro* software while maintaining existing cycle lengths. A summary of LOS, delay, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative B is shown in **Table 11**.

Similar to 2025 Build Conditions: Alternative A, 2025 Build Conditions: Alternative B were compared to 2025 No-Build Conditions. Overall intersection delays at the MD 108 at Ten Oaks Road intersection are projected to increase by approximately 42 and 14 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative B to 2025 No-Build Conditions. Similarly, overall intersection delays at the MD 108 at eastbound MD 32 ramps intersection are projected to increase by approximately 18 and 20 seconds during the AM and PM peak hours, respectively. Overall intersection delays at the MD 108 at westbound MD 32 ramps intersection are projected to increase by approximately 10 and 23 seconds during the AM and PM peak hours, respectively. Westbound MD 32 off-ramp queues are projected to increase approximately 4 percent during the PM peak hour, increasing the potential for queues to extend onto mainline westbound MD 32. Overall intersection delays at the MD 108 at Auto Drive/Signal Bell Lane intersection are projected to be increase by approximately 0 and 22 seconds during the AM and PM peak hours, respectively. During the AM peak hour, northbound Signal Bell Lane and southbound Daybreak Circle (east) left-turn delays onto Great Star Drive are projected to increase by approximately 130 and 9 seconds, respectively. Similar to 2025 No-Build Conditions, the anticipated delays for both of these unsignalized left-turn movements are beyond the acceptable ranges of the HCM methodologies during the PM peak hour; therefore, the *Synchro HCM* Reports are reporting "error" for the delays and queue lengths associated with these movements.

Eastbound Ten Oaks Road left-turn delays onto northbound MD 108 are projected to increase by approximately 66 and 24 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative B to 2025 No-Build Conditions. Similarly, southbound MD 108 left-turn delays onto the eastbound MD 32 on-ramp are projected to increase by approximately 60 and 76 seconds during the AM and PM peak hours, respectively. Westbound Signal Bell Lane left-turn delays at MD 108 are projected to increase by approximately 26 seconds during the PM peak hour. It should also be noted that queues are projected to reach 341 feet and extend beyond the Ballroom Parking Lot driveway.

Table 11 – Capacity Analysis Summary: Alternative B Parking Structure (429 Parking Spaces)
2025 Build Conditions

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	135.5	F	EBL	287.8	F	989 ft[3]
	MD 108 at EB MD 32 Ramps	90.3	F	EBL	265.5	F	384 ft[3]
				SBL	233.7	F	567 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	48.1	D	WBL	33.2	C	329 ft
	MD 108 at Auto Drive/ Signal Bell Lane	11.8	B	WBL	52.6	D	106 ft
				SBL	3.6	A	13 ft[4]
	MD 108 at Great Star Drive	24.8	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	10 ft
				NBL	494.1	F	170 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.8	A	6 ft
				SBL	60.2	F	195 ft
PM Peak	MD 108 at Ten Oaks Road	114.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	103.6	F	EBL	311.0	F	368 ft[3]
				SBL	189.8	F	644 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	98.0	F	WBL	150.0	F	1,204 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	35.4	D	WBL	88.2	F	341 ft[3,5]
				SBL	19.2	B	4 ft[4]
	MD 108 at Great Star Drive	128.2	F	WBL	118.2	F	445 ft[3]
				SBL	196.5	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	-	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	-	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

2025 BUILD CONDITIONS: ALTERNATIVE C

TRAFFIC VOLUMES (2025 Build Conditions: Alternative C)

Peak hour traffic volumes for 2025 Build Conditions with the Alternative C parking structure (single-story parking deck) were calculated following the same methodology discussed for 2025 Build Conditions with the Alternatives A and B parking structures. Similar to 2025 Build Conditions: Alternative A, 2025 Build: Alternative C traffic volumes assume 100 parking spaces will be dedicated to Park and Ride patrons, reducing the maximum number of parking spaces available to event patrons to 202. Therefore, 202 vehicle trips (i.e., 100 percent occupancy) were distributed through the study area during the AM and PM peak hours for event arrivals and departures, respectively, based on the existing counts performed during event departures and the methodology/assumptions discussed in the previous section for Alternatives A and B.

The net new trips generated by Ten Oaks Ballroom event arrivals and departures during the AM and PM peak hours, respectively, are shown in **Figure 17** for the Alternative C parking structure. 2025 Build Condition: Alternative C traffic volumes were calculated by adding the net new trips to 2025 No-Build traffic volumes and are shown in **Figure 18**.

Figure 17 – Trips Generated by Ten Oaks Ballroom Event Arrivals and Departures
Alternative C (302 Parking Spaces)

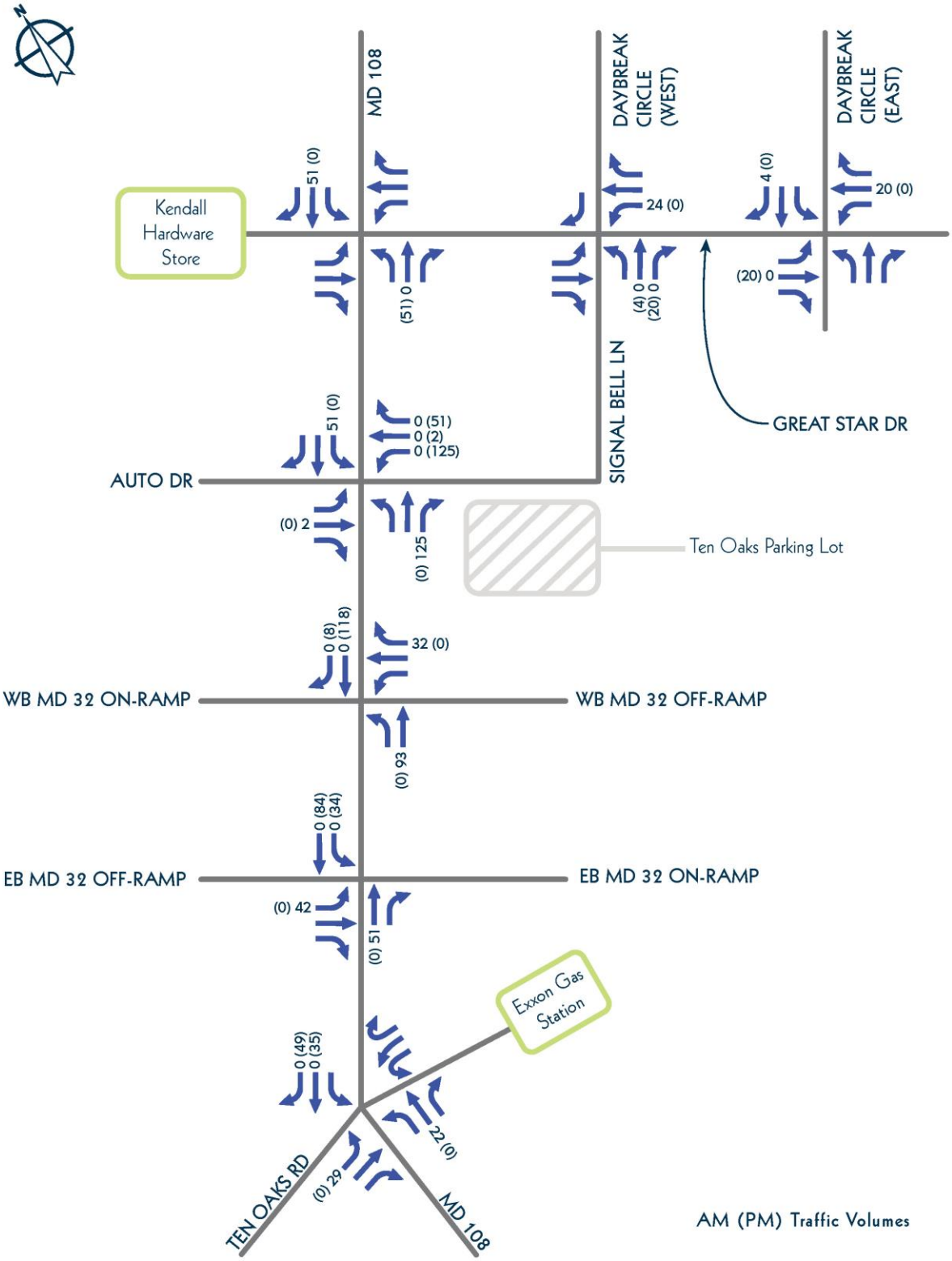
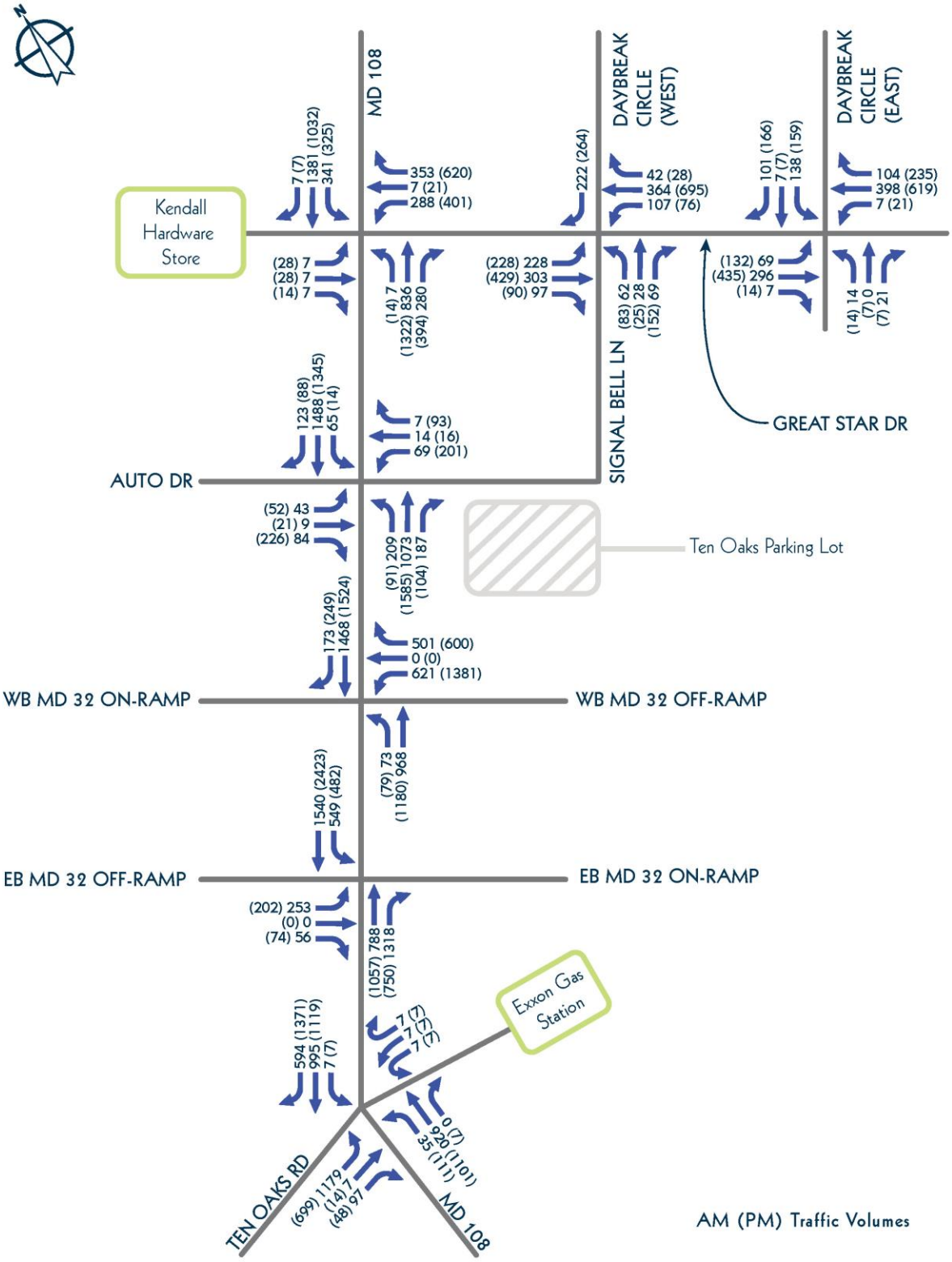


Figure 18 – 2025 Build Conditions with Alternative C Parking Structure (302 Parking Spaces) Traffic Volumes



CAPACITY ANALYSIS (2025 Build Conditions: Alternative C)

Capacity analyses were performed to determine the impacts of providing 302 parking spaces at the Ten Oaks Parking Lot (i.e., Alternative C) following the same methodology discussed for 2025 Build Conditions with the Alternatives A and B parking structures. 2025 No-Build *Synchro* 8 files were updated with 2025 Build: Alternative C traffic volumes (see **Figure 18**) and intersection splits and offsets were optimized using the *Synchro* software while maintaining existing cycle lengths. A summary of LOS, delay, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative C is shown in **Table 12**.

Similar to 2025 Build Conditions: Alternatives A and B, 2025 Build Conditions: Alternative C were compared to 2025 No-Build Conditions. Overall intersection delays at the MD 108 at Ten Oaks Road intersection are projected to increase by approximately 25 and 11 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative C to 2025 No-Build Conditions. Similarly, overall intersection delays at the MD 108 at eastbound MD 32 ramps intersection are projected to increase by approximately 10 and 12 seconds during the AM and PM peak hours, respectively. Overall intersection delays at the MD 108 at westbound MD 32 ramps intersection are projected to increase by approximately 6 and 14 seconds during the AM and PM peak hours, respectively. Westbound MD 32 off-ramp queues are projected to increase approximately 3 percent during the PM peak hour, increasing the potential for queues to extend onto mainline westbound MD 32. Overall intersection delays at the MD 108 at Auto Drive/Signal Bell Lane intersection are projected to be increase by approximately 0 and 11 seconds during the AM and PM peak hours, respectively. During the AM peak hour, northbound Signal Bell Lane and southbound Daybreak Circle (east) left-turn delays onto Great Star Drive are projected to increase by approximately 75 and 5 seconds, respectively. Similar to 2025 No-Build Conditions, the anticipated delays for both of these unsignalized left-turn movements are beyond the acceptable ranges of the HCM methodologies during the PM peak hour; therefore, the *Synchro HCM* Reports are reporting "error" for the delays and queue lengths associated with these movements.

Eastbound Ten Oaks Road left-turn delays onto northbound MD 108 are projected to increase by approximately 56 and 0 seconds during the AM and PM peak hours, respectively, when comparing 2025 Build Conditions: Alternative C to 2025 No-Build Conditions. Similarly, southbound MD 108 left-turn delays onto the eastbound MD 32 on-ramp are projected to increase by approximately 17 and 1 seconds during the AM and PM peak hours, respectively. Westbound Signal Bell Lane left-turn delays at MD 108 are projected to increase by approximately 9 seconds during the PM peak hour. It should also be noted that queues are projected to reach 303 feet and extend beyond the Ballroom Parking Lot driveway.

Table 12 – Capacity Analysis Summary: Alternative C Parking Structure (302 Parking Spaces)
2025 Build Conditions

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	118.2	F	EBL	277.8	F	972 ft[3]
	MD 108 at EB MD 32 Ramps	82.3	F	EBL	267.5	F	353 ft[3]
				SBL	190.9	F	569 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	44.2	D	WBL	34.3	C	336 ft
	MD 108 at Auto Drive/ Signal Bell Lane	11.8	B	WBL	52.6	D	106 ft
				SBL	3.9	A	10 ft[4]
	MD 108 at Great Star Drive	25.4	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	9 ft
				NBL	438.4	F	164 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.8	A	6 ft
				SBL	56.2	F	186 ft
PM Peak	MD 108 at Ten Oaks Road	111.4	F	EBL	241.6	F	755 ft[3]
	MD 108 at EB MD 32 Ramps	95.9	F	EBL	311.0	F	368 ft[3]
				SBL	114.2	F	552 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	89.1	F	WBL	141.1	F	1,192 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	24.5	C	WBL	71.2	E	303 ft[3,5]
				SBL	12.5	B	3 ft[4]
	MD 108 at Great Star Drive	125.6	F	WBL	106.8	F	436 ft[3]
				SBL	196.3	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	-	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	-	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

VI. POTENTIAL ROADWAY IMPROVEMENTS

As shown, the adjacent roadway network does not have the capacity to adequately accommodate traffic volumes generated by the proposed parking structures. However, it should be noted the roadway network is also unable to adequately accommodate future no-build traffic volumes. To mitigate the traffic impacts associated with the proposed Ten Oaks Parking Lot expansion, several potential roadway improvements were identified and analyzed. Although the goal of these roadway improvements is to improve traffic capacity and operations associated with the expansion of the parking lot, these improvements would benefit traffic operations during non-event periods as well. The following roadway improvement options were considered (see **Figure 15** for Option 1 and 2 concept plans).

- **Option 1** – Provide a left-turn lane, shared left-turn/through lane, and a separate right-turn lane on the westbound Signal Bell Lane approach to MD 108 and modify signal phasing on the eastbound Auto Drive and westbound Signal Bell Lane approaches to MD 108 from concurrent phasing with permissive left turns to split phasing

- **Option 2** – Construct Option 1 roadway improvements and construct channelization to permit right-in/right-out/left-in only operations on the south leg of the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection (additionally, the Great Star Drive at Daybreak Circle (east) intersection was considered both as a signalized and as an unsignalized intersection)

- **Option 3** – Construct Option 2 roadway improvements and construct long-term roadway improvements recommended as part of the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* (i.e., constructing an additional travel lane along MD 108 from Guilford Road to the eastbound MD 32 Ramps intersection; additionally, installing a signal at the Great Star Drive at Daybreak Circle (east) intersection was considered)

OPTION 1

The MD 108 at Auto Drive/Signal Bell lane intersection is the primary intersection which accommodates vehicles originating to/from the Ten Oaks Parking Lot; therefore, Option 1 focuses on providing intersection improvements at this intersection, specifically on the westbound Signal Bell Lane approach to MD 108. Currently, the westbound Signal Bell Lane approach to MD 108 consists of a left-turn lane and an approximately 75-foot shared through/right-turn lane (lane use pavement markings are not provided on the east leg; however, the westbound Signal Bell Lane approach generally operates as a left-turn lane and a shared through/right-turn lane). Left-turn queues greater than 4 vehicles block access to the rightmost lane. Left-turn queues rarely block the rightmost lane (through and right-turning vehicles) during non-event departure periods; however, the rightmost lane is consistently blocked during event departures. Widening Signal Bell Lane between MD 108 and the Ten Oaks Parking Lot driveways was considered to improve capacity and operations. The following two lane configurations were considered on the westbound Signal Bell Lane approach to MD 108:

- Left-turn lane, shared left-turn/through lane, right-turn lane
- Two left-turn lanes and a shared through/right-turn lane

A left-turn lane, shared left-turn/through lane, and right-turn lane will provide the greatest overall benefit to traffic operations right turns will be unobstructed by through vehicles (the through volume is low so minimal impacts to left-turn operations are anticipated). This lane configuration requires modifying the phasing on the eastbound Auto Drive and westbound Signal Bell Lane approaches from concurrent phasing with permissive left turns to split phasing. Due to the relatively low traffic volumes on Auto Drive and Signal Bell Lane at MD 108 and longer side street phases at adjacent signals along MD 108, split phasing is anticipated to have minimal impacts to traffic along the MD 108 corridor during non-event periods (i.e., the MD 108 green band can be maintained). In addition, split phasing will eliminate the need for westbound left-turning motorists to judge acceptable gaps in opposing eastbound Auto Drive traffic and provide improved traffic operations for this movement; currently, left-turning vehicles hesitate before making this movement to ensure that they do not conflict with vehicles coming from Auto Drive.

Providing three separate approach lanes on the east leg of the MD 108 at Auto Drive/Signal Bell Lane intersection will require acquiring approximately 1,600 square feet of right-of-way along the north side of Signal Bell Lane east of MD 108 (within the Riverhill Station property). Widening of Signal Bell Lane to the north will provide a better alignment with Auto Drive, while widening to the south side of the road would create an offset intersection. The widening of Signal Bell Lane would require new pavement construction, reconstruction of the sidewalk, replacement of a signal mast arm pole, and reconfiguration of sidewalk crossings at the Signal Bell Lane intersection with the Ten Oaks Parking Lot. These improvements (i.e., Option 1 roadway improvements) are projected to cost approximately $482,000.

OPTION 2

In addition to the westbound Signal Bell Lane approach to MD 108, delays for several other intersections and critical movements within the study area are projected increase as compared to 2025 No-Build Conditions during Ten Oaks Ballroom event arrivals and departures. Therefore, roadway improvements at other intersections were also identified in order to reduce the traffic impacts associated with the Build conditions, in addition to those outlined in Option 1. A description of each improvement considered for Option 2 is provided below.

SOUTHBOUND MD 108 LEFT-TURN ONTO EASTBOUND MD 32

During the PM peak hour, the southbound MD 108 left-turn volume onto eastbound MD 32 is projected to increase by 19 percent (from 448 to 534 vehicles), 12 percent (from 448 to 503 vehicles), and 8 percent (from 448 to 482 vehicles) during 2025 Build Conditions with Alternative A, Alternative B, and Alternative C parking structures, respectively, as compared to 2025 No-Build Conditions. Additionally, approximately 550 left turns are projected during the AM peak hour during both No-Build and Build Conditions (with all three alternatives). With 2025 Build Conditions (all three alternatives), the southbound MD 108 left-turn movement at the eastbound MD 32 on-ramp is projected to operate at LOS 'F' during the AM and PM peak hours, respectively. Due to the high number of left-turn volumes, consideration was given to providing a second southbound MD 108 left-turn lane at the eastbound MD 32 ramps. Providing a second left-turn lane would require widening the MD 108 bridge over MD 32. However, it should be noted that the No-Build volumes and delays also indicate that capacity improvements are needed. Widening the bridge

is beyond the scope of this study; therefore, providing a second southbound MD 108 left-turn onto eastbound MD 32 was not evaluated further.

GREAT STAR DRIVE UNSIGNALIZED INTERSECTIONS

The northbound Signal Bell Lane and southbound Daybreak Circle (east) left-turning movements onto Great Star Drive are projected to fail during 2025 No-Build Conditions, 2025 Build Conditions, and 2025 Build Conditions with Option 1 roadway improvements for Alternative A, Alternative B, and Alternative C parking structures. Great Star Drive serves as the secondary ingress/egress roadway for the Ten Oaks Parking Lot. Therefore, roadway improvements to improve traffic operations along Great Star Drive were considered.

The Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection is located approximately 225 feet east of the MD 108 at Great Star Drive signalized intersection. Westbound Great Star Drive queues at MD 108 occasionally extend to Signal Bell Lane. Due to the close proximity of the intersections, northbound Signal Bell Lane left-turning and through vehicles at Great Star Drive are required to judge acceptable gaps in vehicles originating from northbound or southbound MD 108 (i.e., northbound right-turning and southbound left-turning vehicles), while judging simultaneous gaps in westbound Great Star Drive and southbound Daybreak Circle (west) right-turning traffic. For these reasons, installing a traffic signal at the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection was considered; however, providing a traffic signal at this location is not recommended due to the close proximity to the MD 108 traffic signal. Therefore, constructing intersection channelization to restrict the northbound Signal Bell Lane left-turn and through movements (i.e., permitting right turns only on the northbound approach) was considered (i.e., with the improvements, operations on the south leg would be similar to the existing operations on the north leg of the intersection).

Channelizing the northbound Signal Bell Lane approach at Great Star Drive to allow right turns only will divert existing left-turn and through vehicles to alternate routes. Traffic currently turning left from northbound Signal Bell Lane to westbound Great Star Drive is anticipated to divert to travel south along Signal Bell Lane to access MD 108 at Auto Drive/Signal Bell Lane intersection. Traffic currently originating from Signal Bell Lane traveling across Great Star Drive to access Daybreak Circle (west) is assumed to turn right onto eastbound Great Star Drive and complete a subsequent eastbound left turn onto Daybreak Circle (east). Existing northbound Signal Bell Lane left-turning and through vehicles would be diverted no more than approximately 1,500 feet. Installing channelization at this intersection was considered as part of the *River Hill Village Center Community Plan* (December 2013).

Additionally, installing a traffic signal at the Great Star Drive at Daybreak Circle (east) intersection was considered to accommodate diverted traffic (i.e., northbound Signal Bell Lane through vehicles at Great Star Drive will become eastbound left-turning vehicles at Great Star Drive at Daybreak Circle (east) and to improve operations for southbound Daybreak Circle (east) left turns onto eastbound Great Star Drive. Traffic signal warrant analyses were conducted in accordance with the 2011 *Maryland Manual on Uniform Traffic Control Devices* (*MD MUTCD*) for the Great Star Drive at Daybreak Circle (east) intersection using September 9, 2014 traffic volumes, indicate that a traffic signal is not currently warranted. Criteria for a minor street approach with both a single lane and double lane were compared to existing traffic volumes. Projected 2025 No-Build traffic volumes (see **Figure 12**) at the Great Star Drive at Daybreak Circle (east)

were reviewed to determine whether a traffic signal would be warranted during future conditions. Projected AM and PM peak hour traffic volumes were reviewed as well as traffic volumes for peak hour "fringe" hours (traffic volumes for "fringe" hours were calculated using hourly ratios based on existing count data). The analyses indicate that the Great Star Drive at Daybreak Circle (east) intersection will meet the four-hour vehicular volume warrant (Warrant 4) under 2025 No-Build Conditions (i.e., without an event at the Ten Oaks Ballroom and without any diversion of traffic). Installing a traffic signal or roundabout at this intersection was considered as part of the *River Hill Village Center Community Plan* (December 2013).

Option 2 roadway improvements would require removal of pavement, construction of curb, and installation of a traffic signal at the Great Star Drive/Daybreak Circle (east) intersection. These improvements are projected to cost approximately $1.0 M.

OPTION 3

Long-term roadway improvements within the study area were recommended as part the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)*, including constructing an additional travel lane along northbound and southbound MD 108 from Guilford Road to the eastbound MD 32 ramps. The second northbound MD 108 travel lane would be dropped as a right-turn lane onto the eastbound MD 32 on-ramp and the second southbound MD 108 travel lane would be dropped as a right-turn lane into the Saint Louis Catholic Church driveway. It should be noted that one modification was made to the proposed lane configurations as part of the traffic analyses for this study as compared to the proposed lane configurations in the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108).* Based on field observations, a relatively high proportion of eastbound Ten Oaks Road left-turning vehicles complete a subsequent right turn onto the eastbound MD 32 ramps; therefore, maintaining two northbound MD 108 right-turn lanes onto the eastbound MD 32 on-ramp is recommended (i.e., a right-turn lane and a shared through/right-turn lane).

Since Option 3 improvements are being investigated as part of other studies due to traffic demand in the corridor independent of this study, no cost estimates were prepared for these improvements.

2025 PROJECTED TRAFFIC VOLUMES WITH OPTION 2 AND 3 ROADWAY IMPROVEMENTS

Traffic volumes for 2025 Build Conditions with Option 2 and 3 roadway improvements for Alternative A, Alternative B, and Alternative C are shown in **Figures 20, 21, and 22,** respectively. For the purposes of the analyses, existing northbound Signal Bell Lane left-turning vehicles that are diverted are assumed to have destinations along northbound MD 108, north of Great Star Drive; therefore, all of these vehicles were reassigned to complete a westbound Signal Bell Lane right-turn onto northbound MD 108. However, it should be noted that a portion of existing northbound Signal Bell Lane left-turning vehicles at Great Star Drive could be traveling to a destination along MD 108 to the south.

Figure 19 - Option 1 and 2 Roadway Improvements Concept

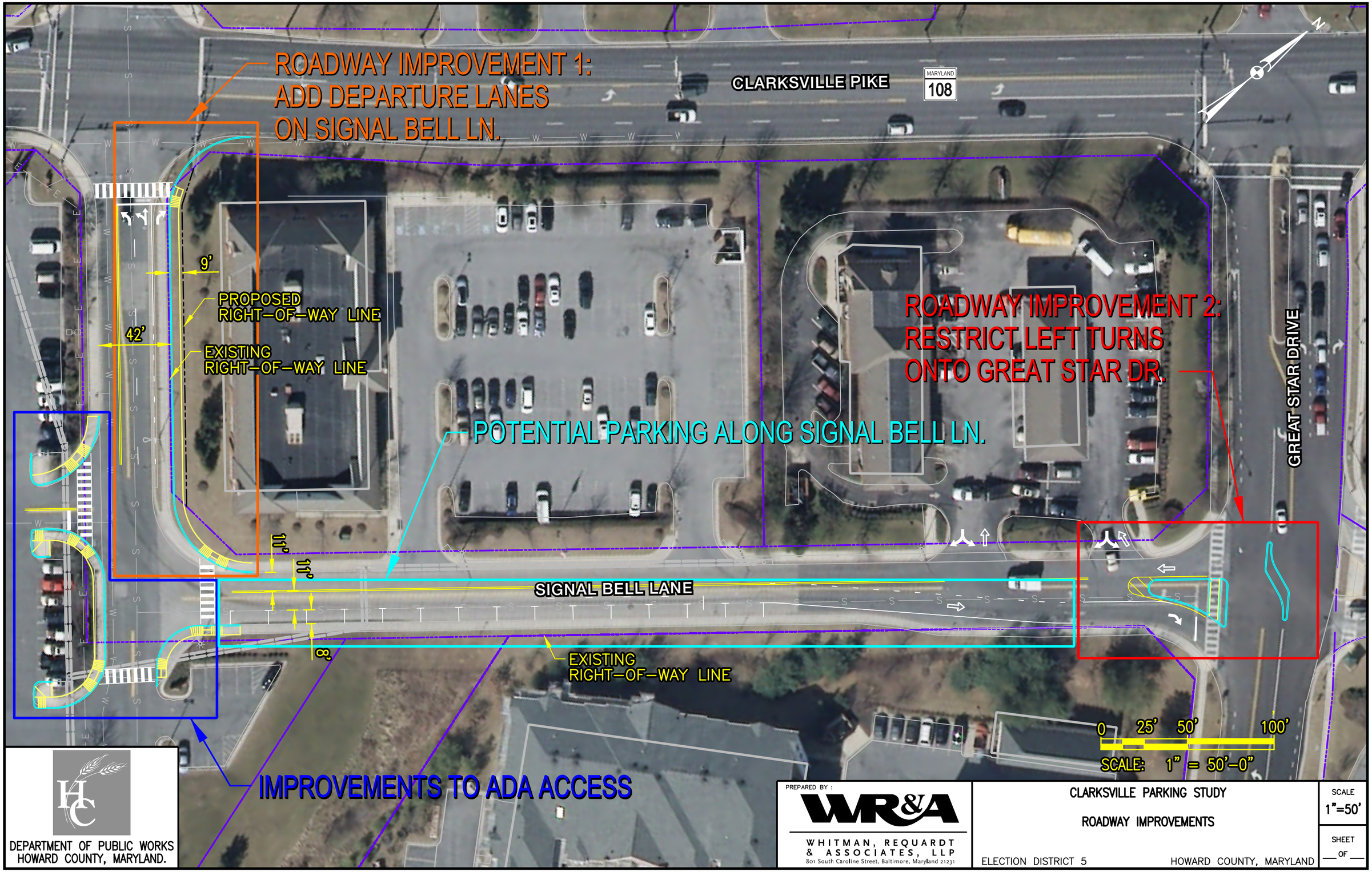


Figure 20 – 2025 Build Conditions with Alternative A Parking Structure (614 Parking Spaces) Option 2 and 3 Roadway Improvements Traffic Volumes

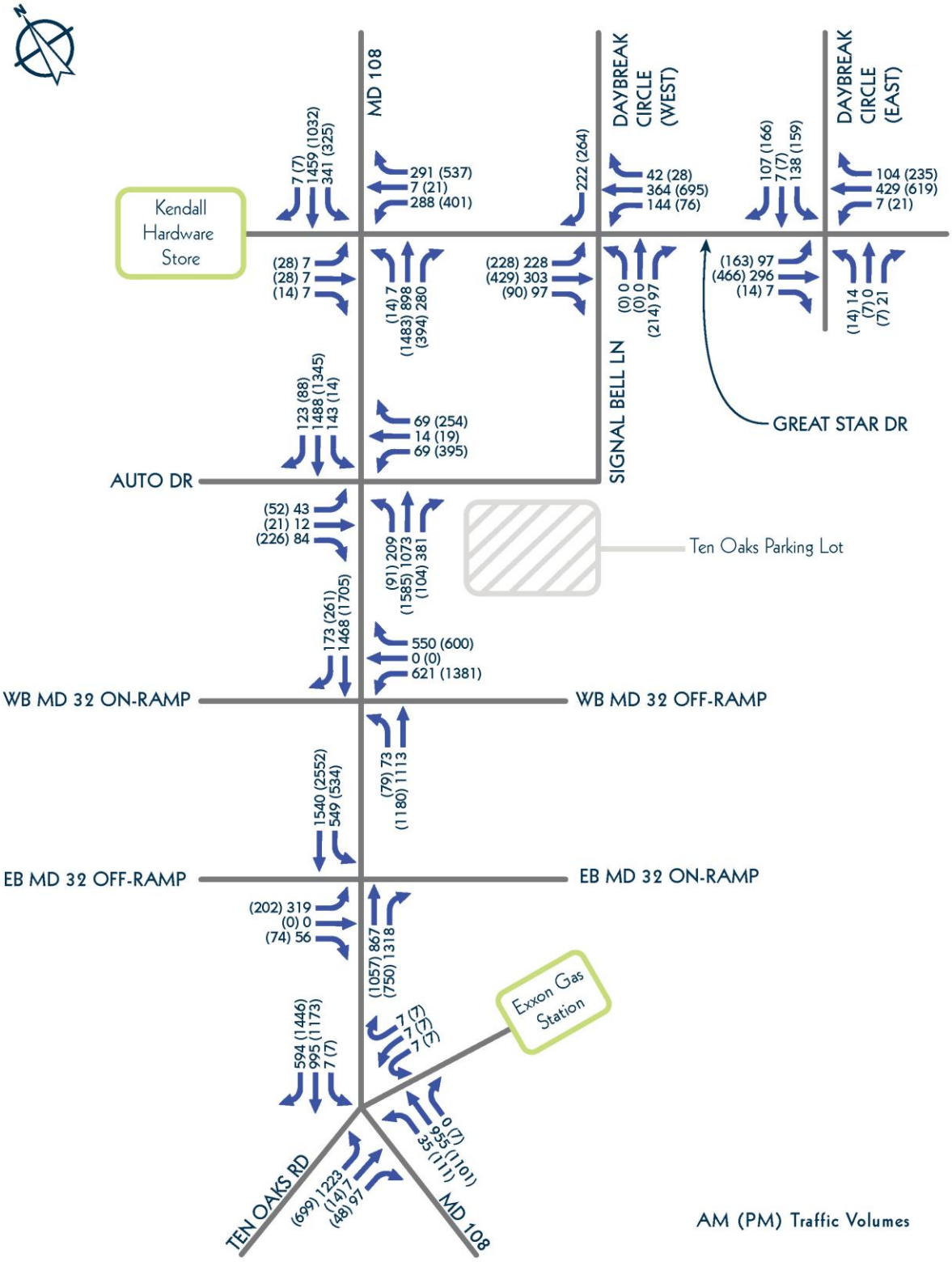


Figure 21 – 2025 Build Conditions with Alternative B Parking Structure (429 Parking Spaces) Option 2 and 3 Roadway Improvements Traffic Volumes

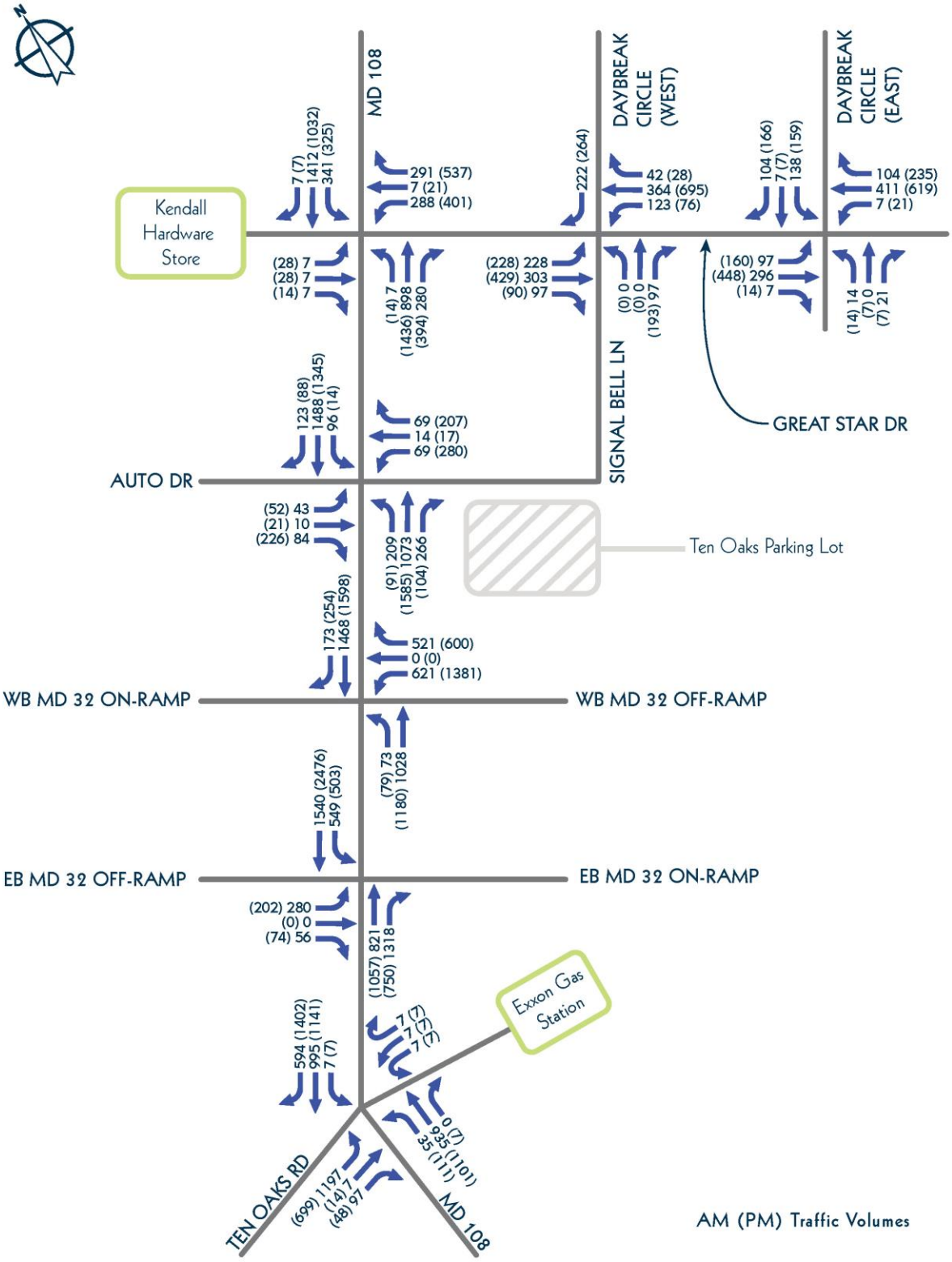
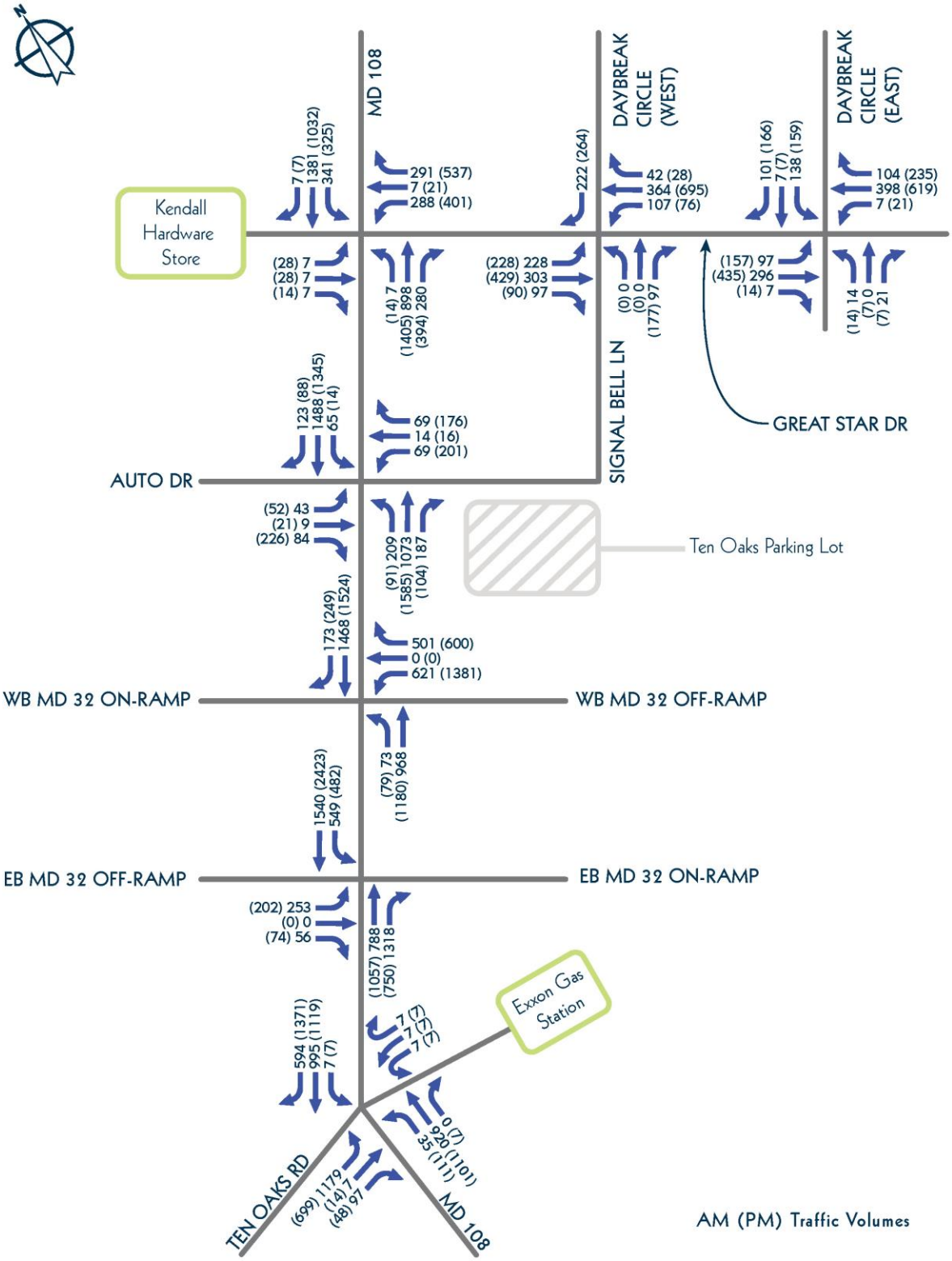


Figure 22 – 2025 Build Conditions with Alternative C Parking Structure (302 Parking Spaces) Option 2 and 3 Roadway Improvements Traffic Volumes



VII. TRAFFIC ANALYSIS WITH ROADWAY IMPROVEMENTS

ALTERNATIVE A

2025 BUILD CONDITIONS WITH OPTION 1 ROADWAY IMPROVEMENTS (ALTERNATIVE A)

Capacity analyses were performed to determine the benefits of constructing the Option 1 roadway improvements (i.e., providing a left-turn lane, shared left-turn/through lane, and right-turn lane on the westbound Signal Bell Lane approach to MD 108 and modifying the side street phasing from concurrent to split phasing) for Alternative A. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative A with Option 1 roadway improvements is shown in **Table 13**. As shown, westbound Signal Bell Lane left-turn delays at MD 108 with the implementation of Option 1 roadway improvements are projected to be approximately 89 seconds during the PM hour, a decrease of approximately 50 seconds as compared 2025 Build Conditions: Alternative A with existing lane configurations. Additionally, 95th-percentile queues are projected to decrease from approximately 475 feet to approximately 369 feet. With the construction of Option 1 roadway improvements, overall intersection delay at MD 108 at Auto Drive/Signal Bell Lane is projected to be relatively similar to 2025 Build Conditions: Alternative A (i.e., with existing lane configurations) during the AM peak hour; however, overall delay will decrease by approximately 36 percent during the PM peak hour. Overall intersection delays at the other study intersections with the implementation of Option 1 roadway improvements will be similar to 2025 Build Conditions: Alternative A.

Table 13 – Capacity Analysis Summary: Alternative A Parking Structure (614 Parking Spaces)
2025 Build Conditions with Option 1 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	156.0	F	EBL	350.4	F	1,038 ft[3]
	MD 108 at EB MD 32 Ramps	101.4	F	EBL	284.2	F	426 ft[3]
				SBL	262.1	F	605 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	50.6	D	WBL	32.5	C	327 ft
	MD 108 at Auto Drive/ Signal Bell Lane	17.0	B	WBL/T	54.6	D	86 ft
				SBL	23.5	C	100 ft[4]
	MD 108 at Great Star Drive	24.5	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.7	A	12 ft
				NBL	575.0	F	178 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.9	A	6 ft
				SBL	66.4	F	209 ft
PM Peak	MD 108 at Ten Oaks Road	124.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	114.6	F	EBL	311.0	F	368 ft[3]
				SBL	190.7	F	689 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	111.0	F	WBL	169.3	F	1,228 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	41.2	D	WBL/T	88.5	F	369 ft[3,5]
				SBL	15.3	B	3 ft[4]
	MD 108 at Great Star Drive	132.8	F	WBL	118.2	F	445 ft[3]
				SBL	218.6	F	601 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	-	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	-	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

2025 BUILD CONDITIONS WITH OPTION 2 ROADWAY IMPROVEMENTS (ALTERNATIVE A)

Capacity analyses for Option 2 roadway improvements assume that the Option 1 roadway improvements previously discussed will also be constructed. Traffic volumes for 2025 Build Conditions: Alternative A with Option 2 roadway improvements are shown in **Figure 20**. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative A with Option 2 roadway improvements is shown in **Table 14.** For the purposes of the analysis, the proposed Great Star Drive at Daybreak Circle (east) traffic signal was modeled with protected/permissive phasing on the eastbound and westbound Great Star Drive approaches and concurrent phasing with permissive left turns on the northbound and southbound Daybreak Circle (east) approaches. Additionally, the analysis assumes that the proposed signal would operate in coordination with the existing MD 108 at Great Star Drive traffic signal. As shown, the proposed Great Star Drive at Daybreak Circle (east) signalized intersection is projected to operate at LOS 'B' and 'C' during the AM and PM peak hours, respectively. The southbound Daybreak Circle (east) left-turning movement onto Great Star Drive is projected to operate at LOS 'E' and 'F' with projected delays of approximately 59 and 84 seconds during the AM and PM peak hours, respectively, with the installation of a traffic signal. Comparatively, the movement is projected to operate with significantly longer delays without the installation of a traffic signal. The MD 108 at Ten Oaks Road, eastbound MD 32 ramps, westbound MD 32 ramps, and Great Star Drive intersections with Alternative A are projected to operate relatively similar to 2025 Build Conditions without roadway improvements; however, delays increase as compared to the 2025 No-Build Conditions.

Table 14 – Capacity Analysis Summary: Alternative A Parking Structure (614 Parking Spaces)
2025 Build Conditions with Option 2 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	156.0	F	EBL	350.4	F	1038 ft[3]
	MD 108 at EB MD 32 Ramps	101.4	F	EBL	284.2	F	426 ft[3]
				SBL	262.1	F	606 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	50.5	D	WBL	32.5	C	327 ft
	MD 108 at Auto Drive/ Signal Bell Lane	17.4	B	WBL/T	54.6	D	86 ft
				SBL	23.5	C	100 ft[4]
	MD 108 at Great Star Drive	25.0	C	WBL	62.2	E	234 ft[3]
				SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.7	A	12 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	9.0	A	9 ft
				SBL	102.4	F	263 ft
		13.8	B	EBL	2.0	A	10 ft[4]
				SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	124.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	114.7	F	EBL	311.0	F	368 ft[3]
				SBL	191.5	F	689 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	110.9	F	WBL	169.3	F	1,228 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	44.8	D	WBL/T	88.5	F	369 ft[5]
				SBL	15.3	B	3 ft[4]
	MD 108 at Great Star Drive	126.8	F	WBL	166.1	F	468 ft[3,4]
				SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	12.0	B	36 ft
				WBL	9.0	A	7 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.4	B	23 ft
				SBL	Error	-	Error
		24.2	C	EBL	11.1	A	15 ft[4]
				SBL	84.0	F	259 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

2025 BUILD CONDITIONS WITH OPTION 3 ROADWAY IMPROVEMENTS (ALTERNATIVE A)

Capacity analyses were performed to determine the impacts of constructing Option 3 roadway improvements in conjunction with Option 2 roadway improvements (see **Figure 19**) for the Alternative A parking structure. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative A with Option 3 roadway improvements is shown in **Table 15.** Overall intersection delays with 2025 Build Conditions: Alternative A and Option 3 roadway improvements were compared to 2025 No-Build Conditions (i.e., without a Ten Oaks Ballroom event). As shown, overall intersection delays at the study intersections except for MD 108 at Ten Oaks Road are projected to increase by no more than 12 seconds during the AM peak hour. During the PM peak hour, overall intersection delays at the MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane intersections are projected to increase by approximately 37 and 31 seconds, respectively. Overall intersection delays for the MD 108 at Ten Oaks Road, eastbound MD 32 ramps, and Great Star Drive intersections are projected to increase by no more than 15 seconds during the PM peak hour.

Widening northbound MD 108 provides three receiving lanes between Ten Oaks Road at the eastbound MD 32 on-ramp for eastbound Ten Oaks Road left-turning vehicles; therefore, capacity analyses were performed to determine the benefits of providing a third eastbound left-turn lane on the Ten Oaks Road approach to MD 108 as compared to maintaining two eastbound left-turn lanes. Overall intersection delays at MD 108 at Ten Oaks Road with Alternative A will decrease by approximately 32 and 16 seconds during the AM and PM peak hours, respectively, with the construction of a third left-turn lane on the eastbound Ten Oaks Road approach to MD 108. LOS for the intersection will improve to LOS 'D' and 'E' with the third left-turn lane as compared to LOS 'E' and 'F' conditions with two eastbound left-turn lanes during the AM and PM peak hours, respectively. Additionally, eastbound left-turn delays will decrease by approximately 83 and 35 seconds during the AM and PM peak hours, respectively.

Table 15 – Capacity Analysis Summary: Alternative A Parking Structure (614 Parking Spaces)
2025 Build Conditions with Option 3 Roadway Improvements

Peak Hour	Intersection		Overall Intersection		Critical Left-Turn Movements			
			Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	2 EB Left Lanes	73.3	E	EBL	204.8	F	955 ft[3]
		3 EB Left Lanes	41.3	D	EBL	121.8	F	657 ft[3]
	MD 108 at EB MD 32 Ramps		74.4	E	EBL	234.3	F	414 ft[3]
					SBL	154.3	F	552 ft[3,4,5]
	MD 108 at WB MD 32 Ramps		50.3	D	WBL	32.5	C	327 ft
	MD 108 at Auto Drive/Signal Bell Lane		17.5	B	WBL/T	54.6	D	86 ft
					SBL	23.5	C	100 ft[4]
	MD 108 at Great Star Drive		25.0	C	WBL	62.2	E	237 ft[3]
					SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	9.1	A	21 ft
					WBL	8.7	A	12 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	9.0	A	9 ft
					SBL	102.4	F	263 ft
			13.8	B	EBL	2.0	A	10 ft[4]
					SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	Two EB Left Lanes	90.0	F	EBL	265.1	F	767 ft[3]
		Three EB Left Lanes	74.3	E	EBL	230.5	F	567 ft[3]
	MD 108 at EB MD 32 Ramps		98.6	F	EBL	311.0	F	368 ft[3]
					SBL	68.2	E	593 ft[5]
	MD 108 at WB MD 32 Ramps		111.7	F	WBL	169.3	F	1,228 ft[3]
	MD 108 at Auto Drive/Signal Bell Lane		44.6	D	WBL/T	89.0	F	370 ft[5]
					SBL	14.6	B	4 ft[4]
	MD 108 at Great Star Drive		126.3	F	WBL	166.1	F	468 ft[3,4]
					SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	12.0	B	36 ft
					WBL	9.0	A	7 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	11.4	B	23 ft
					SBL	Error	-	Error
			24.2	C	EBL	11.1	B	15 ft[4]
					SBL	84.0	F	259 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

ALTERNATIVE B

2025 BUILD CONDITIONS WITH OPTION 1 ROADWAY IMPROVEMENTS (ALTERNATIVE B)

Capacity analyses were performed to determine the benefits of constructing the Option 1 roadway improvements (i.e., providing a left-turn lane, shared left-turn/through lane, and right-turn lane on the westbound Signal Bell Lane approach to MD 108 and modifying the side street phasing from concurrent to split phasing) for Alternative B following the same methodology as Alternative A. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative B with Option 1 roadway improvements is shown in **Table 16**. As shown, westbound Signal Bell Lane left-turn delays at MD 108 with the implementation of Option 1 roadway improvements are projected to be approximately 84 seconds during the PM hour, a decrease of approximately 4 seconds as compared 2025 Build Conditions: Alternative B with existing lane configurations. Due to the installation of split phasing, the projected decrease in delay is minimal; however, overall operations during ballroom event departures particularly are expected to be improved as compared to conditions without roadway improvements. Additionally, 95th-percentile queues during the PM peak are projected to decrease by approximately 105 feet from approximately 340 feet to approximately 235 feet. With the construction of Option 1 roadway improvements, overall intersection delay at MD 108 at Auto Drive/Signal Bell Lane is projected to be relatively similar to 2025 Build Conditions: Alternative B (i.e., with existing lane configurations) during the AM and PM peak hours. Overall intersection delays at the other study intersections with the implementation of Option 1 roadway improvements will be similar to 2025 Build Conditions: Alternative B.

2025 BUILD CONDITIONS WITH OPTION 2 ROADWAY IMPROVEMENTS (ALTERNATIVE B)

Capacity analyses were performed to determine the benefits of construction the Option 2 roadway improvements for Alternative B following the same methodology as Alternative A. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative B with Option 2 roadway improvements is shown in **Table 17**. With Option 2 roadway improvements, overall intersection delays during the AM and PM peak hours at the MD 108 at Ten Oaks Road, eastbound MD 32 ramps, and westbound MD 32 ramps, Auto Drive/Signal Bell Lane, and MD 108 at Great Star Drive intersections are projected to be relatively similar to those with Option 1 roadway improvements for Alternative B. However, traffic operations at Great Star Drive at Signal Bell Lane/Daybreak Circle (west) and Great Star Drive at Daybreak Circle (east) are projected to improve. With Option 2 roadway improvements for Alternative B, the Great Star Drive at Daybreak Circle (east) intersection is projected to operate at LOS 'B' and 'C' during the AM and PM peak hours, respectively, with the installation of a traffic signal.

Table 16 – Capacity Analysis Summary: Alternative B Parking Structure (429 Parking Spaces)
2025 Build Conditions with Option 1 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	135.6	F	EBL	287.8	F	989 ft[3]
	MD 108 at EB MD 32 Ramps	90.9	F	EBL	265.5	F	384 ft[3]
				SBL	236.9	F	593 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	46.0	D	WBL	33.2	C	329 ft
	MD 108 at Auto Drive/ Signal Bell Lane	16.1	B	WBL/T	54.6	D	86 ft
				SBL	10.4	B	20 ft[4]
	MD 108 at Great Star Drive	25.1	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	10 ft
				NBL	494.1	F	170 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.8	A	6 ft
				SBL	60.2	F	195 ft
PM Peak	MD 108 at Ten Oaks Road	114.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	103.6	F	EBL	311.0	F	368 ft[3]
				SBL	189.9	F	644 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	96.7	F	WBL	150.0	F	1,204 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	37.2	D	WBL/T	84.4	F	233 ft
				SBL	15.0	B	6 ft[4]
	MD 108 at Great Star Drive	130.7	F	WBL	118.2	F	384 ft[3]
				SBL	196.5	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	-	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	-	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

Table 17 – Capacity Analysis Summary: Alternative B Parking Structure (429 Parking Spaces)
2025 Build Conditions with Option 2 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	135.5	F	EBL	287.8	F	989 ft[3]
	MD 108 at EB MD 32 Ramps	90.3	F	EBL	265.5	F	384 ft[3]
				SBL	233.7	F	567 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	46.4	D	WBL	33.2	C	331 ft
	MD 108 at Auto Drive/Signal Bell Lane	16.9	B	WBL/T	54.6	D	86 ft
				SBL	10.0	B	14 ft[4]
	MD 108 at Great Star Drive	25.0	C	WBL	62.3	E	240 ft[3]
				SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	10 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	9.0	A	9 ft
				SBL	92.0	F	247 ft
		13.8	B	EBL	1.9	A	11 ft[4]
				SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	114.4	F	EBL	265.1	F	767 ft[3]
	MD 108 at EB MD 32 Ramps	102.9	F	EBL	311.0	F	368 ft[3]
				SBL	185.8	F	645 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	97.7	F	WBL	150.0	F	1,204 ft[3]
	MD 108 at Auto Drive/Signal Bell Lane	38.8	D	WBL/T	79.8	E	263 ft[5]
				SBL	13.6	B	7 ft[4]
	MD 108 at Great Star Drive	121.3	F	WBL	166.1	F	469 ft[3,4]
				SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	12.0	B	36 ft
				WBL	9.0	A	7 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.4	B	23 ft
				SBL	Error	-	Error
		24.1	C	EBL	9.8	A	14 ft[4]
				SBL	84.0	F	259 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length greater than 95th-pecentile queue length; therefore, 50th-percentile queue is reported

2025 BUILD CONDITIONS WITH OPTION 3 ROADWAY IMPROVEMENTS (ALTERNATIVE B)

Capacity analyses were performed to determine the benefits of constructing the Option 3 roadway improvements for Alternative B following the same methodology as Alternative A. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative B with Option 3 roadway improvements is shown in **Table 18**. Overall intersection delays with 2025 Build Conditions: Alternative B and Option 3 roadway improvements were compared to 2025 No-Build Conditions (i.e., without a Ten Oaks Ballroom event). As shown, overall intersection delays at the study intersections except for MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane during the PM peak hour are projected to increase by no more than 8 seconds. During the PM peak hour, overall intersection delays at the MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane intersections are projected to increase by approximately 24 and 25 seconds, respectively.

Installing a third eastbound left-turn lane on the Ten Oaks Road approach to MD 108 was considered for Alternative B similar to Alternative A. Overall intersection delays at MD 108 at Ten Oaks Road with Alternative B will decrease by approximately 28 and 16 seconds during the AM and PM peak hours, respectively, with the construction of a third left-turn lane as compared to conditions with Option 3 roadway improvements with two left-turn lanes, similar to existing conditions. Overall intersection level of service would improve to LOS 'D' and 'E' during the AM and PM peak hours, respectively.

Table 18 – Capacity Analysis Summary: Alternative B Parking Structure (429 Parking Spaces)
2025 Build Conditions with Option 3 Roadway Improvements

Peak Hour	Intersection		Overall Intersection		Critical Left-Turn Movements			
			Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	Two EB Left Lanes	67.6	E	EBL	193.1	F	930 ft[3]
		Three EB Left Lanes	39.3	D	EBL	113.4	F	639 ft[3]
	MD 108 at EB MD 32 Ramps		67.2	E	EBL	265.5	F	384 ft[3]
					SBL	94.9	F	507 ft[3,4,5]
	MD 108 at WB MD 32 Ramps		45.4	D	WBL	33.2	C	331 ft
	MD 108 at Auto Drive/Signal Bell Lane		16.8	B	WBL/T	54.6	D	86 ft
					SBL	10.5	B	19 ft[4]
	MD 108 at Great Star Drive		25.5	C	WBL	62.3	E	240 ft[3]
					SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	9.1	A	21 ft
					WBL	8.6	A	10 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	9.0	A	9 ft
					SBL	92.0	F	247 ft
			13.8	B	EBL	1.9	A	11 ft[4]
					SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	Two EB Left Lanes	81.9	F	EBL	241.6	F	755 ft[3]
		Three EB Left Lanes	65.6	E	EBL	205.0	F	554 ft3
	MD 108 at EB MD 32 Ramps		91.2	F	EBL	311.0	F	368 ft[3]
					SBL	63.9	E	557 ft[4,5]
	MD 108 at WB MD 32 Ramps		98.6	F	WBL	150.0	F	1,204 ft[3]
	MD 108 at Auto Drive/Signal Bell Lane		37.7	D	WBL/T	79.8	E	263 ft
					SBL	12.7	B	6 ft[4]
	MD 108 at Great Star Drive		121.2	F	WBL	166.1	F	468 ft[3,4]
					SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	12.0	B	36 ft
					WBL	9.0	A	7 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	11.4	B	23 ft
					SBL	Error	-	Error
			24.3	C	EBL	10.5	B	14 ft[4]
					SBL	84.0	F	259 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length greater than 95th-pecentile queue length; therefore, 50th-percentile queue is reported

ALTERNATIVE C

2025 BUILD CONDITIONS WITH OPTION 1 ROADWAY IMPROVEMENTS (ALTERNATIVE C)

Capacity analyses were performed to determine the benefits of constructing the Option 1 roadway improvements (i.e., providing a left-turn lane, shared left-turn/through lane, and right-turn lane on the westbound Signal Bell Lane approach to MD 108 and modifying the side street phasing from concurrent to split phasing) for Alternative C following the same methodology as Alternatives A and B. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative C with Option 1 roadway improvements is shown in **Table 19**. As shown, westbound Signal Bell Lane left-turn delays at MD 108 with the implementation of Option 1 roadway improvements are projected to be approximately 79 seconds during the PM hour, an increase of approximately 8 seconds as compared to 2025 Build Conditions: Alternative C with existing lane configurations. The projected minor increase in delay is due to change from concurrent to split phasing; however, overall operations during ballroom event departures particularly are expected to be improved as compared to conditions without roadway improvements. Additionally, 95th-percentile queues are projected to decrease by approximately 120 feet from approximately 305 feet to approximately 185 feet. With the construction of Option 1 roadway improvements, overall intersection delay at MD 108 at Auto Drive/Signal Bell Lane is projected to be relatively similar to 2025 Build Conditions: Alternative C (i.e., with existing lane configurations) during the AM and PM peak hours. Overall intersection delays at the other study intersections with the implementation of Option 1 roadway improvements will be similar to 2025 Build Conditions: Alternative C.

2025 BUILD CONDITIONS WITH OPTION 2 ROADWAY IMPROVEMENTS (ALTERNATIVE C)

Capacity analyses were performed to determine the benefits of construction the Option 2 roadway improvements for Alternative C following the same methodology as Alternatives A and B. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative C with Option 2 roadway improvements is shown in **Table 20**. With Option 2 roadway improvements, overall intersection delays during the AM and PM peak hours at the MD 108 at Ten Oaks Road, eastbound MD 32 ramps, and westbound MD 32 ramps, Auto Drive/Signal Bell Lane, and MD 108 at Great Star Drive intersections are projected to be relatively similar to those with Option 1 roadway improvements for Alternative C. However, traffic operations at Great Star Drive at Signal Bell Lane/Daybreak Circle (west) and Great Star Drive at Daybreak Circle (east) are projected to improve. With Option 2 roadway improvements for Alternative C, the Great Star Drive at Daybreak Circle (east) intersection is projected to operate at LOS 'B' and 'C' during the AM and PM peak hours, respectively, with the installation of a traffic signal.

Table 19 – Capacity Analysis Summary: Alternative C Parking Structure (302 Parking Spaces)
2025 Build Conditions with Option 1 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	118.2	F	EBL	277.8	F	972 ft[3]
	MD 108 at EB MD 32 Ramps	82.3	F	EBL	267.5	F	353 ft[3]
				SBL	190.8	F	569 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	42.5	D	WBL	34.3	C	336 ft
	MD 108 at Auto Drive/ Signal Bell Lane	16.2	B	WBL/T	54.6	D	86 ft
				SBL	6.4	A	9 ft[4]
	MD 108 at Great Star Drive	25.1	C	WBL	65.3	E	232 ft[3]
				SBL	46.3	D	350 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	9 ft
				NBL	438.4	F	164 ft
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.8	A	6 ft
				SBL	56.2	F	186 ft
PM Peak	MD 108 at Ten Oaks Road	111.4	F	EBL	241.6	F	755 ft[3]
	MD 108 at EB MD 32 Ramps	95.9	F	EBL	311.0	F	368 ft[3]
				SBL	114.3	F	551 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	87.8	F	WBL	141.1	F	1,192 ft[3]
	MD 108 at Auto Drive/ Signal Bell Lane	31.0	C	WBL/T	79.3	E	185 ft
				SBL	13.1	B	6 ft[4]
	MD 108 at Great Star Drive	127.8	F	WBL	106.8	F	436 ft[3]
				SBL	196.3	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	11.1	B	31 ft
				WBL	9.0	A	7 ft
				NBL	Error	-	Error
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.1	B	18 ft
				SBL	Error	-	Error

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length shown

Table 20 – Capacity Analysis Summary: Alternative C Parking Structure (302 Parking Spaces)
2025 Build Conditions with Option 2 Roadway Improvements

Peak Hour	Intersection	Overall Intersection		Critical Left-Turn Movements			
		Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	118.2	F	EBL	277.8	F	957 ft[3]
	MD 108 at EB MD 32 Ramps	82.3	F	EBL	267.5	F	353 ft[3]
				SBL	190.8	F	569 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	42.5	D	WBL	34.3	C	334 ft
	MD 108 at Auto Drive/Signal Bell Lane	17.1	B	WBL/T	54.6	D	86 ft
				SBL	6.2	A	9 ft[4]
	MD 108 at Great Star Drive	25.6	C	WBL	62.5	E	238 ft[3]
				SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	9.1	A	21 ft
				WBL	8.6	A	9 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	8.9	A	9 ft
				SBL	85.1	F	235 ft
		13.8	B	EBL	1.9	A	11 ft[4]
				SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	111.4	F	EBL	241.6	F	720 ft[3]
	MD 108 at EB MD 32 Ramps	95.9	F	EBL	311.0	F	368 ft[3]
				SBL	114.2	F	551 ft[3,4,5]
	MD 108 at WB MD 32 Ramps	87.7	F	WBL	141.1	F	1,192 ft[3]
	MD 108 at Auto Drive/Signal Bell Lane	34.6	C	WBL/T	74.2	E	182 ft
				SBL	16.9	B	7 ft[4]
	MD 108 at Great Star Drive	118.4	F	WBL	166.1	F	469 ft[3,4]
				SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	*Unsignalized*		EBL	12.0	B	36 ft
				WBL	9.0	A	7 ft
				NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)	*Unsignalized*		EBL	11.4	B	22 ft
				SBL	Error	-	Error
		24.1	C	EBL	8.7	A	13 ft[4]
				SBL	84.0	F	259 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length greater than 95th-pecentile queue length; therefore, 50th-percentile queue is reported

2025 BUILD CONDITIONS WITH OPTION 3 ROADWAY IMPROVEMENTS (ALTERNATIVE C)

Capacity analyses were performed to determine the benefits of constructing the Option 3 roadway improvements for Alternative C following the same methodology as Alternatives A and B. A summary of delays, LOS, and 95th-percentile queue lengths for 2025 Build Conditions: Alternative C with Option 3 roadway improvements is shown in **Table 21**. Overall intersection delays with 2025 Build Conditions: Alternative C and Option 3 roadway improvements were compared to 2025 No-Build Conditions (i.e., without a Ten Oaks Ballroom event). As shown, overall intersection delays at the study intersections except for MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane during the PM peak hour are projected to increase by no more than 6 seconds. During the PM peak hour, overall intersection delays at the MD 108 at westbound MD 32 ramps and MD 108 at Auto Drive/Signal Bell Lane intersections are projected to increase by approximately 16 and 19 seconds, respectively.

Installing a third eastbound left-turn lane on the Ten Oaks Road approach to MD 108 was considered for Alternative C similar to Alternative A. Overall intersection delays at MD 108 at Ten Oaks Road with Alternative C will decrease by approximately 19 and 14 seconds during the AM and PM peak hours, respectively, with the construction of a third left-turn lane as compared to conditions with Option 3 roadway improvements with two left-turn lanes, similar to existing conditions. Overall intersection level of service would improve to LOS 'D' during the AM peak hour.

Table 21 – Capacity Analysis Summary: Alternative C Parking Structure (302 Parking Spaces)
2025 Build Conditions with Option 3 Roadway Improvements

Peak Hour	Intersection		Overall Intersection		Critical Left-Turn Movements			
			Delay[1] (sec)	LOS[2]	Critical Movement	Delay[1] (sec)	LOS[2]	95th-Percentile Queue Length (feet)
AM Peak	MD 108 at Ten Oaks Road	Two EB Left Lanes	60.1	E	EBL	169.5	F	901 ft[3]
		Three EB Left Lanes	40.9	D	EBL	122.6	F	639 ft[3]
	MD 108 at EB MD 32 Ramps		67.1	E	EBL	267.5	F	353 ft[3]
					SBL	104.8	F	515 ft[3,4,5]
	MD 108 at WB MD 32 Ramps		42.3	D	WBL	34.3	C	336 ft
	MD 108 at Auto Drive/Signal Bell Lane		17.1	B	WBL/T	54.6	D	86 ft
					SBL	6.2	A	9 ft[4]
	MD 108 at Great Star Drive		25.7	C	WBL	62.5	E	238 ft[3]
					SBL	52.5	D	368 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	9.1	A	21 ft
					WBL	8.6	A	9 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	8.9	A	9 ft
					SBL	85.1	F	235 ft
			13.8	B	EBL	1.9	A	11 ft[4]
					SBL	59.4	E	180 ft
PM Peak	MD 108 at Ten Oaks Road	Two EB Left Lanes	75.8	E	EBL	220.1	F	743 ft[3]
		Three EB Left Lanes	61.5	E	EBL	205.0	F	554 ft[3]
	MD 108 at EB MD 32 Ramps		87.0	F	EBL	311.0	F	368 ft[3]
					SBL	61.3	E	533 ft[4,5]
	MD 108 at WB MD 32 Ramps		90.6	F	WBL	141.1	F	1,192 ft[3]
	MD 108 at Auto Drive/Signal Bell Lane		32.5	C	WBL/T	74.2	E	182 ft
					SBL	11.8	B	6 ft[4]
	MD 108 at Great Star Drive		117.1	F	WBL	166.3	F	470 ft[3,4]
					SBL	197.2	F	588 ft[3]
	Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)		*Unsignalized*		EBL	12.0	B	36 ft
					WBL	9.0	A	7 ft
					NBL	*Movement Prohibited*		
	Great Star Drive at Daybreak Circle (east)		*Unsignalized*		EBL	11.4	B	22 ft
					SBL	Error	-	Error
			24.3	C	EBL	9.3	A	14 ft[4]
					SBL	83.4	F	256 ft[3]

[1] Delay – Average delay per approach vehicle (seconds)
[2] LOS – Level of Service
[3] Volume exceeds capacity; queue length may exceed calculated 95th-percentile queue length
[4] Volume for 95th-percentile queue is metered by upstream signal
[5] 50th-percentile queue length greater than 95th-pecentile queue length; therefore, 50th-percentile queue is reported

VIII. CRITICAL LANE VOLUME (CLV) TRAFFIC ANALYSIS

Maryland State Highway Administration's (SHA) *Guidelines for Traffic Impact Reports/Studies*, requires all intersections be analyzed using Critical Lane Volume (CLV) analysis. The guidelines further state that "in certain circumstances other methodologies, including the *Highway Capacity Manual* (HCM), might be appropriate to identify operational problems." Intersections resulting in level of service worse than 'D' must be identified and improvements should be recommended. The *Howard County Design Manual* (Volume III) requires SHA's CLV analysis procedures be used and that LOS 'D' be the minimum LOS used for the purposes of planning road and intersection projects. As such, CLV analyses were performed to supplement the *Synchro* (HCM methodologies) capacity analyses. CLV analysis is based on traffic volumes, lane configurations, and traffic operations (e.g., signal phasing) and provides overall intersection LOS based on the sum of the critical volumes. Left-turn phasing, signal timing (i.e., cycle lengths, splits, signal coordination), impacts of adjacent intersections, and pedestrians do not impact LOS for CLV analysis. *Synchro* (HCM methodologies) provides additional of measures of effectiveness (MOE's), such as delay and LOS on a lane group, approach, or overall intersection level.

A summary of the level of service based on CLV analyses, for the seven study intersections is shown in **Table 22**. As shown, the MD 108 at Ten Oaks Road, MD 108 at eastbound MD 32 ramps, MD 108 at westbound MD 32 ramps, and MD 108 at Great Star Drive intersections are projected to operate at LOS 'F' during 2025 No-Build Conditions (i.e., without a Ten Oaks Ballroom event) during at least one peak hour. The MD 108 at Auto Drive/Signal Bell Lane, Great Star Drive at Signal Bell Lane/Daybreak Circle (west), and Great Star Drive at Daybreak Circle (east) intersections are projected to operate at LOS 'C' during 2025 No-Build Conditions during at least one peak hour.

The MD 108 at Ten Oaks Road intersection is projected to operate at LOS 'F' with all Alternatives A, B, and C with 2025 Build, 2025 Build with Option 1 roadway improvements, 2025 Build with Option 2 roadway improvements conditions. During the PM peak hour with 2025 Build Conditions with Option 3 roadway improvements, MD 108 at Ten Oaks Road is projected to operate at LOS 'E' with Alternative A and at LOS 'D' with Alternative B and C. The MD 108 at eastbound MD 32 ramps intersection is projected to operate at LOS 'F' during all future scenarios during both the AM and PM peak hours. The MD 108 at westbound MD 32 ramps intersection is projected to operate at LOS 'E' and 'F' during the AM and PM peak hours, respectively, during all 2025 Build scenarios. The MD 108 at Great Star Drive intersection is projected to operate at LOS 'C' and 'F' during the AM and PM peak hours, respectively, during all future scenarios.

During the PM peak hour, the MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'D' with 2025 Build Conditions, 2025 Build Conditions with Option 2 roadway improvements, and 2025 Build Conditions with Option 3 roadway improvements for Alternative A and with 2025 Build Conditions for Alternative B. Otherwise, the MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'C' during all future scenarios.

The Great Star Drive at Signal Bell Lane/Daybreak Circle (west) and Great Star Drive at Daybreak Circle (east) intersections are projected to operate at LOS 'C' or better during both the AM and PM peak hours during all future scenarios.

Table 22 – Intersection Level of Service Summary: Critical Lane Volume (CLV)

Intersection	Overall Intersection Level of Service[1,2] Critical Lane Volume (CLV)												
	Existing	2025 No-Build	Alternative A (614 Parking Spaces)				Alternative B (429 Parking Spaces)				Alternative C (302 Parking Spaces)			
			2025 Build	2025 Build w/Opt 1	2025 Build w/Opt 2	2025 Build w/Opt 3	2025 Build	2025 Build w/Opt 1	2025 Build w/Opt 2	2025 Build w/Opt 3	2025 Build	2025 Build w/Opt 1	2025 Build w/Opt 2	2025 Build w/Opt 3
MD 108 at Ten Oaks Road	C (1,193) B (1,069)	F (1,773) F (1,679)	F (1,817) F (1,768)			**2 EB Left Lanes:** D (1,357) E (1,475) **3 EB Left Lanes:** B (1,111) E (1,473)	F (1,801) F (1,736)			**2 EB Left Lanes:** D (1,341) D (1,431) **3 EB Left Lanes:** B (1,100) D (1,429)	F (1,791) F (1,714)			**2 EB Left Lanes:** D (1,330) D (1,400) **3 EB Left Lanes:** B (1,093) D (1,398)
MD 108 at Eastbound MD 32 Ramps	B (1,147) B (1,010)	F (1,839) F (1,607)	F (1,976) F (1,693)			F (1,976) F (1,693)	F (1,927) F (1,662)			F (1,927) F (1,662)	F (1,893) F (1,641)			F (1,893) F (1,641)
MD 108 at Westbound MD 32 Ramps	A (893) C (1,163)	D (1,445) F (1,813)	E (1,526) F (1,989)				E (1,497) F (1,926)				E (1,477) F (1,883)			
MD 108 at Auto Drive/Signal Bell Lane	A (751) A (672)	C (1,218) B (1,097)	C (1,223) D (1,416)	C (1,200) C (1,264)	C (1,200) D (1,326)		C (1,221) D (1,301)	C (1,198) C (1,194)	C (1,198) C (1,256)		C (1,220) C (1,222)	C (1,197) C (1,146)	C (1,197) C (1,208)	
MD 108 at Great Star Drive	A (682) A (992)	C (1,153) F (1,606)	C (1,153) F (1,677)		C (1,185) F (1,681)		C (1,153) F (1,651)		C (1,187) F (1,655)		C (1,153) F (1,634)		C (1,187) F (1,638)	
Great Star Drive at Signal Bell Lane/ Daybreak Circle (west)	A (555) A (855)	A (876) C (1,270)	A (876) C (1,270)		A (592) B (1,061)		A (876) C (1,270)		A (592) B (1,040)		A (876) C (1,270)		A (592) B (1,024)	
Great Star Drive at Daybreak Circle (east)	A (445) A (792)	A (724) C (1,182)	A (775) C (1,182)		A (803) C (1,213)		A (757) C (1,182)		A (785) C (1,210)		A (744) C (1,182)		A (772) C (1,207)	

[1] Level of Service (Total Critical Lane Volume) – AM/PM peak hour
[2] CLV Level of Service Criteria: A ≤ 1,000
B ≤ 1,150
C ≤ 1,300
D ≤ 1,450
E ≤ 1,600
F > 1,600

IX. SUMMARY OF FINDINGS

This study documents the existing parking availability and parking demand associated with the Ten Oaks Parking Lot, which serves Park and Ride patrons, Ten Oaks Ballroom patrons, and Fifth District Volunteer Fire Department staff and visitors. Based on an evaluation of geometric, right-of-way, and zoning constraints and existing and projected parking demand, three parking expansion alternatives were identified for the Ten Oaks Parking Lot. A maximum of 614, 419, and 302 parking spaces (shared by Park and Ride users and Ten Oaks Ballroom patrons) could be accommodated by Alternative A, Alternative B, and Alternative C parking structures, respectively. The three proposed alternatives would provide an increase of 410, 215, and 98 parking spaces, respectively, within the Ten Oaks Parking Lot. It should be noted that the extra 10 parking spaces required to accommodate a 400-person event while maintaining the Park and Ride can be provided via parallel parking along the east side of Signal Bell Road, between the Ten Oaks Ballroom and Great Star Drive. As such, the Alternative B analysis accounts for these 10 additional parking spaces outside the Ten Oaks Parking Lot. Based on observations, a review of industry standards, the assumed parking demand rate, and maintaining the current Park and Ride location, Alternative A would accommodate an event of approximately 605 to 695 patrons; Alternative B would accommodate an event of approximately 387 to 445 patrons; and Alternative C would accommodate an event of approximately 238 to 273 patrons. While not all events will fill the proposed parking capacity and have event arrivals and departures that overlap with the peak hours of the adjacent roadway network, evaluating these scenarios (i.e., Build Conditions) is a conservative approach. The traffic impacts associated with the proposed expansion of the Ten Oaks Parking Lot were evaluated and traffic mitigation improvements were identified and evaluated for their effectiveness. In addition to the 2025 No-Build and Build Conditions, the following roadway improvement options were evaluated for each of the three parking structure alternatives.

- **Option 1** – Provide a left-turn lane, shared left-turn/through lane, and a separate right-turn lane on the westbound Signal Bell Lane approach to MD 108 and modify signal phasing on the eastbound Auto Drive and westbound Signal Bell Lane approaches to MD 108 from concurrent phasing with permissive left turns to split phasing

- **Option 2** – Construct Option 1 roadway improvements and construct channelization to permit right-in/right-out/left-in only operations on the south leg of the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection (additionally, the Great Star Drive at Daybreak Circle (east) intersection was considered both as a signalized and as an unsignalized intersection)

- **Option 3** – Construct Option 2 roadway improvements and construct long-term roadway improvements recommended as part of the draft *Multimodal Traffic Study and Conceptual Improvements: Clarksville Pike (MD 108)* (i.e., constructing an additional travel lane along MD 108 from Guilford Road to the eastbound MD 32 Ramps intersection; additionally, installing a signal at the Great Star Drive at Daybreak Circle (east) intersection was considered)

A summary of overall intersection level of service (*Synchro* HCM methodologies) for each scenario analyzed is shown in **Table 23**. As shown, the MD 108 at Ten Oaks Road intersection is projected to operate at LOS 'F' during 2025 No-Build Build Conditions with all three alternatives except with the construction of Option 3 roadway improvements. With the Option 3 roadway improvements, the MD 108 at Tens Oaks

Road intersection is projected to operate at LOS 'E' except during the PM peak hour with Alternatives A and B, when the intersection will operate at LOS 'F'. The MD 108 at eastbound MD 32 ramps intersection operates at LOS 'E' with 2025 No-Build Conditions and with 2025 Build Conditions with Option 3 roadway improvements for all three alternatives during the AM peak hour and operates at LOS 'F' during all other scenarios. The MD 108 at westbound MD 32 ramps intersection is projected to operate at LOS 'D' during the AM peak hour with 2025 No-Build and all 2025 Build Conditions. During the PM peak hour, the MD 108 at westbound MD 32 ramps intersection is projected to operate at LOS 'E' with 2025 No-Build Conditions and at LOS 'F' with all 2025 Build Conditions. With 2025 No-Build and all 2025 Build Conditions, the MD 108 at Great Star Drive intersection is projected to operate at LOS 'C' and 'F' during the AM and PM peak hours, respectively.

During the AM peak hour, the MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'B' with 2025 No-Build and all 2025 Build Conditions. Without construction of roadway improvements on the westbound Signal Bell Lane approach to MD 108, the intersection is projected to operate at LOS 'E', 'D', and 'C' with Alternative A, Alternative B, and Alternative C parking structures, respectively, during the PM peak hour. With the installation of roadway improvements, the intersection is projected to operate LOS 'D' with Alternatives A and B and LOS 'C' with Alternative C.

The northbound Signal Bell Lane left-turn movement onto Great Star Drive will operate at LOS 'F' during both the AM and PM peak hours during 2025 No-Build and Build Conditions without the construction of Option 2 or 3 roadway improvements (the movement is prohibited in these scenarios), similar to existing conditions. The southbound Daybreak Circle (east) left-turn movement onto Great Star Drive will operate at LOS 'F' during 2025 No-Build and all 2025 Build Conditions without the implementation of Option 2 or 3 roadway improvements, similar to the PM peak hour during existing conditions. With 2025 Build Conditions and Option 2 and 3 roadway improvements, assuming the Great Star Drive at Daybreak Circle (east) intersection will be signalized, the overall intersection is projected to operate at LOS 'B' and 'C' during the AM and PM peak hours, respectively. While these intersections are impacted by the proposed Ten Oaks Parking Lot expansion, it should be noted that the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) and Daybreak Circle (east) intersections will not operate at an acceptable LOS with 2025 No-Build traffic conditions without the Ten Oaks Parking Lot expansion. Additionally, while widening MD 108 will increase capacity at the MD 32 interchange and improve LOS, this improvement would require bridge widening and is beyond the scope of this study.

Additionally, Critical Lane Volume (CLV) analyses was performed for the seven study intersections for all scenarios analyzed. Based on CLV analysis, the MD 108 at Ten Oaks Road intersection is projected to operate at LOS 'F' during all future scenarios without the installation of Option 3 roadway improvements. The MD 108 at eastbound MD 32 ramps, MD 108 at westbound MD 32 ramps, and MD 108 at Great Star Drive intersections are projected to operate at LOS 'F' during at least one peak hour during all future scenarios. The MD 108 at Auto Drive/Signal Bell Lane intersection is projected to operate at LOS 'D' or better during all future scenarios. Additionally, the Great Start Drive at Signal Bell Lane/Daybreak Circle (west) and Great Star Drive at Daybreak Circle (east) intersections are projected to operate at LOS 'C' or better during all future scenarios.

Based on the analyses and field observations during ballroom event arrivals and departures, if the proposed Ten Oaks Parking Lot expansion (i.e., Alternative A, Alternative B, or Alternative C) is constructed,

roadway improvements at the MD 108 at Auto Drive/Signal Bell Lane, Great Star Drive at Signal Bell Lane/Daybreak Circle (west), and Great Star Drive at Daybreak Circle (east) intersections described in Option 2 are recommended. Additionally, relocating the Clarksville Park and Ride should be considered to minimize the impacts to the existing parking lot, provide additional parking for Ballroom events, and/or reduce impacts to the surrounding roadway network. A summary of costs for each Alternative plus Option 2 roadway improvements are shown in **Table 24** below.

Based on discussions with Howard County Department of Public Works and Fifth District Volunteer Fire Department, pursing construction of a single-story parking deck structure (i.e., Alternative C) and maintaining the Park and Ride is recommended for both financial and aesthetic reasons, which would provide 302 parking spaces on the property. A variant of a structure designed to accommodate future expansion to three or four levels would provide 317 parking spaces. Additionally, widening the westbound Signal Bell Lane approach to MD 108 to provide a left-turn lane, shared left-turn/through lane, and a right-turn lane, modifying the signal phasing on the eastbound Auto Drive and westbound Signal Bell Lane approaches to MD 108 from concurrent phasing with permissive left turns to split phasing, and construction channelization to permit right-in/right-out/left-in only operations on the south leg of the Great Star Drive at Signal Bell Lane/Daybreak Circle (west) intersection (i.e., Option 2 roadway improvements) is recommended.

Table 23 – Intersection Level of Service Summary: *Synchro (HCM Methodologies)*

Intersection	Overall Intersection Level of Service[1] *Synchro* (HCM Methodologies)													
	Existing	2025 No-Build	Alternative A (614 Parking Spaces)				Alternative B (429 Parking Spaces)				Alternative C (302 Parking Spaces)			
			2025 Build[2]	2025 Build w/Opt 1[2]	2025 Build w/Opt 2[2]	2025 Build w/Opt 3[2]	2025 Build[2]	2025 Build w/Opt 1[2]	2025 Build w/Opt 2[2]	2025 Build w/Opt 3[2]	2025 Build[2]	2025 Build w/Opt 1[2]	2025 Build w/Opt 2[2]	2025 Build w/Opt 3[2]
MD 108 at Ten Oaks Road	D (D)	F (F)	F (F) +67% (+24%)	F (F) +67% (+24%)	F (F) +67% (+24%)	**2 EB Left Lanes:** E (F) -21% (-10%) **3 EB Left Lanes:** D (E) -56% (-26%)	F (F) +45% (+14%)	F (F) +45% (+14%)	F (F) +45% (+14%)	**2 EB Left Lanes:** E (F) -28% (-18%) **3 EB Left Lanes:** D (E) -58% (-44%)	F (F) +27% (+11%)	F (F) +27% (+11%)	F (F) +27% (+11%)	**2 EB Left Lanes:** E (E) -36% (-25%) **3 EB Left Lanes:** D (E) -56% (-39%)
MD 108 at Eastbound MD 32 Ramps	C (C)	E (F)	F (F) +42% (+37%)	F (F) +40% (+37%)	F (F) +40% (+37%)	E (F) +3% (+18%)	F (F) +25% (+24%)	F (F) +26% (+24%)	F (F) +25% (+23%)	E (F) -7% (+9%)	F (F) +14% (+15%)	F (F) +14% (+15%)	F (F) +14% (+15%)	E (F) -7% (+4%)
MD 108 at Westbound MD 32 Ramps	C (C)	D (E)	D (F) +36% (+50%)	D (F) +32% (+48%)	D (F) +32% (+48%)	D (F) +31% (+49%)	D (F) +26% (+31%)	D (F) +20% (+29%)	D (F) +21% (+30%)	D (F) +19% (+31%)	D (F) +15% (+19%)	D (F) +11% (+17%)	D (F) +11% (+17%)	D (F) +10% (+21%)
MD 108 at Auto Drive/Signal Bell Lane	B (B)	B (B)	B (E) +18% (+389%)	B (D) +44% (+212%)	B (D) +47% (+239%)	B (D) +48% (+238%)	B (D) 0% (+168%)	B (D) +36% (+182%)	B (D) +43% (+194%)	B (D) +42% (+186%)	B (C) +0% (+86%)	B (C) +37% (+135%)	B (C) +45% (+162%)	B (C) +45% (+146%)
MD 108 at Great Star Drive	B (D)	C (F)	C (F) -8% (+8%)	C (F) -6% (+9%)	C (F) -5% (+4%)	C (F) -5% (+4%)	C (F) -5% (+5%)	C (F) -4% (+7%)	C (F) -5% (0%)	C (F) -3% (+0%)	C (F) -3% (+3%)	C (F) -4% (+5%)	C (F) -2% (-3%)	C (F) -2% (-4%)
Great Star Drive at Signal Bell Lane/ Daybreak Circle (west) (NB left-turn)	F (F)	F (Error)	F (Error) +58% (n/a)	F (Error) +58% (n/a)	*Movement Prohibited*		F (Error) +36% (n/a)	F (Error) +36% (n/a)	*Movement Prohibited*		F (Error) +21% (n/a)	F (Error) +21% (n/a)	*Movement Prohibited*	
Great Star Drive at Daybreak Circle (east)	C (F) (SB left-turn)	F (Error) (SB left-turn)	F (Error) +31% (n/a) (SB left-turn)	F (Error) +31% (n/a) (SB left-turn)	B (C) n/a (n/a)	B (C) n/a (n/a)	F (Error) +19% (n/a) (SB left-turn)	F (Error) +19% (n/a) (SB left-turn)	B (C) n/a (n/a)	B (C) n/a (n/a)	F (Error) +11% (n/a) (SB left-turn)	F (Error) +11% (n/a) (SB left-turn)	B (C) n/a (n/a)	B (C) n/a (n/a)

[1] AM (PM) peak hour
[2] Percentage change in overall intersection delay compared to 2025 No-Build Conditions is shown

Table 24 – Total Cost Summary (Park and Ride Relocation Not Included)

Parking Alternative	Total Ballroom Spaces	Net Spaces Gained[1]	Estimated Garage Cost (Millions)[2]	Estimated Option 2 Roadway Improvement Cost (Millions)	Estimated Total Cost (Millions)
Alternative A	614	410[3]	$12.5	$1.0	$13.5
Alternative B	419	215[3]	$7.9	$1.0	$8.9
Alternative C	302	98[3]	$4.5	$1.0	$5.5
Alternative C-1	317	113[3]	$6.7	$1.0	$7.7

[1] The Park & Ride uses about 90 spaces on weekdays; 90 additional spaces can be "gained" by Park & Ride relocation.
[2] May not include the desired level of architectural finish.
[3] Does not include 14 parallel parking spaces which can be added via restriping Signal Bell Lane

Appendix A: Existing Traffic Counts

Maryland State Highway Administration
Highway Information Services Division
Turning Movement Count Study - Field Sheet

Station ID: S2000130045 **County:** Howard **Comments:** LOS AM:A PM:C

Date: Thursday 12/12/2002 **Town:** none

Location: MD 108 at Ten Oaks Rd **Weather:**

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:30	09:30	2143		16:30	17:30	2835

Hour	TEN OAKS RD From North				EXXON GAS STATION From South				MD 108 From East				MD 108 From West				Grand Total
Begin	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	
6:00	26	2	2	30	0	0	0	0	1	74	10	85	1	54	0	55	170
6:15	35	1	3	39	0	0	0	0	0	98	13	111	3	98	2	103	253
6:30	34	7	4	45	0	0	2	2	2	119	21	142	1	117	1	119	308
6:45	50	0	6	56	0	1	2	3	0	138	42	180	2	109	3	114	353
7:00	70	1	5	76	0	1	0	1	0	176	65	241	1	106	1	108	426
7:15	71	3	4	78	0	1	1	2	0	152	84	236	1	122	12	135	451
7:30	129	1	7	137	0	0	1	1	0	141	73	214	6	120	5	131	483
7:45	107	3	6	116	0	1	1	2	0	168	85	253	7	163	3	173	544
8:00	90	3	5	98	0	2	3	5	1	182	79	262	4	172	6	182	547
8:15	95	2	5	102	0	0	1	1	1	203	75	279	7	132	10	149	531
8:30	**101**	**2**	**8**	**111**	**0**	**0**	**1**	**1**	**0**	**140**	**86**	**226**	**6**	**158**	**6**	**170**	**508**
8:45	**116**	**2**	**9**	**127**	**1**	**0**	**0**	**1**	**0**	**166**	**73**	**239**	**10**	**155**	**1**	**166**	**533**
9:00	**110**	**2**	**14**	**126**	**1**	**0**	**0**	**1**	**0**	**172**	**73**	**245**	**4**	**159**	**1**	**164**	**536**
9:15	**104**	**0**	**3**	**107**	**0**	**0**	**1**	**1**	**5**	**181**	**67**	**253**	**7**	**195**	**3**	**205**	**566**
9:30	71	3	11	85	3	0	0	3	1	154	66	221	3	132	4	139	448
9:45	81	2	12	95	1	0	2	3	3	180	70	253	5	174	6	185	536
10:00	92	1	17	110	3	1	0	4	3	167	51	221	8	156	2	166	501
10:15	74	2	8	84	2	3	3	8	3	146	59	208	10	179	7	196	496
10:30	83	3	5	91	1	0	4	5	5	125	34	164	4	117	2	123	383
10:45	58	0	4	62	1	0	0	1	1	104	58	163	2	152	4	158	384
11:00	69	5	6	80	0	0	0	0	1	109	59	169	3	148	2	153	402
11:15	60	3	7	70	0	0	1	1	1	118	40	159	4	125	1	130	360
11:30	60	1	4	65	1	1	2	4	5	102	43	150	4	136	3	143	362
11:45	50	4	5	59	0	0	2	2	0	108	42	150	3	99	2	104	315
12:00	62	2	7	71	0	0	1	1	1	87	61	149	3	96	2	101	322
12:15	54	2	6	62	0	0	1	1	4	84	55	143	2	110	2	114	320
12:30	62	1	6	69	1	1	0	2	3	95	63	161	5	115	2	122	354
12:45	57	0	6	63	1	3	1	5	1	114	68	183	2	121	0	123	374
13:00	53	2	2	57	0	1	0	1	3	106	62	171	2	108	2	112	341
13:15	73	1	2	76	0	0	1	1	2	104	51	157	4	129	0	133	367
13:30	37	3	3	43	0	1	0	1	3	210	49	262	4	115	0	119	425
13:45	47	1	4	52	4	1	2	7	5	136	51	192	4	104	3	111	362
14:00	42	1	2	45	1	0	2	3	3	129	54	186	3	146	0	149	383
14:15	44	0	2	46	0	0	0	0	1	135	66	202	5	137	0	142	390
14:30	54	1	7	62	0	1	0	1	3	148	60	211	3	135	1	139	413
14:45	58	2	7	67	0	0	1	1	2	144	81	227	1	145	4	150	445
15:00	68	0	8	76	1	0	1	2	10	149	82	241	4	153	1	158	477
15:15	87	1	10	98	4	0	2	6	2	146	116	264	5	212	3	220	588
15:30	74	2	11	87	3	1	1	5	4	154	119	277	5	173	6	184	553
15:45	68	5	4	77	0	0	1	1	7	138	84	229	5	188	2	195	502
16:00	84	2	8	94	3	3	1	7	2	160	134	296	3	181	3	187	584
16:15	77	3	4	84	2	1	0	3	5	198	145	348	12	219	3	234	669
16:30	**88**	**10**	**7**	**105**	**3**	**2**	**1**	**6**	**1**	**201**	**170**	**372**	**8**	**212**	**7**	**227**	**710**
16:45	**102**	**3**	**12**	**117**	**1**	**3**	**2**	**6**	**3**	**186**	**149**	**338**	**13**	**234**	**5**	**252**	**713**
17:00	**93**	**10**	**5**	**108**	**0**	**0**	**0**	**0**	**4**	**232**	**137**	**373**	**13**	**186**	**1**	**200**	**681**
17:15	**100**	**1**	**7**	**108**	**1**	**3**	**1**	**5**	**2**	**191**	**214**	**407**	**10**	**198**	**3**	**211**	**731**
17:30	110	3	11	124	2	4	0	6	4	179	171	354	9	204	2	215	699
17:45	88	0	9	97	3	2	1	6	0	222	109	331	12	195	5	212	646
18:00	104	3	5	112	1	1	1	3	8	173	133	314	11	193	6	210	639
18:15	95	1	4	100	3	2	1	6	2	192	122	316	3	205	7	215	637
18:30	88	1	8	97	0	3	2	5	0	158	102	260	7	178	2	187	549
18:45	74	1	4	79	0	0	1	1	4	176	89	269	1	167	1	169	518
TOTAL	**3879**	**115**	**331**	**4325**	**48**	**44**	**52**	**144**	**122**	**7770**	**4165**	**12057**	**265**	**7837**	**160**	**8262**	**24788**
AM Peak	**431**	**6**	**34**	**471**	**2**	**0**	**2**	**4**	**5**	**659**	**299**	**963**	**27**	**667**	**11**	**705**	**2143**
PM Peak	**383**	**24**	**31**	**438**	**5**	**8**	**4**	**17**	**10**	**810**	**670**	**1490**	**44**	**830**	**16**	**890**	**2835**

Station ID: S2000130045 **County:** Howard **Comments:** LOS AM:A PM:C

Date: Thursday 12/12/2002 **Town:** none

Location: MD 108 at Ten Oaks Rd **Weather:**

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin 08:30	End 09:30	Volume 2143	PM PERIOD 12:00PM-19:00PM	Begin 16:30	End 17:30	Volume 2835

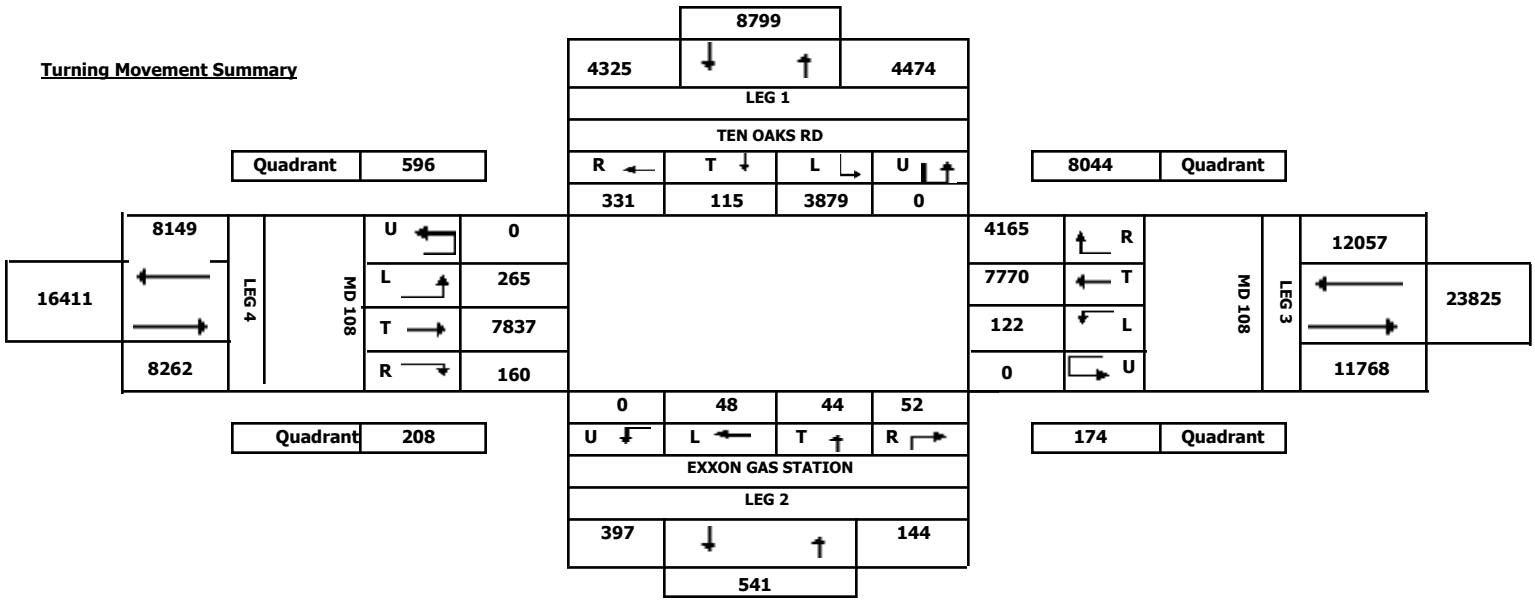
Hour	TEN OAKS RD North Leg			EXXON GAS STATION South Leg			MD 108 East Leg			MD 108 West Leg		
Ending	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
6:45	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0
8:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9:30	0	0	0	0	0	0	0	1	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	1	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	1	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0
16:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
17:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**1**	**0**
AM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

Station ID:	S2000130045	**County:**	Howard	**Comments:**	LOS AM:A PM:C
Date:	Thursday 12/12/2002	**Town:**	none		
Location:	MD 108 at Ten Oaks Rd	**Weather:**			

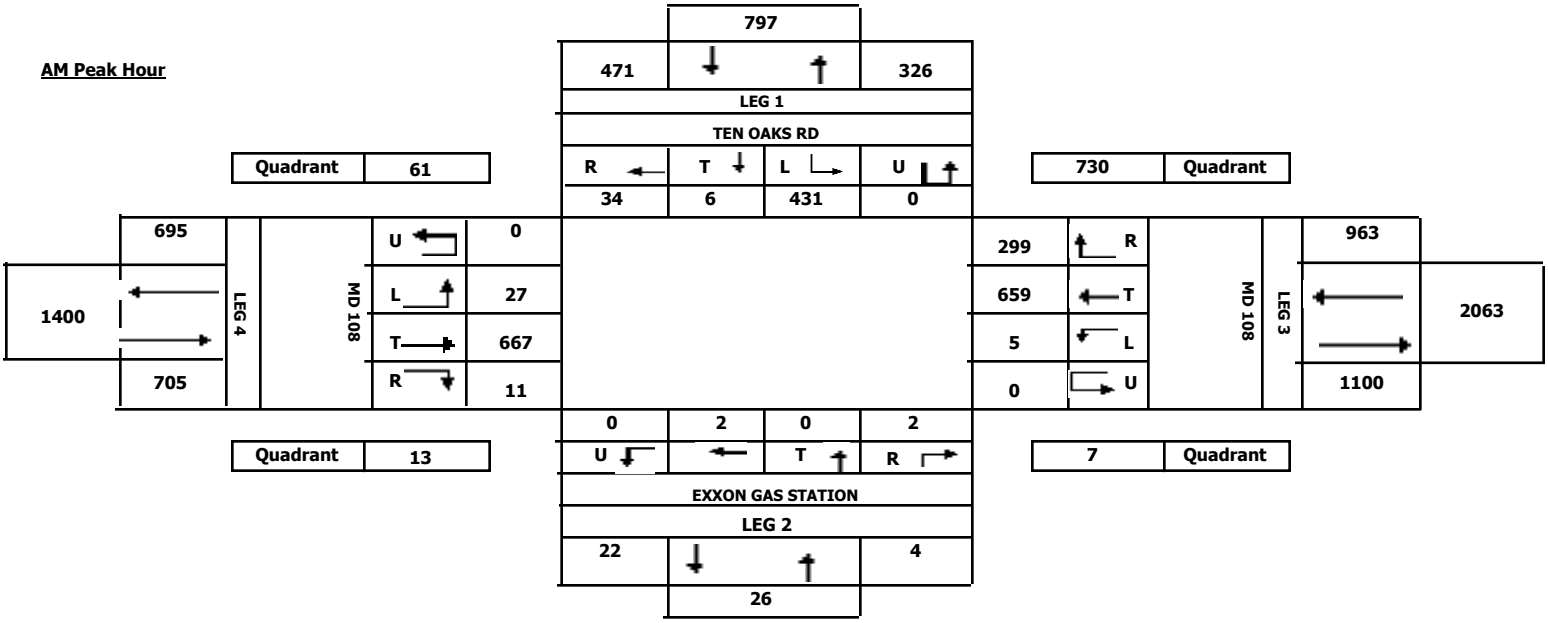
Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:30	09:30	2143		16:30	17:30	2835

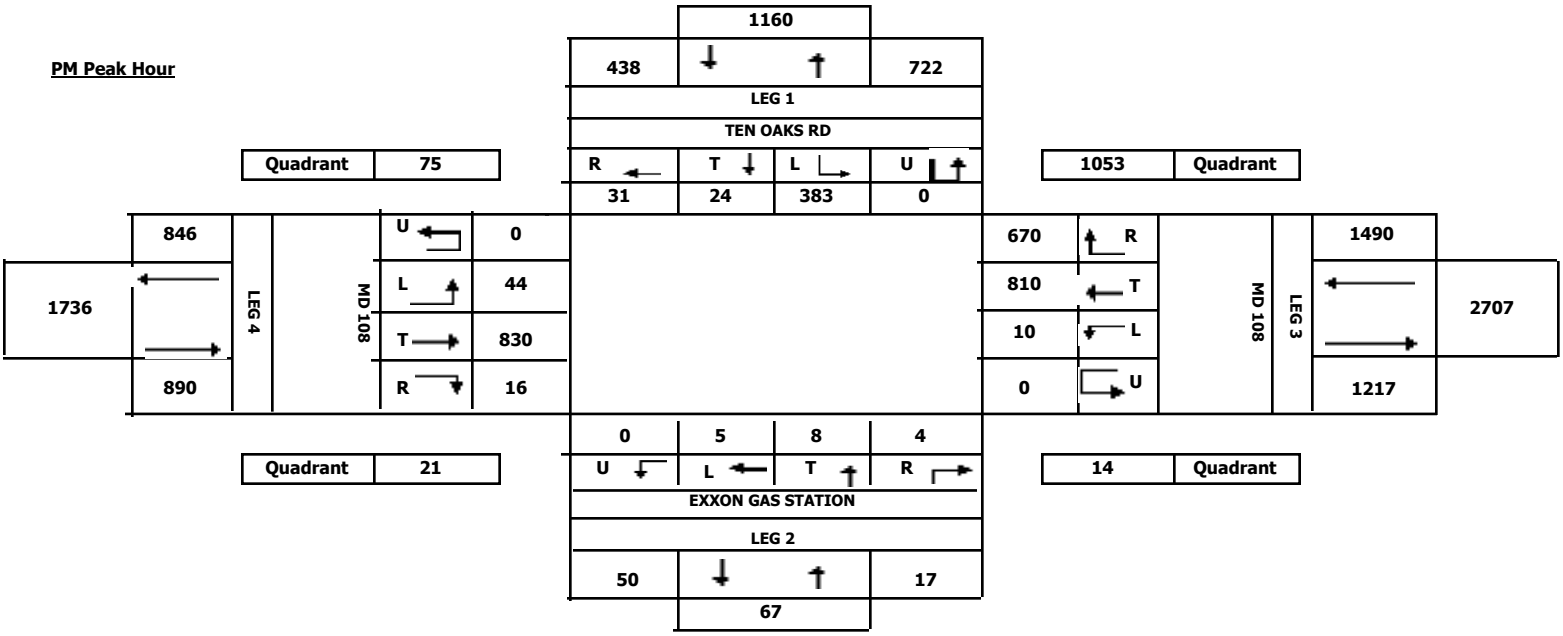
Turning Movement Summary



AM Peak Hour



PM Peak Hour



Maryland State Highway Administration
Highway Information Services Division
Turning Movement Count Study - Field Sheet

Station ID: S1998130127 **County:** Howard **Comments:** LOS AM:A PM:A

Date: Wednesday 12/12/2012 **Town:** none

Location: MD 108 at Ramps 4&6 to and from MD 32 SB **Weather:** Sunny

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:00	09:00	2434		17:00	18:00	3087

Hour	Ramp 6 from MD 32 SB From North				Ramp 4 to MD 32 SB From South				MD 108 From East				MD 108 From West				Grand Total
Begin	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	
6:00	11	0	5	16	0	0	0	0	36	75	0	111	0	11	67	78	205
6:15	10	0	11	21	0	0	0	0	39	112	0	151	0	30	76	106	278
6:30	20	0	7	27	0	0	0	0	29	146	0	175	0	61	139	200	402
6:45	25	0	14	39	0	0	0	0	56	190	0	246	0	78	126	204	489
7:00	47	0	10	57	0	0	0	0	57	203	0	260	0	112	146	258	575
7:15	27	0	12	39	0	0	0	0	90	220	0	310	0	104	137	241	590
7:30	31	1	10	42	0	0	0	0	81	217	0	298	0	91	151	242	582
7:45	25	0	9	34	0	0	0	0	83	228	0	311	0	97	166	263	608
8:00	**21**	**0**	**9**	**30**	**0**	**0**	**0**	**0**	**77**	**242**	**0**	**319**	**0**	**81**	**190**	**271**	**620**
8:15	**23**	**0**	**11**	**34**	**0**	**0**	**0**	**0**	**79**	**252**	**0**	**331**	**0**	**81**	**169**	**250**	**615**
8:30	**21**	**0**	**9**	**30**	**0**	**0**	**0**	**0**	**82**	**207**	**0**	**289**	**0**	**97**	**163**	**260**	**579**
8:45	**39**	**0**	**9**	**48**	**0**	**0**	**0**	**0**	**63**	**252**	**0**	**315**	**0**	**99**	**158**	**257**	**620**
9:00	47	0	16	63	0	0	0	0	76	207	0	283	0	101	149	250	596
9:15	33	1	7	41	0	0	0	0	78	157	0	235	0	91	125	216	492
9:30	29	0	9	38	0	0	0	0	61	142	0	203	0	88	117	205	446
9:45	29	0	7	36	0	0	0	0	58	142	0	200	0	84	91	175	411
10:00	36	0	10	46	0	0	0	0	55	134	0	189	0	57	87	144	379
10:15	48	0	8	56	0	0	0	0	52	120	0	172	0	57	75	132	360
10:30	34	0	11	45	0	0	0	0	57	141	0	198	0	86	74	160	403
10:45	24	0	11	35	0	0	0	0	58	124	0	182	0	73	91	164	381
11:00	22	0	8	30	0	0	0	0	64	126	0	190	0	89	69	158	378
11:15	23	0	11	34	0	0	0	0	56	144	0	200	0	89	74	163	397
11:30	25	0	17	42	0	0	0	0	60	148	0	208	0	105	68	173	423
11:45	34	0	6	40	0	0	0	0	61	140	0	201	0	62	48	110	351
12:00	13	0	7	20	0	0	0	0	63	152	0	215	0	80	46	126	361
12:15	24	0	5	29	0	0	0	0	69	158	0	227	0	89	84	173	429
12:30	27	0	6	33	0	0	0	0	67	187	0	254	0	92	92	184	471
12:45	17	0	7	24	0	0	0	0	53	159	0	212	0	104	102	206	442
13:00	25	0	7	32	0	0	0	0	37	195	0	232	0	103	93	196	460
13:15	24	0	6	30	0	0	0	0	43	164	0	207	0	105	86	191	428
13:30	17	0	9	26	0	0	0	0	78	193	0	271	0	102	74	176	473
13:45	16	0	9	25	0	0	0	0	42	179	0	221	0	115	72	187	433
14:00	13	0	5	18	0	0	0	0	66	172	0	238	0	111	72	183	439
14:15	21	0	5	26	0	0	0	0	59	277	0	336	0	107	78	185	547
14:30	28	1	11	40	0	0	0	0	56	241	0	297	0	107	93	200	537
14:45	25	0	12	37	0	0	0	0	63	215	0	278	0	100	84	184	499
15:00	13	0	15	28	0	0	0	0	61	261	0	322	0	112	88	200	550
15:15	23	0	13	36	0	0	0	0	53	248	0	301	0	131	93	224	561
15:30	25	0	9	34	0	0	0	0	57	320	0	377	0	138	99	237	648
15:45	28	0	8	36	0	0	0	0	60	341	0	401	0	146	140	286	723
16:00	16	1	9	26	0	0	0	0	80	349	0	429	0	136	136	272	727
16:15	19	0	18	37	0	0	0	0	74	369	0	443	0	140	103	243	723
16:30	22	0	18	40	0	0	0	0	68	400	0	468	0	142	103	245	753
16:45	22	0	10	32	0	0	0	0	66	386	0	452	0	150	123	273	757
17:00	**21**	**0**	**8**	**29**	**0**	**0**	**0**	**0**	**63**	**400**	**0**	**463**	**0**	**171**	**126**	**297**	**789**
17:15	**28**	**0**	**12**	**40**	**0**	**0**	**0**	**0**	**70**	**362**	**0**	**432**	**0**	**152**	**131**	**283**	**755**
17:30	**20**	**0**	**18**	**38**	**0**	**0**	**0**	**0**	**66**	**377**	**0**	**443**	**0**	**173**	**121**	**294**	**775**
17:45	**24**	**0**	**10**	**34**	**0**	**0**	**0**	**0**	**59**	**388**	**0**	**447**	**0**	**156**	**131**	**287**	**768**
18:00	19	0	15	34	0	0	0	0	57	401	0	458	0	119	123	242	734
18:15	25	0	16	41	0	0	0	0	44	318	0	362	0	117	106	223	626
18:30	19	0	13	32	0	0	0	0	55	267	0	322	0	125	81	206	560
18:45	22	0	10	32	0	0	0	0	42	259	0	301	0	101	76	177	510
TOTAL	**1280**	**4**	**528**	**1812**	**0**	**0**	**0**	**0**	**3179**	**11807**	**0**	**14986**	**0**	**5348**	**5512**	**10860**	**27658**
AM Peak	**104**	**0**	**38**	**142**	**0**	**0**	**0**	**0**	**301**	**953**	**0**	**1254**	**0**	**358**	**680**	**1038**	**2434**
PM Peak	**93**	**0**	**48**	**141**	**0**	**0**	**0**	**0**	**258**	**1527**	**0**	**1785**	**0**	**652**	**509**	**1161**	**3087**

Station ID: S1998130127 **County:** Howard **Comments:** LOS AM:A PM:A

Date: Wednesday 12/12/2012 **Town:** none

Location: MD 108 at Ramps 4&6 to and from MD 32 SB **Weather:** Sunny

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin 08:00	End 09:00	Volume 2434	PM PERIOD 12:00PM-19:00PM	Begin 17:00	End 18:00	Volume 3087

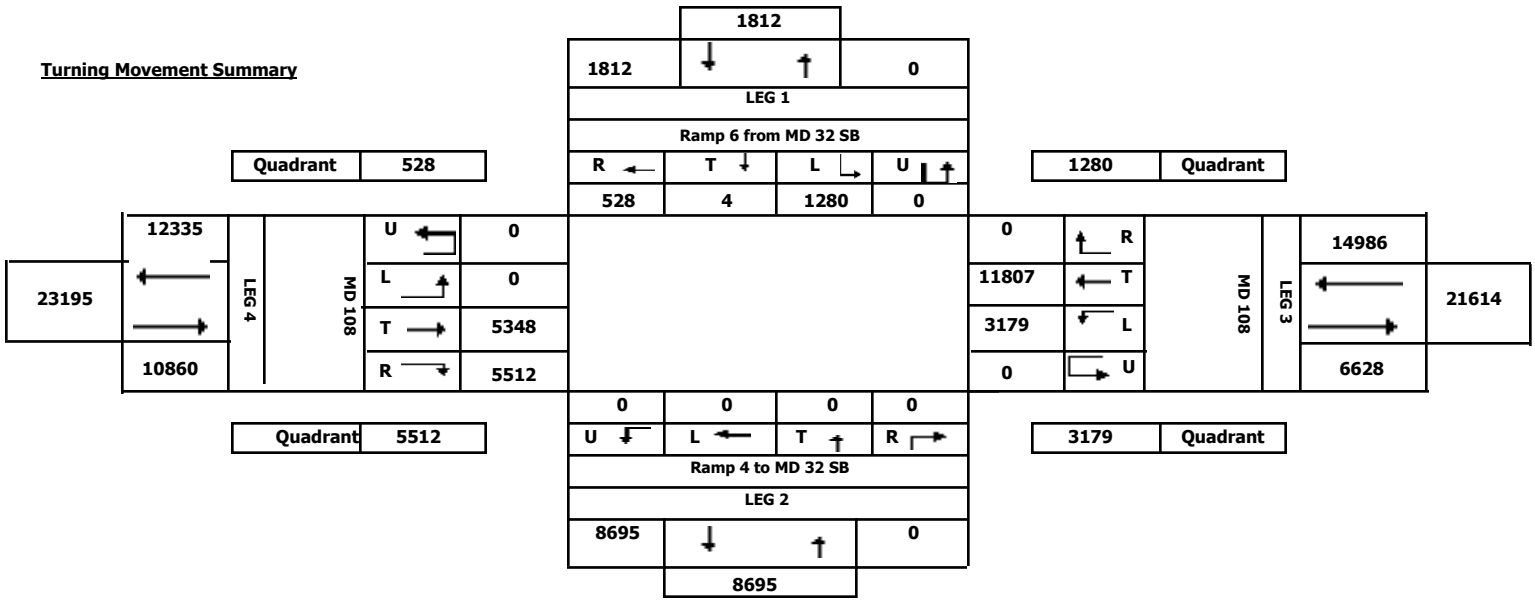
Hour	Ramp 6 from MD 32 SB North Leg			Ramp 4 to MD 32 SB South Leg			MD 108 East Leg			MD 108 West Leg		
Ending	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
6:45	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0
8:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	1	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	1	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	1	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	1	0	0	0
16:45	0	0	0	0	1	0	0	0	0	0	0	0
17:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:45	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**1**	**0**	**0**	**0**
AM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PM Peak	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Station ID:	S1998130127	**County:**	Howard	**Comments:**	LOS AM:A PM:A
Date:	Wednesday 12/12/2012	**Town:**	none		
Location:	MD 108 at Ramps 4&6 to and from MD 32 SB	**Weather:**	Sunny		

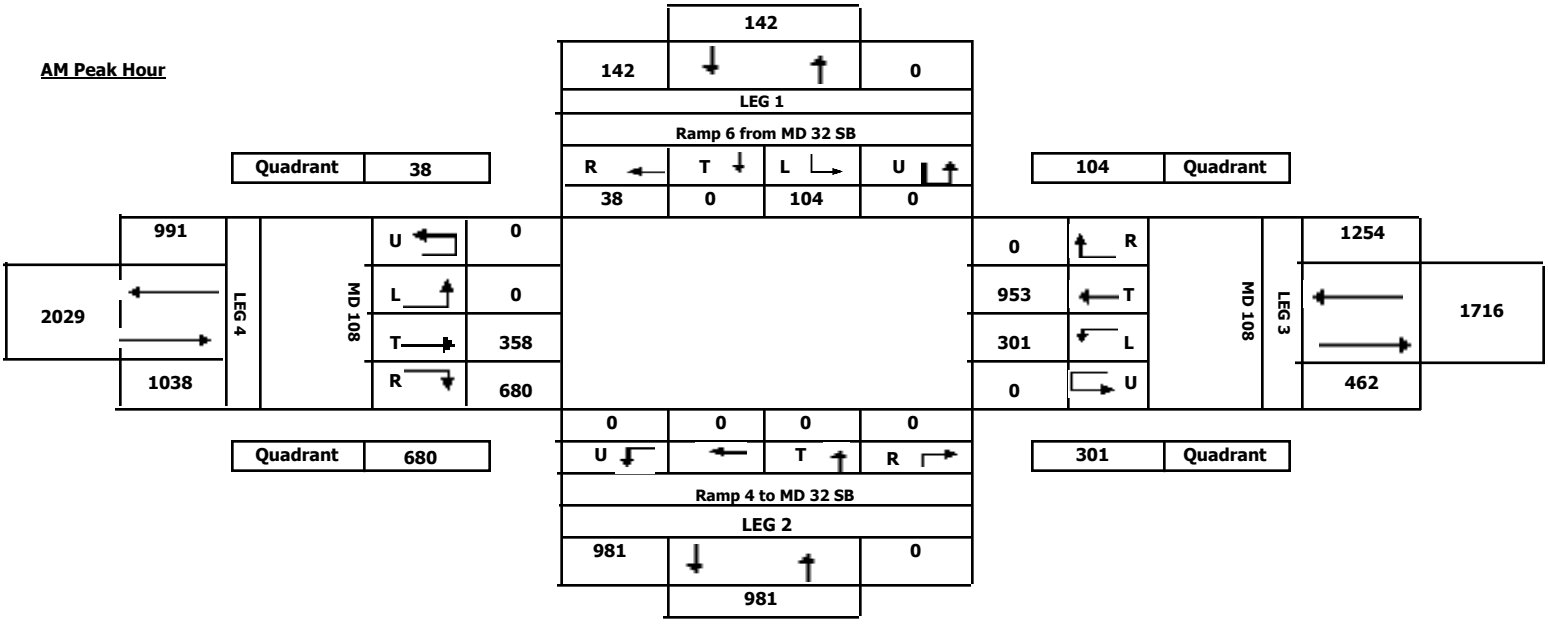
Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:00	09:00	2434		17:00	18:00	3087

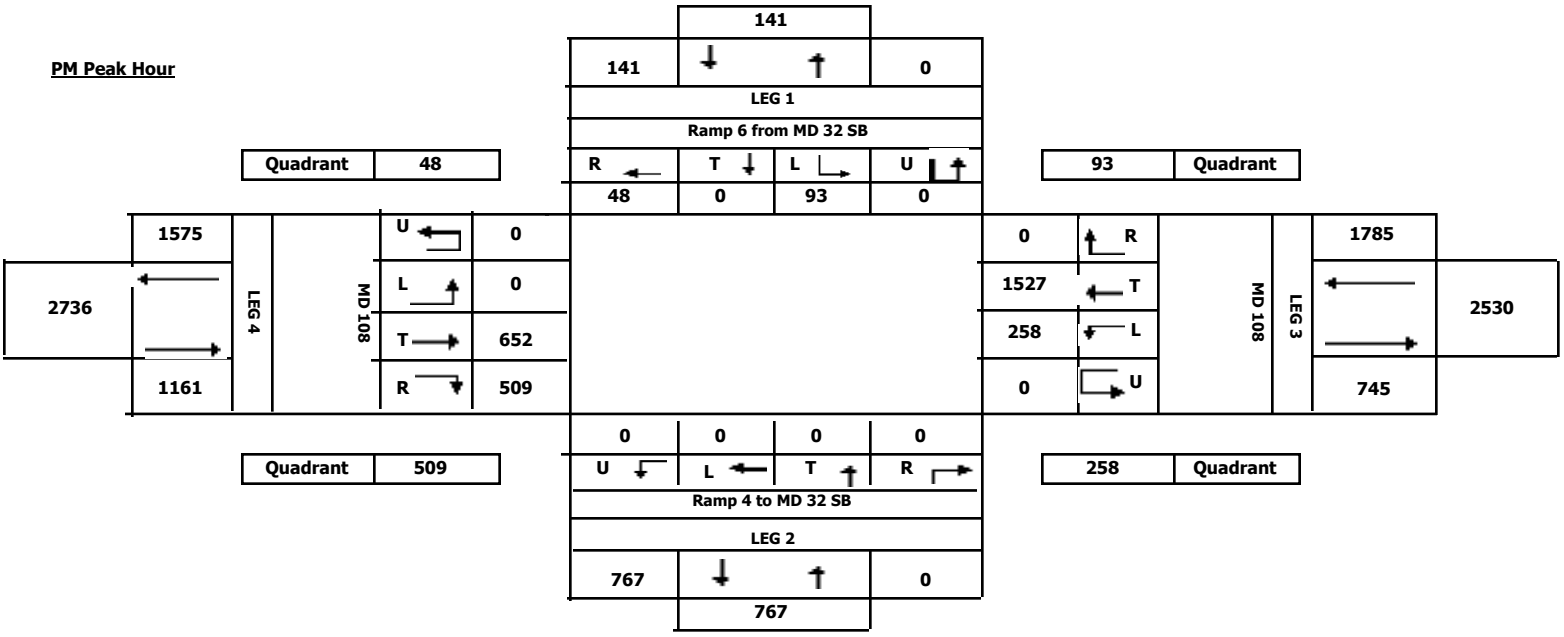
Turning Movement Summary



AM Peak Hour



PM Peak Hour



Maryland State Highway Administration
Highway Information Services Division
Turning Movement Count Study - Field Sheet

Station ID: S1998130128 **County:** Howard **Comments:** LOS AM:A PM:C

Date: Thursday 12/13/2012 **Town:** none

Location: MD 108 at Ramps 2&8 to and from MD 32 NB **Weather:** Sunny

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:00	09:00	2391		17:00	18:00	3036

Hour	Ramp 8 to MD 32 NB From North				Ramp 2 from MD 32 NB From South				MD 108 From East				MD 108 From West				Grand Total
Begin	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	
6:00	0	0	0	0	42	0	16	58	0	68	4	72	2	25	0	27	157
6:15	0	0	0	0	61	0	18	79	0	76	4	80	1	50	0	51	210
6:30	0	0	0	0	77	0	28	105	0	102	5	107	6	70	0	76	288
6:45	0	0	0	0	108	0	53	161	0	130	13	143	3	125	0	128	432
7:00	0	0	0	0	90	0	41	131	0	176	18	194	6	130	0	136	461
7:15	0	0	0	0	121	0	57	178	0	176	23	199	8	132	0	140	517
7:30	0	0	0	0	116	0	60	176	0	168	11	179	9	145	0	154	509
7:45	0	0	0	0	112	0	90	202	0	174	21	195	9	149	0	158	555
8:00	**0**	**0**	**0**	**0**	**94**	**0**	**82**	**176**	**0**	**194**	**11**	**205**	**12**	**170**	**0**	**182**	**563**
8:15	**0**	**0**	**0**	**0**	**119**	**0**	**60**	**179**	**0**	**198**	**14**	**212**	**13**	**189**	**0**	**202**	**593**
8:30	**0**	**0**	**0**	**0**	**123**	**0**	**57**	**180**	**0**	**212**	**23**	**235**	**14**	**212**	**0**	**226**	**641**
8:45	**0**	**0**	**0**	**0**	**93**	**0**	**42**	**135**	**0**	**177**	**20**	**197**	**12**	**250**	**0**	**262**	**594**
9:00	0	0	0	0	86	0	44	130	0	164	16	180	10	159	0	169	479
9:15	0	0	0	0	76	0	36	112	0	147	30	177	14	132	0	146	435
9:30	0	0	0	0	65	0	36	101	0	151	27	178	19	118	0	137	416
9:45	0	0	0	0	76	0	50	126	0	124	17	141	5	124	0	129	396
10:00	0	0	0	0	54	0	48	102	0	120	20	140	23	98	0	121	363
10:15	0	0	0	0	83	0	39	122	0	128	18	146	4	98	0	102	370
10:30	0	0	0	0	58	0	43	101	0	138	21	159	6	128	0	134	394
10:45	0	0	0	0	61	0	40	101	0	120	28	148	7	110	0	117	366
11:00	0	0	0	0	52	0	47	99	0	120	27	147	10	96	0	106	352
11:15	0	0	0	0	66	0	51	117	0	126	25	151	7	129	0	136	404
11:30	0	0	0	0	74	0	56	130	0	129	24	153	6	137	0	143	426
11:45	0	0	0	0	68	0	70	138	0	136	26	162	2	132	0	134	434
12:00	0	0	0	0	69	0	58	127	0	154	32	186	13	105	0	118	431
12:15	0	0	0	0	83	0	59	142	0	147	26	173	10	111	0	121	436
12:30	0	0	0	0	87	0	59	146	0	184	25	209	4	129	0	133	488
12:45	0	0	0	0	77	0	71	148	0	165	23	188	11	128	0	139	475
13:00	0	0	0	0	84	0	64	148	0	174	25	199	8	104	0	112	459
13:15	0	0	0	0	86	0	72	158	0	164	40	204	8	126	0	134	496
13:30	0	0	0	0	72	0	64	136	0	132	44	176	8	116	0	124	436
13:45	0	0	0	0	99	0	72	171	0	165	26	191	5	97	0	102	464
14:00	0	0	0	0	100	0	66	166	0	150	42	192	12	131	0	143	501
14:15	0	0	0	0	111	0	79	190	0	199	40	239	9	124	0	133	562
14:30	0	0	0	0	102	0	69	171	0	187	39	226	10	133	0	143	540
14:45	0	0	0	0	125	0	82	207	0	183	31	214	8	132	0	140	561
15:00	0	0	0	0	131	1	72	204	0	201	39	240	7	125	0	132	576
15:15	0	0	0	0	168	0	70	238	0	185	34	219	9	137	0	146	603
15:30	0	0	0	0	182	1	68	251	0	219	24	243	11	142	0	153	647
15:45	0	0	0	0	160	0	90	250	0	193	26	219	18	168	0	186	655
16:00	0	0	0	0	185	0	104	289	0	212	31	243	10	172	0	182	714
16:15	0	0	0	0	221	5	79	305	0	226	24	250	13	165	0	178	733
16:30	0	0	0	0	252	4	80	336	0	220	19	239	10	177	0	187	762
16:45	0	0	0	0	238	3	89	330	0	195	22	217	11	170	0	181	728
17:00	**0**	**0**	**0**	**0**	**256**	**1**	**82**	**339**	**0**	**238**	**32**	**270**	**20**	**167**	**0**	**187**	**796**
17:15	**0**	**0**	**0**	**0**	**230**	**0**	**82**	**312**	**0**	**214**	**32**	**246**	**11**	**172**	**0**	**183**	**741**
17:30	**0**	**0**	**0**	**0**	**220**	**0**	**79**	**299**	**0**	**213**	**29**	**242**	**11**	**185**	**0**	**196**	**737**
17:45	**0**	**0**	**0**	**0**	**230**	**0**	**80**	**310**	**0**	**192**	**31**	**223**	**12**	**217**	**0**	**229**	**762**
18:00	0	0	0	0	177	1	71	249	0	210	28	238	7	182	0	189	676
18:15	0	0	0	0	193	2	62	257	0	192	44	236	16	184	0	200	693
18:30	0	0	0	0	178	0	68	246	0	170	34	204	9	139	0	148	598
18:45	0	0	0	0	155	0	71	226	0	146	40	186	7	127	0	134	546
TOTAL	**0**	**0**	**0**	**0**	**6246**	**18**	**3226**	**9490**	**0**	**8684**	**1328**	**10012**	**496**	**7173**	**0**	**7669**	**27171**
AM Peak	**0**	**0**	**0**	**0**	**429**	**0**	**241**	**670**	**0**	**781**	**68**	**849**	**51**	**821**	**0**	**872**	**2391**
PM Peak	**0**	**0**	**0**	**0**	**936**	**1**	**323**	**1260**	**0**	**857**	**124**	**981**	**54**	**741**	**0**	**795**	**3036**

Station ID: S1998130128 **County:** Howard **Comments:** LOS AM:A PM:C

Date: Thursday 12/13/2012 **Town:** none

Location: MD 108 at Ramps 2&8 to and from MD 32 NB **Weather:** Sunny

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin 08:00	End 09:00	Volume 2391	PM PERIOD 12:00PM-19:00PM	Begin 17:00	End 18:00	Volume 3036

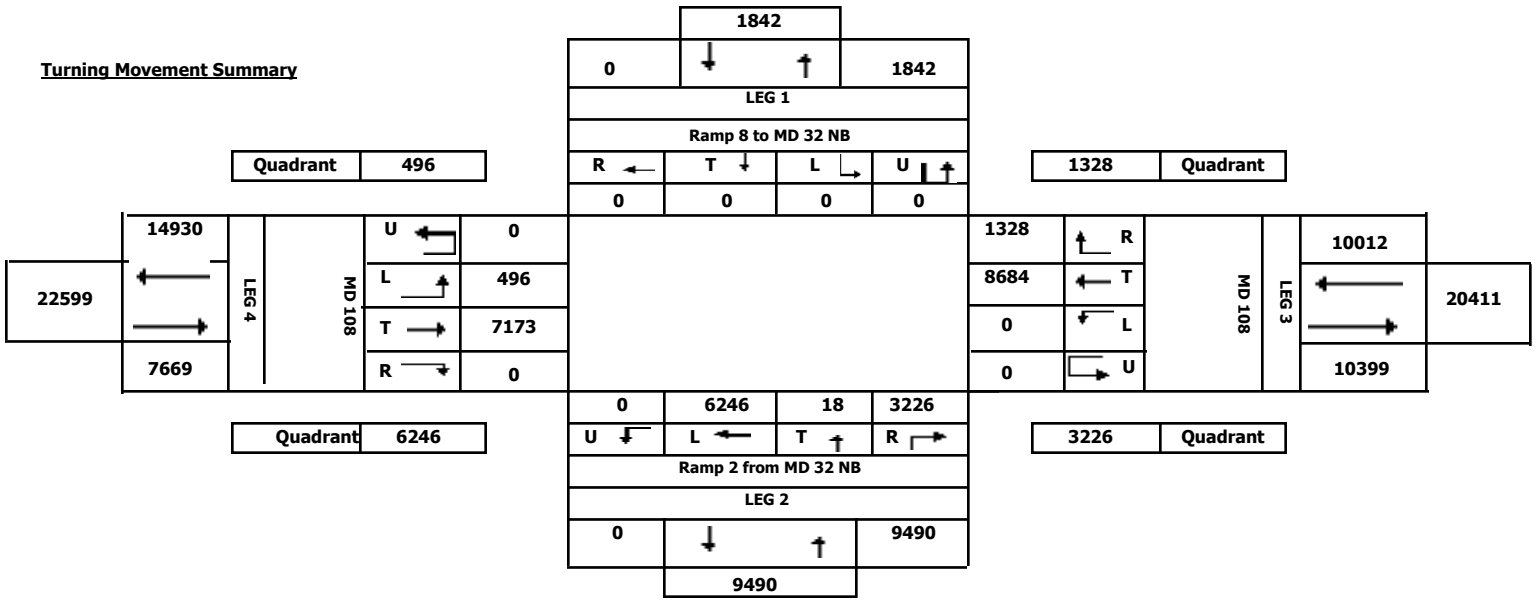
Hour	Ramp 8 to MD 32 NB North Leg			Ramp 2 from MD 32 NB South Leg			MD 108 East Leg			MD 108 West Leg		
Ending	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	1	0	0	0	0	0	0	0
6:45	0	0	0	0	1	0	0	0	0	0	0	0
7:00	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0
8:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	1	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	1	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	1	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	1	0	0	0	0	0	0	0
11:45	0	0	0	0	1	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	1
13:45	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	1	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	2	14	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0
17:00	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**3**	**30**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
AM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PM Peak	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Station ID:	S1998130128	**County:**	Howard	**Comments:**	LOS AM:A PM:C
Date:	Thursday 12/13/2012	**Town:**	none		
Location:	MD 108 at Ramps 2&8 to and from MD 32 NB	**Weather:**	Sunny		

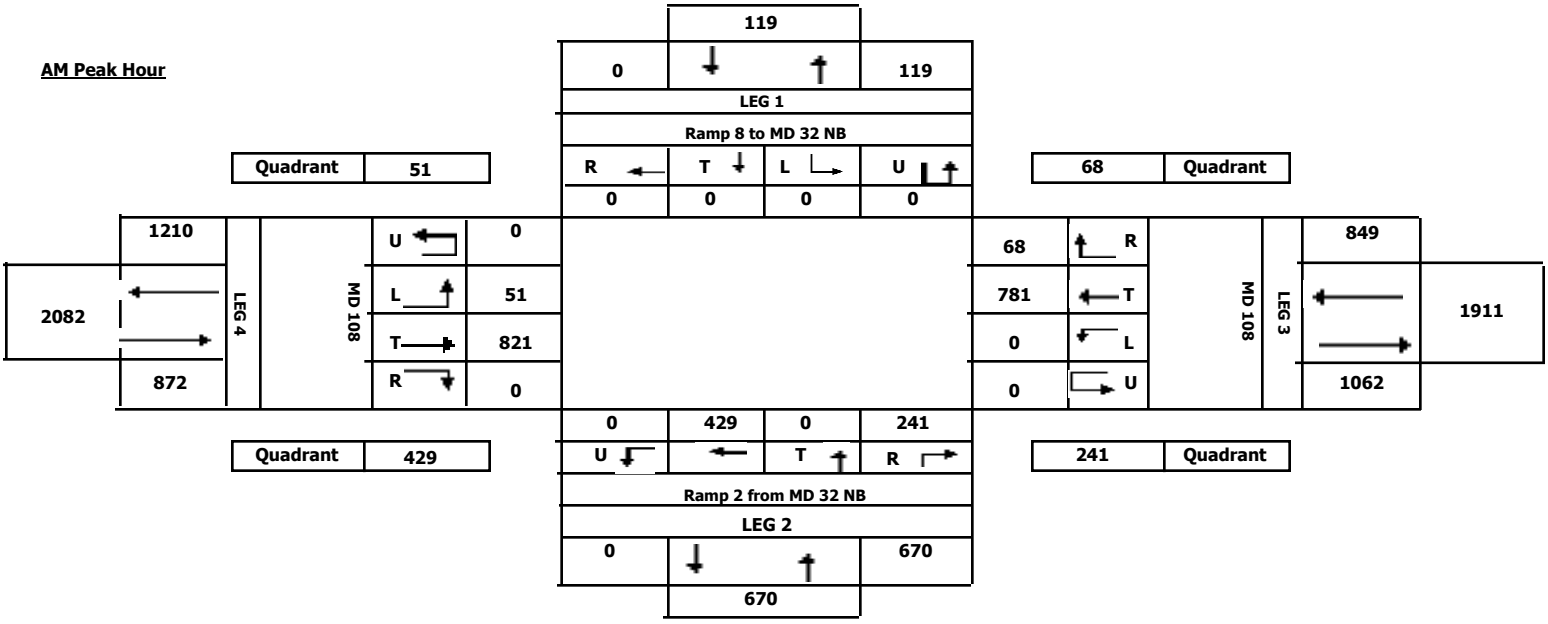
Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		08:00	09:00	2391		17:00	18:00	3036

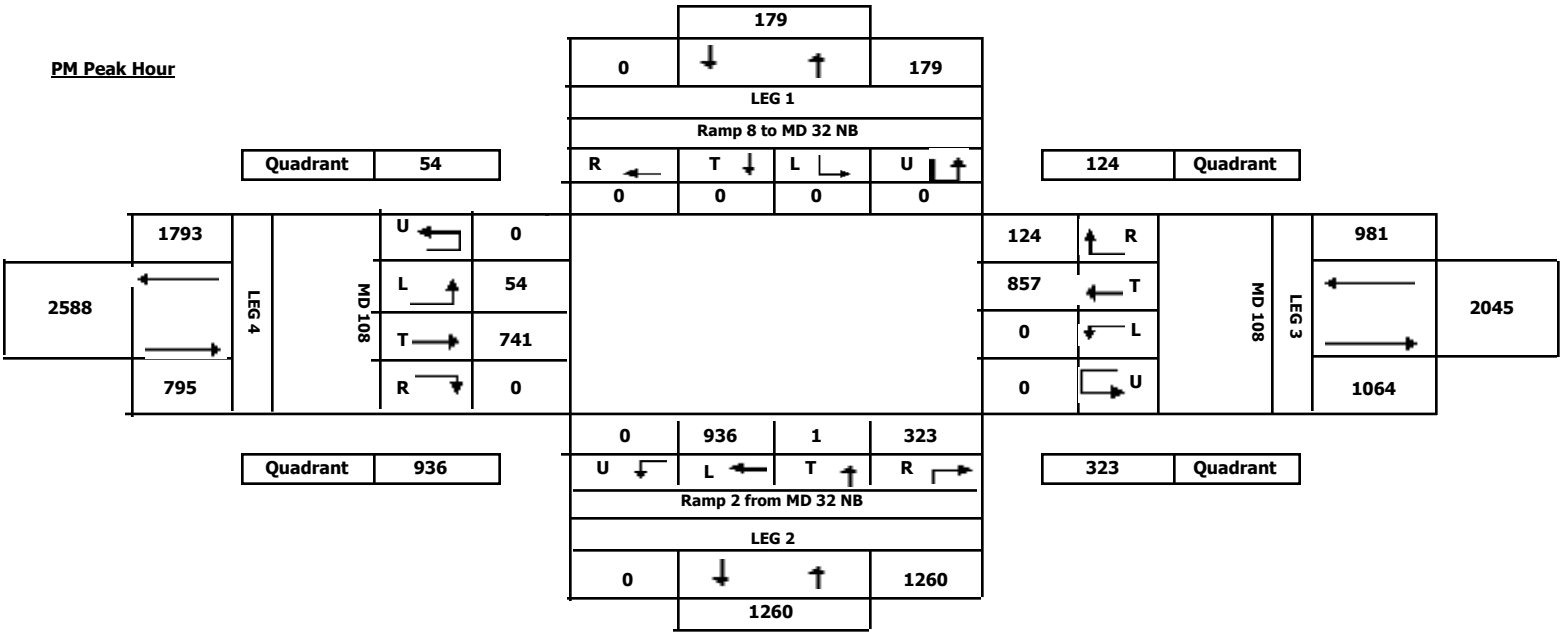
Turning Movement Summary



AM Peak Hour



PM Peak Hour



Tri-State Traffic Data, Inc.

610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 1

Groups Printed- Cars - Heavy Vehicles - RTOR

	MD-108 Southbound					Signal Bell Lane Westbound					MD-108 Northbound					Auto Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	2	56	1	0	59	1	0	3	0	4	11	40	3	0	54	2	0	0	0	2	119
06:15 AM	1	81	1	0	83	0	1	3	0	4	13	49	8	0	70	0	0	0	0	0	157
06:30 AM	6	90	1	0	97	1	0	16	0	17	16	76	9	0	101	2	0	0	0	2	217
06:45 AM	9	145	2	0	156	0	5	17	0	22	16	155	27	0	198	1	0	0	0	1	377
Total	18	372	5	0	395	2	6	39	0	47	56	320	47	0	423	5	0	0	0	5	870
07:00 AM	7	156	2	1	166	1	2	15	0	18	14	177	23	0	214	4	2	0	0	6	404
07:15 AM	20	234	3	0	257	2	3	8	0	13	10	111	15	0	136	2	1	3	0	6	412
07:30 AM	21	175	1	0	197	2	4	20	0	26	10	136	32	0	178	5	0	3	0	8	409
07:45 AM	17	239	2	0	258	1	2	13	0	16	9	164	35	1	209	11	1	4	0	16	499
Total	65	804	8	1	878	6	11	56	0	73	43	588	105	1	737	22	4	10	0	36	1724
08:00 AM	15	235	3	1	254	1	3	15	0	19	9	124	38	0	171	11	1	6	0	18	462
08:15 AM	17	251	1	0	269	0	1	6	1	8	13	136	20	0	169	11	2	2	0	15	461
08:30 AM	12	202	3	0	217	0	1	24	0	25	13	132	28	0	173	9	0	7	0	16	431
08:45 AM	24	211	3	0	238	1	2	7	1	11	10	158	48	0	216	24	1	8	0	33	498
Total	68	899	10	1	978	2	7	52	2	63	45	550	134	0	729	55	4	23	0	82	1852
*** BREAK ***																					
11:00 AM	17	119	2	0	138	2	3	10	0	15	12	114	23	0	149	17	4	17	0	38	340
11:15 AM	14	127	0	0	141	0	0	5	0	5	8	121	27	0	156	24	2	8	0	34	336
11:30 AM	14	123	0	0	137	3	2	3	0	8	9	118	27	1	155	32	5	15	0	52	352
11:45 AM	31	116	4	0	151	0	2	4	1	7	6	123	26	0	155	31	2	12	0	45	358
Total	76	485	6	0	567	5	7	22	1	35	35	476	103	1	615	104	13	52	0	169	1386
12:00 PM	17	146	1	0	164	3	1	4	0	8	12	128	20	0	160	37	7	28	0	72	404
12:15 PM	21	129	0	0	150	3	2	10	2	17	6	143	30	0	179	27	5	20	0	52	398
12:30 PM	33	168	0	0	201	1	4	6	0	11	5	110	33	0	148	31	9	18	0	58	418
12:45 PM	20	178	0	0	198	3	4	6	0	13	6	129	31	0	166	38	7	25	0	70	447
Total	91	621	1	0	713	10	11	26	2	49	29	510	114	0	653	133	28	91	0	252	1667
*** BREAK ***																					
03:00 PM	16	200	1	0	217	0	3	11	0	14	13	164	27	0	204	27	6	23	0	56	491
03:15 PM	22	190	2	0	214	3	3	13	0	19	9	181	35	0	225	36	4	16	0	56	514
03:30 PM	14	170	2	0	186	2	6	11	0	19	10	210	22	0	242	32	5	19	0	56	503
03:45 PM	19	173	1	0	193	4	3	15	0	22	13	239	27	0	279	33	3	23	1	60	554
Total	71	733	6	0	810	9	15	50	0	74	45	794	111	0	950	128	18	81	1	228	2062
04:00 PM	10	195	3	0	208	1	0	16	1	18	9	206	30	0	245	42	9	23	0	74	545
04:15 PM	16	179	3	0	198	1	0	12	0	13	14	196	16	0	226	33	7	23	0	63	500
04:30 PM	13	202	1	0	216	2	4	12	0	18	16	211	24	0	251	32	3	27	1	63	548
04:45 PM	21	158	4	0	183	8	2	20	1	31	24	203	19	0	246	30	3	26	0	59	519
Total	60	734	11	0	805	12	6	60	2	80	63	816	89	0	968	137	22	99	1	259	2112
05:00 PM	12	172	2	0	186	4	4	15	0	23	14	241	17	0	272	40	2	28	0	70	551
05:15 PM	9	153	3	1	166	14	1	12	0	27	12	227	20	0	259	45	7	34	0	86	538
05:30 PM	10	241	1	0	252	6	2	12	0	20	12	243	21	0	276	24	2	14	0	40	588
05:45 PM	12	232	2	0	246	7	2	17	0	26	13	253	17	0	283	28	4	10	0	42	597
Total	43	798	8	1	850	31	9	56	0	96	51	964	75	0	1090	137	15	86	0	238	2274
06:00 PM	6	205	4	0	215	5	1	14	0	20	10	263	31	0	304	34	5	22	0	61	600
06:15 PM	10	197	3	0	210	8	0	16	0	24	8	238	20	0	266	29	1	13	0	43	543
06:30 PM	12	239	2	0	253	1	1	9	0	11	11	244	20	0	275	29	2	16	2	49	588
06:45 PM	13	217	0	0	230	0	1	11	0	12	8	249	19	0	276	33	1	18	0	52	570
Total	41	858	9	0	908	14	3	50	0	67	37	994	90	0	1121	125	9	69	2	205	2301
Grand Total	533	6304	64	3	6904	91	75	411	7	584	404	6012	868	2	7286	846	113	511	4	1474	16248
Apprch %	7.7	91.3	0.9	0		15.6	12.8	70.4	1.2		5.5	82.5	11.9	0		57.4	7.7	34.7	0.3		
Total %	3.3	38.8	0.4	0	42.5	0.6	0.5	2.5	0	3.6	2.5	37	5.3	0	44.8	5.2	0.7	3.1	0	9.1	

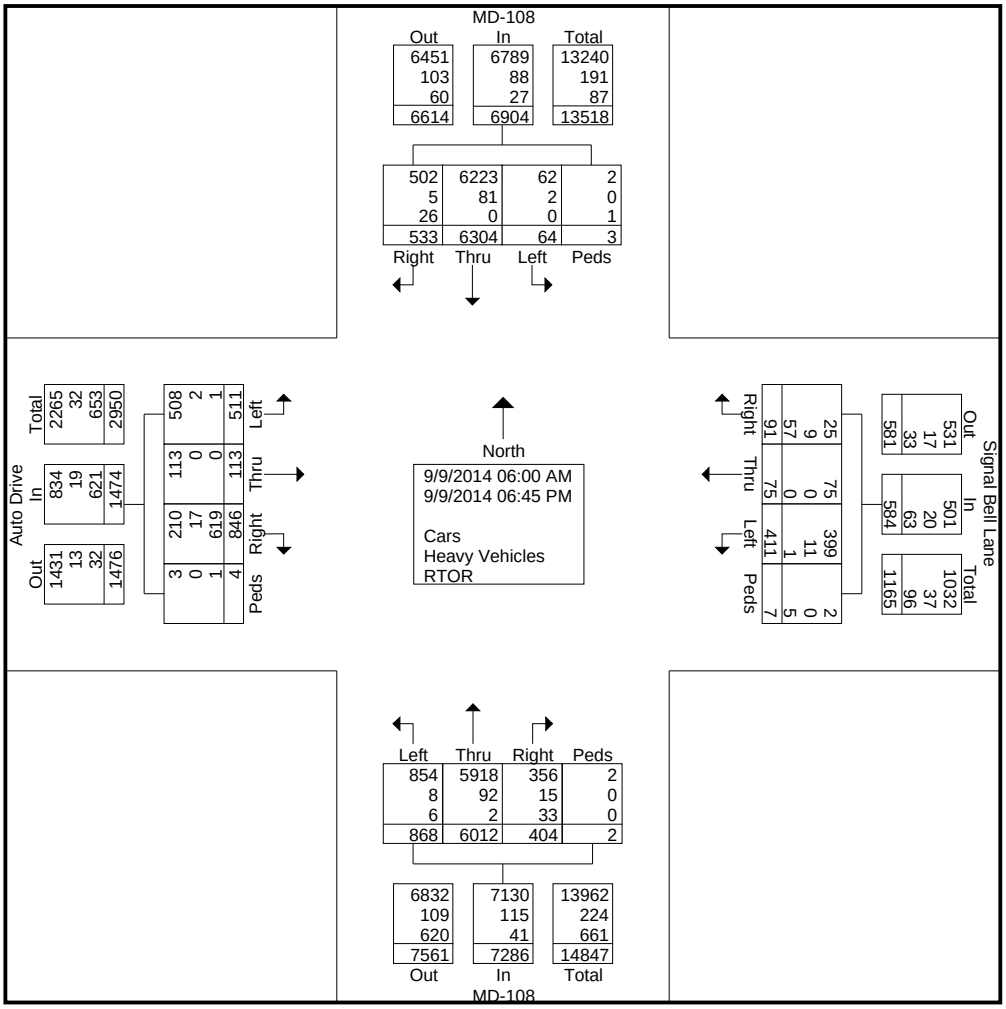
Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 2

Groups Printed- Cars - Heavy Vehicles - RTOR

	MD-108 Southbound					Signal Bell Lane Westbound					MD-108 Northbound					Auto Drive Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Cars	502	6223	62	2	6789	25	75	399	2	501	356	5918	854	2	7130	210	113	508	3	834	15254
% Cars	94.2	98.7	96.9	66.7	98.3	27.5	100	97.1	28.6	85.8	88.1	98.4	98.4	100	97.9	24.8	100	99.4	75	56.6	93.9
Heavy Vehicles	5	81	2	0	88	9	0	11	0	20	15	92	8	0	115	17	0	2	0	19	242
% Heavy Vehicles	0.9	1.3	3.1	0	1.3	9.9	0	2.7	0	3.4	3.7	1.5	0.9	0	1.6	2	0	0.4	0	1.3	1.5
RTOR	26	0	0	1	27	57	0	1	5	63	33	2	6	0	41	619	0	1	1	621	752
% RTOR	4.9	0	0	33.3	0.4	62.6	0	0.2	71.4	10.8	8.2	0	0.7	0	0.6	73.2	0	0.2	25	42.1	4.6



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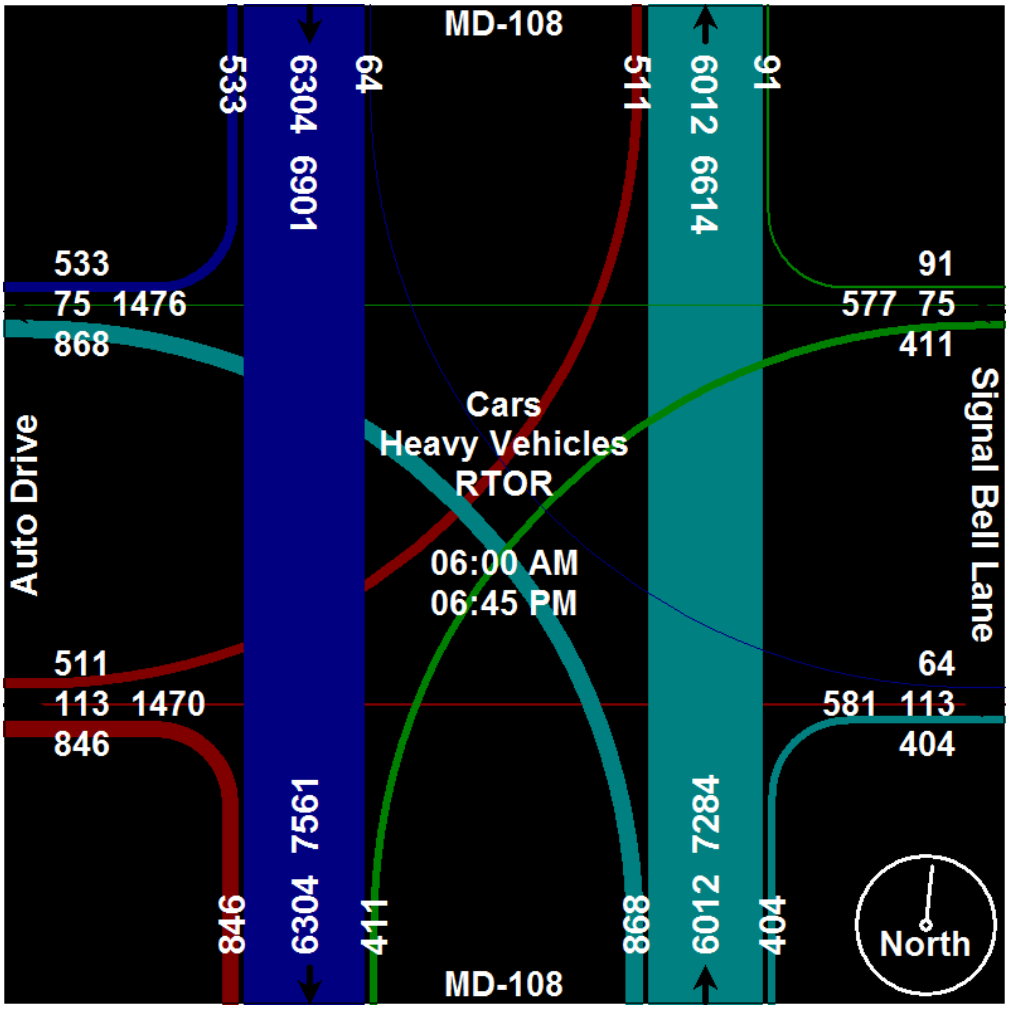
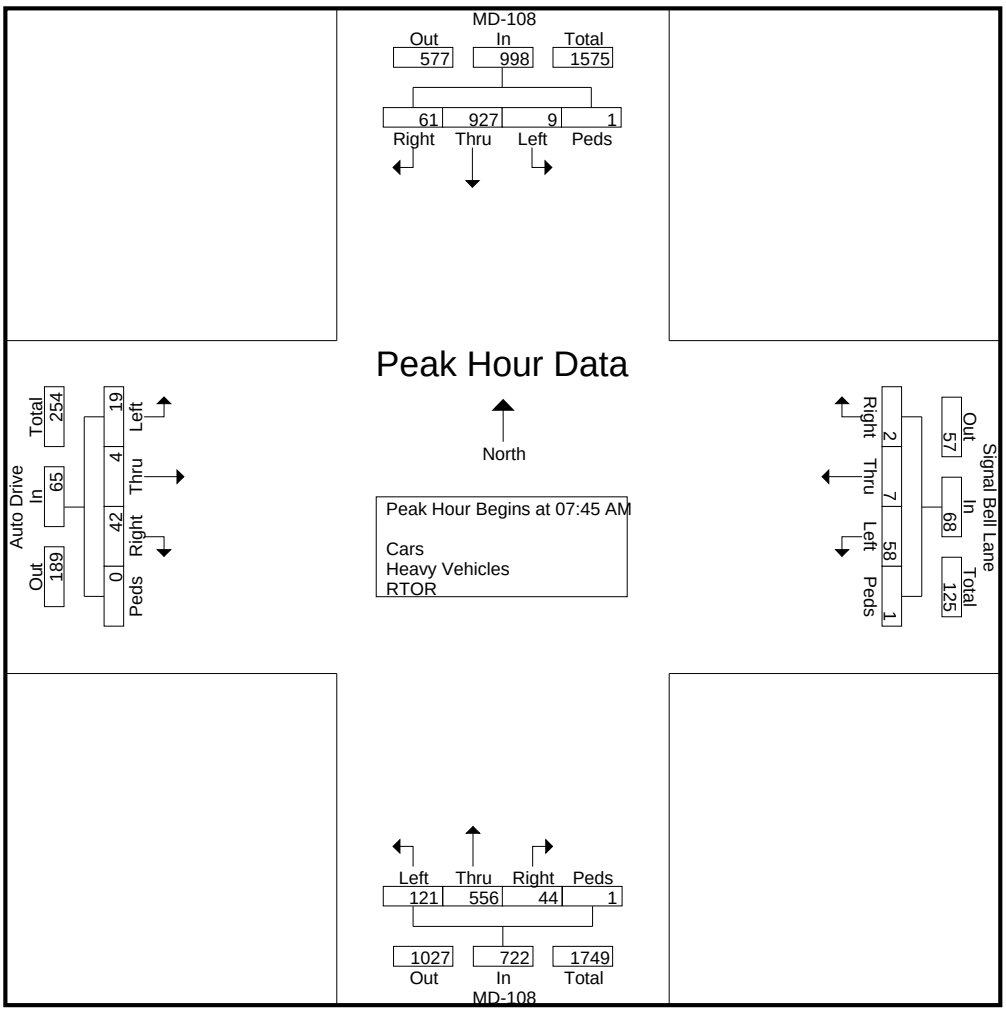


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 4

	MD-108 Southbound					Signal Bell Lane Westbound					MD-108 Northbound					Auto Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**17**	239	2	0	258	**1**	2	13	0	16	9	**164**	35	**1**	**209**	**11**	1	4	0	16	**499**
08:00 AM	15	235	**3**	**1**	254	1	**3**	15	0	19	9	124	**38**	0	171	11	1	6	0	**18**	462
08:15 AM	17	**251**	1	0	**269**	0	1	6	**1**	8	**13**	136	20	0	169	11	**2**	2	0	15	461
08:30 AM	12	202	3	0	217	0	1	**24**	0	**25**	13	132	28	0	173	9	0	**7**	0	16	431
Total Volume	61	927	9	1	998	2	7	58	1	68	44	556	121	1	722	42	4	19	0	65	1853
% App. Total	6.1	92.9	0.9	0.1		2.9	10.3	85.3	1.5		6.1	77	16.8	0.1		64.6	6.2	29.2	0		
PHF	.897	.923	.750	.250	.928	.500	.583	.604	.250	.680	.846	.848	.796	.250	.864	.955	.500	.679	.000	.903	.928

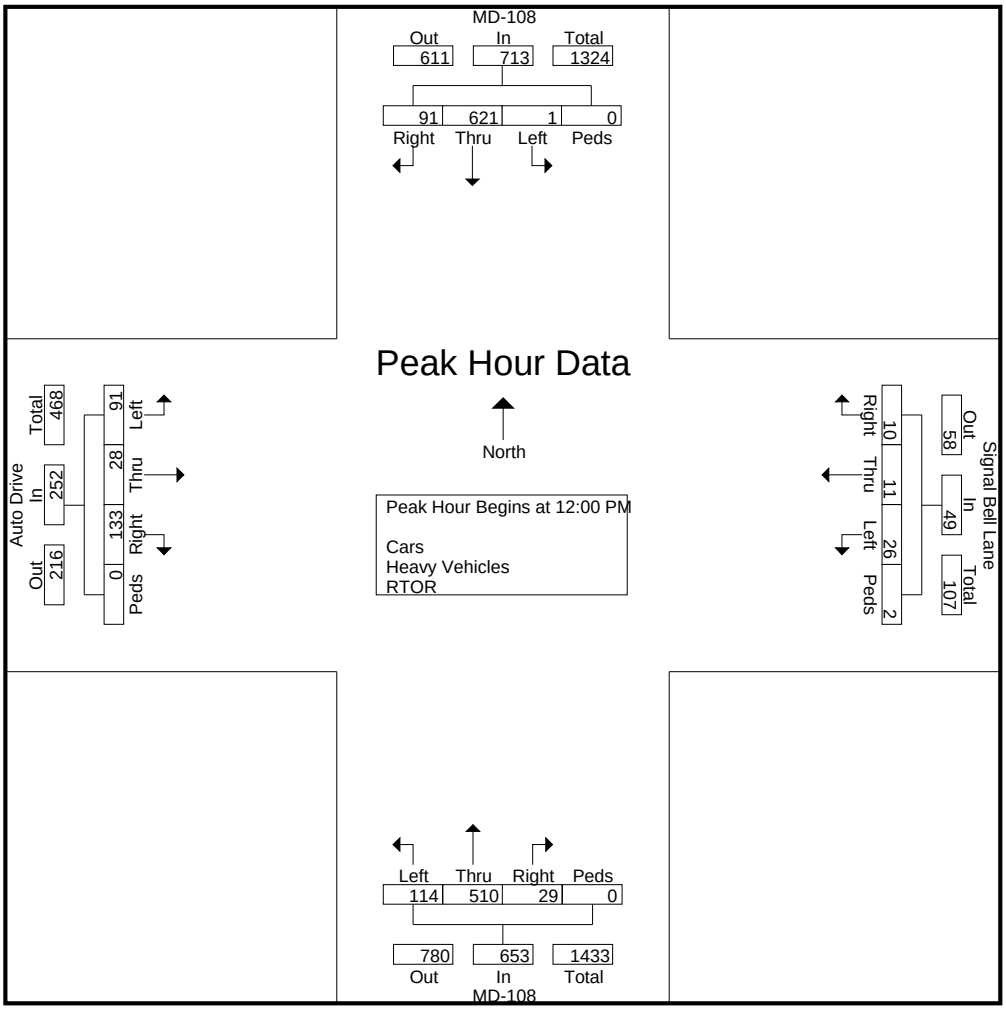


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 5

	MD-108 Southbound					Signal Bell Lane Westbound					MD-108 Northbound					Auto Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	17	146	**1**	0	164	**3**	1	4	0	8	**12**	128	20	0	160	37	7	**28**	0	**72**	404
12:15 PM	21	129	0	0	150	3	2	**10**	**2**	**17**	6	**143**	30	0	**179**	27	5	20	0	52	398
12:30 PM	**33**	168	0	0	**201**	1	**4**	6	0	11	5	110	**33**	0	148	31	**9**	18	0	58	418
12:45 PM	20	**178**	0	0	198	3	4	6	0	13	6	129	31	0	166	**38**	7	25	0	70	**447**
Total Volume	91	621	1	0	713	10	11	26	2	49	29	510	114	0	653	133	28	91	0	252	1667
% App. Total	12.8	87.1	0.1	0		20.4	22.4	53.1	4.1		4.4	78.1	17.5	0		52.8	11.1	36.1	0		
PHF	.689	.872	.250	.000	.887	.833	.688	.650	.250	.721	.604	.892	.864	.000	.912	.875	.778	.813	.000	.875	.932

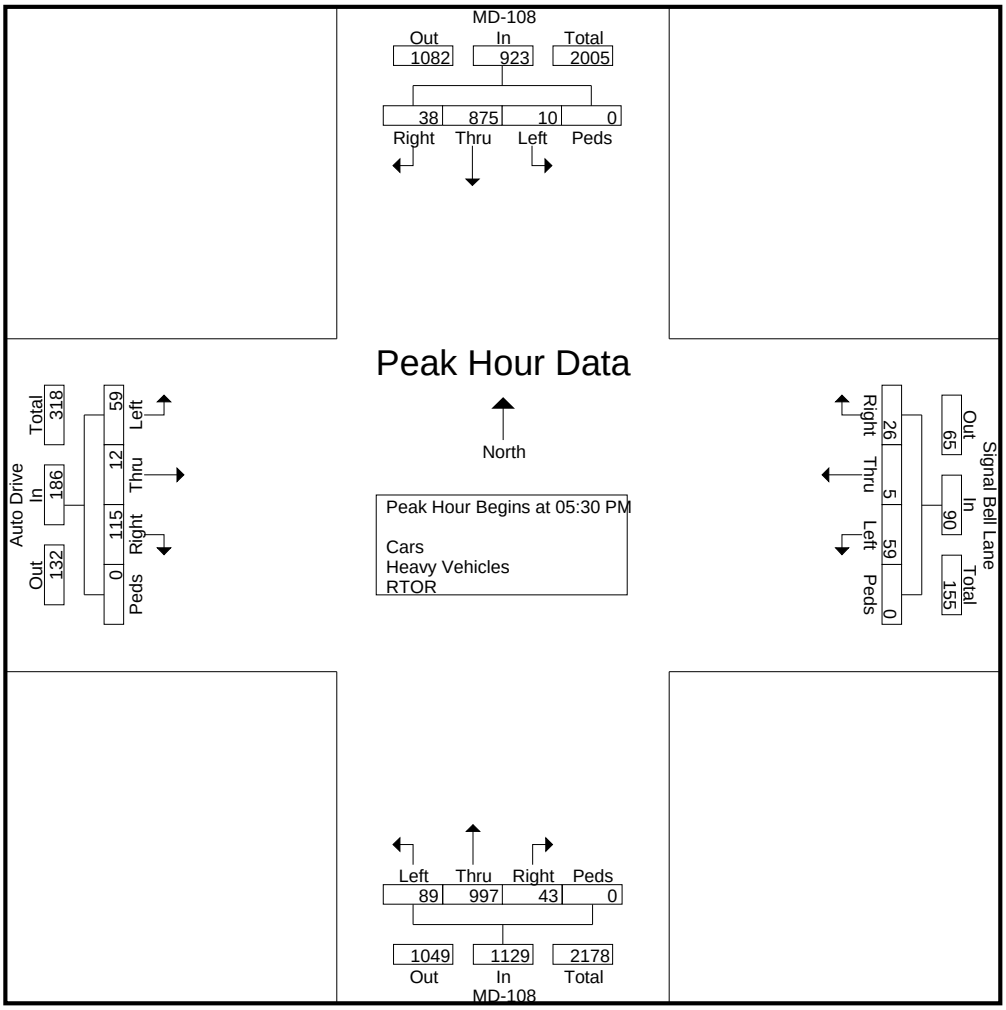


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 6

	MD-108 Southbound					Signal Bell Lane Westbound					MD-108 Northbound					Auto Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:30 PM																					
05:30 PM	10	**241**	1	0	**252**	6	**2**	12	0	20	12	243	21	0	276	24	2	14	0	40	588
05:45 PM	**12**	232	2	0	246	7	2	**17**	0	**26**	**13**	253	17	0	283	28	4	10	0	42	597
06:00 PM	6	205	**4**	0	215	5	1	14	0	20	10	**263**	**31**	0	**304**	**34**	**5**	**22**	0	**61**	**600**
06:15 PM	10	197	3	0	210	**8**	0	16	0	24	8	238	20	0	266	29	1	13	0	43	543
Total Volume	38	875	10	0	923	26	5	59	0	90	43	997	89	0	1129	115	12	59	0	186	2328
% App. Total	4.1	94.8	1.1	0		28.9	5.6	65.6	0		3.8	88.3	7.9	0		61.8	6.5	31.7	0		
PHF	.792	.908	.625	.000	.916	.813	.625	.868	.000	.865	.827	.948	.718	.000	.928	.846	.600	.670	.000	.762	.970



Tri-State Traffic Data, Inc.
610 466-1469
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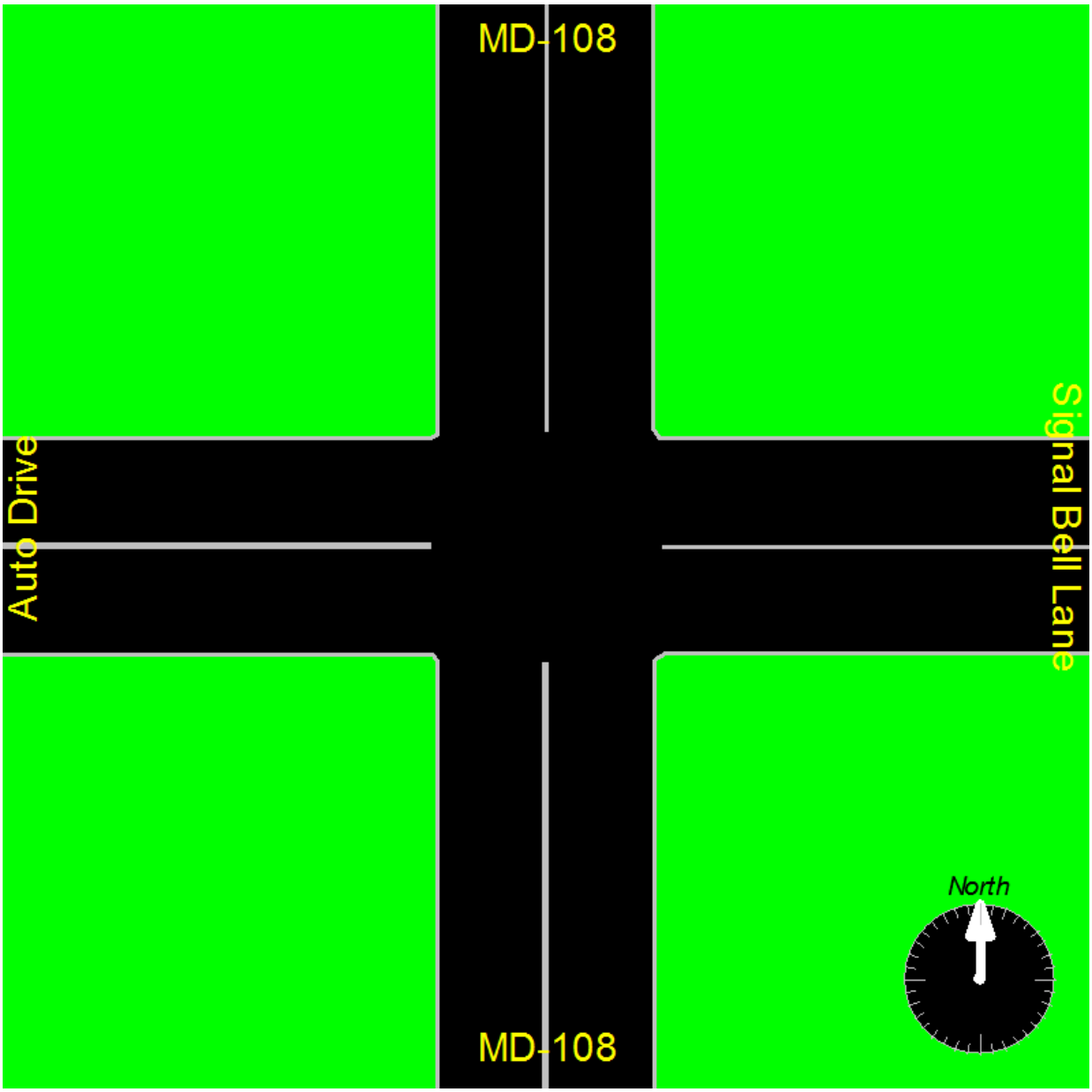
Location: Clarksville, MD
Intersection: MD-108/Signal Bell Drive
Date: Tuesday, September 9, 2014
Counter: CT

File Name : JM 0909 01
Site Code : 00000000
Start Date : 9/9/2014
Page No : 7



Maryland State Highway Administration
Highway Information Services Division
Turning Movement Count Study - Field Sheet

Station ID: S2000130049 **County:** Howard **Comments:** LOS AM:A PM:A

Date: Tuesday 12/18/2012 **Town:** none

Location: MD 108 at Great Star Dr **Weather:** Cloudy

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		07:00	08:00	1909		16:00	17:00	2468

Hour	Entrance to Hardware Store From North				Great Star Dr From South				MD 108 From East				MD 108 From West				Grand Total
Begin	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	L	T	R	TOT	
6:00	0	0	0	0	13	0	6	19	16	39	0	55	0	22	19	41	115
6:15	0	0	0	0	11	0	20	31	11	60	0	71	0	27	21	48	150
6:30	0	0	0	0	18	0	22	40	12	82	1	95	0	40	20	60	195
6:45	0	0	0	0	24	2	44	70	21	112	1	134	1	120	32	153	357
7:00	0	1	0	1	30	0	93	123	60	140	1	201	1	181	35	217	542
7:15	0	0	0	0	33	1	79	113	56	164	2	222	3	110	46	159	494
7:30	0	1	1	2	39	0	69	108	45	136	4	185	4	107	37	148	443
7:45	3	0	3	6	40	2	63	105	36	132	7	175	2	103	39	144	430
8:00	1	2	0	3	40	1	46	87	31	128	2	161	0	110	41	151	402
8:15	0	1	1	2	35	4	52	91	30	124	1	155	1	97	41	139	387
8:30	1	0	0	1	36	0	41	77	27	119	1	147	0	81	30	111	336
8:45	3	0	2	5	47	2	51	100	29	132	3	164	2	108	45	155	424
9:00	1	2	0	3	51	0	54	105	45	144	1	190	4	103	40	147	445
9:15	4	4	1	9	49	3	47	99	45	102	4	151	0	104	42	146	405
9:30	2	3	0	5	42	5	40	87	39	99	3	141	2	97	45	144	377
9:45	0	4	1	5	41	1	52	94	27	93	1	121	3	104	45	152	372
10:00	1	2	2	5	43	2	37	82	20	87	5	112	1	81	47	129	328
10:15	3	2	1	6	39	3	40	82	20	88	4	112	4	87	48	139	339
10:30	2	1	5	8	40	0	47	87	20	85	5	110	6	76	37	119	324
10:45	1	3	6	10	48	2	48	98	31	87	2	120	5	92	55	152	380
11:00	0	5	3	8	55	3	41	99	25	94	4	123	6	109	29	144	374
11:15	1	2	3	6	46	3	39	88	22	75	2	99	4	87	44	135	328
11:30	2	4	2	8	35	4	47	86	45	68	3	116	2	98	47	147	357
11:45	3	3	3	9	69	5	62	136	20	67	4	91	3	111	73	187	423
12:00	1	2	2	5	55	0	64	119	22	89	1	112	7	134	45	186	422
12:15	4	5	0	9	82	2	64	148	26	75	2	103	7	109	68	184	444
12:30	1	1	3	5	61	4	64	129	33	100	5	138	5	108	47	160	432
12:45	3	7	2	12	55	5	66	126	18	91	2	111	1	105	55	161	410
13:00	6	3	2	11	74	7	44	125	26	70	1	97	5	78	48	131	364
13:15	6	0	1	7	64	6	47	117	15	109	5	129	2	81	53	136	389
13:30	2	1	0	3	56	7	44	107	27	99	3	129	3	99	50	152	391
13:45	4	3	1	8	71	9	46	126	14	72	1	87	5	121	48	174	395
14:00	9	4	1	14	61	10	79	150	19	123	4	146	5	118	51	174	484
14:15	7	4	3	14	61	5	66	132	39	144	6	189	3	88	41	132	467
14:30	2	3	2	7	48	2	61	111	41	130	2	173	10	108	57	175	466
14:45	2	1	4	7	63	4	65	132	43	124	1	168	2	120	58	180	487
15:00	4	2	5	11	66	3	69	138	45	103	3	151	1	136	55	192	492
15:15	2	3	1	6	69	2	72	143	51	135	3	189	2	147	54	203	541
15:30	3	4	4	11	70	4	76	150	58	137	6	201	3	158	50	211	573
15:45	2	1	3	6	63	6	78	147	46	119	1	166	5	168	53	226	545
16:00	4	2	2	8	66	4	91	161	58	154	2	214	3	216	49	268	651
16:15	5	3	1	9	74	7	88	169	50	142	3	195	6	200	49	255	628
16:30	6	6	3	15	75	6	78	159	30	152	4	186	3	165	65	233	593
16:45	3	4	2	9	64	3	105	172	27	122	2	151	3	190	71	264	596
17:00	1	3	3	7	65	4	105	174	21	134	1	156	2	175	50	227	564
17:15	4	4	0	8	78	4	96	178	26	146	4	176	3	161	72	236	598
17:30	2	3	2	7	77	4	89	170	22	131	0	153	2	195	70	267	597
17:45	3	3	0	6	62	3	106	171	25	144	1	170	1	196	58	255	602
18:00	4	2	0	6	68	4	106	178	21	164	2	187	2	191	67	260	631
18:15	3	2	1	6	66	4	114	184	33	138	1	172	6	187	63	256	618
18:30	2	7	0	9	79	2	111	192	32	120	2	154	2	169	62	233	588
18:45	6	9	2	17	74	4	100	178	22	111	2	135	2	160	41	203	533
TOTAL	129	132	84	345	2791	168	3334	6293	1623	5835	131	7589	155	6338	2508	9001	23228
AM Peak	3	2	4	9	142	3	304	449	197	572	14	783	10	501	157	668	1909
PM Peak	18	15	8	41	279	20	362	661	165	570	11	746	15	771	234	1020	2468

Station ID: S2000130049 **County:** Howard **Comments:** LOS AM:A PM:A

Date: Tuesday 12/18/2012 **Town:** none

Location: MD 108 at Great Star Dr **Weather:** Cloudy

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin 07:00	End 08:00	Volume 1909	PM PERIOD 12:00PM-19:00PM	Begin 16:00	End 17:00	Volume 2468

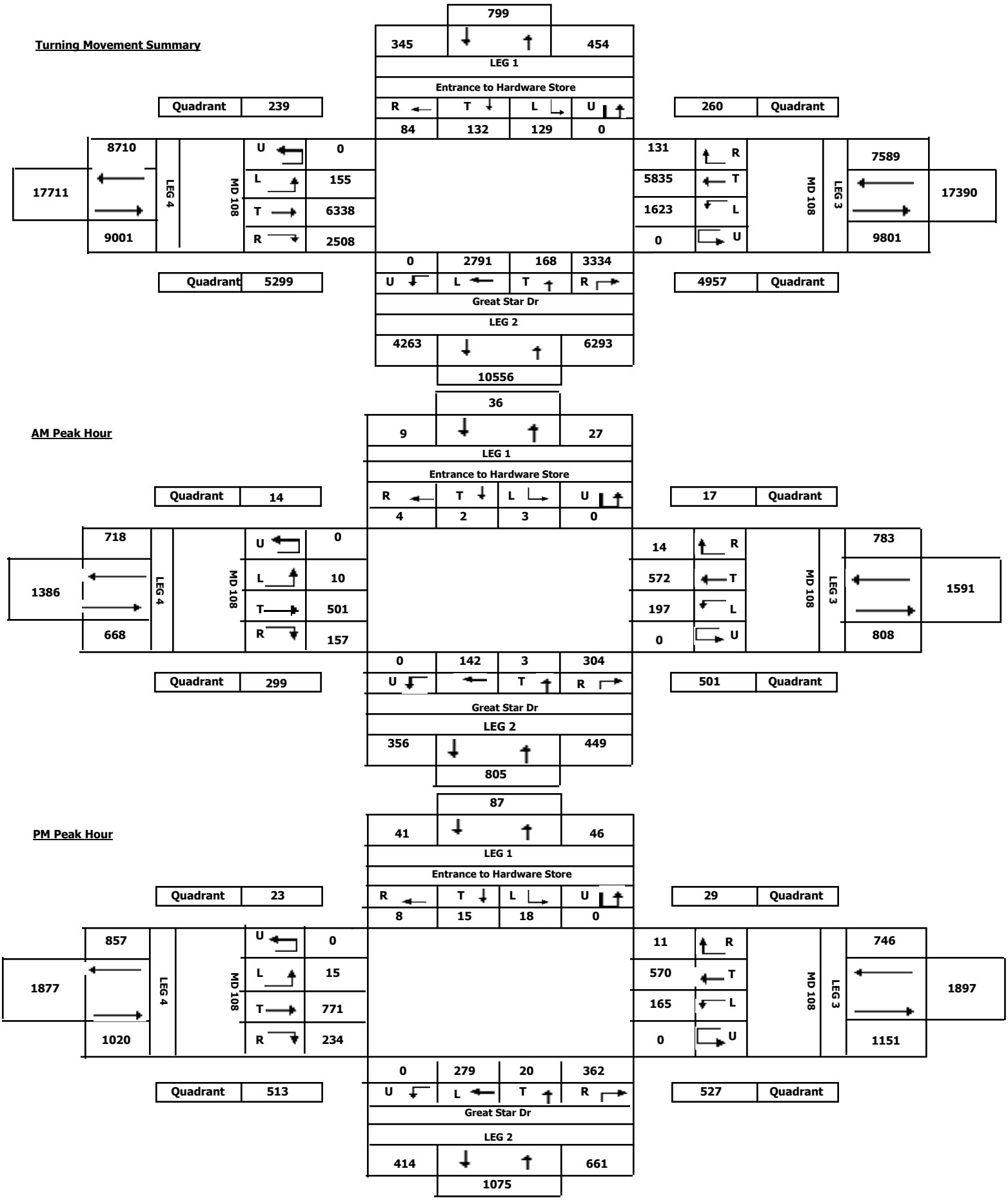
Hour	Entrance to Hardware Store North Leg			Great Star Dr South Leg			MD 108 East Leg			MD 108 West Leg		
Ending	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.	S.C.	PED.	U.T.
6:00	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	0	0	0	0	0	0	0	0	0	0	0
6:30	0	0	0	0	0	0	0	0	0	0	0	0
6:45	0	0	0	0	0	0	0	0	0	0	0	0
7:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
7:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:00	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	1	0	0	0	0
9:30	0	0	0	0	0	0	0	0	0	0	0	0
9:45	0	0	0	0	1	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	2	0	0	2	0	0	1	0	0	0	0
10:30	0	0	0	0	2	0	0	1	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	2	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	1	0	0	0	0	0	0	0
12:00	0	0	0	0	0	1	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	1	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	1	0	0	0	0	0	0
13:30	0	1	0	0	1	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	1	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	1	0	0	0	0	0	0	0
16:00	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
16:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
16:45	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	1	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**4**	**0**	**0**	**10**	**4**	**0**	**4**	**0**	**0**	**0**	**0**
AM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PM Peak	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**

Station ID:	S2000130049	**County:**	Howard	**Comments:**	LOS AM:A PM:A
Date:	Tuesday 12/18/2012	**Town:**	none		
Location:	MD 108 at Great Star Dr	**Weather:**	Cloudy		

Interval (dd): 15 min

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Begin	End	Volume	PM PERIOD 12:00PM-19:00PM	Begin	End	Volume
		07:00	08:00	1909		16:00	17:00	2468

Turning Movement Summary



Tri-State Traffic Data, Inc.

610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 1

Groups Printed- Cars - Buses - Trucks - Bicycles on Crosswalk - Pedestrians

	Daybreak Circle Southbound					Great Star Drive Westbound					Signal Bell Lane Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	10	0	0	0	10	4	5	7	0	16	10	2	2	0	14	10	3	11	0	24	64
06:15 AM	12	1	1	1	15	4	13	9	0	26	5	2	8	0	15	15	8	10	1	34	90
06:30 AM	14	1	0	0	15	4	16	11	0	31	12	3	10	2	27	17	15	21	0	53	126
06:45 AM	27	0	0	0	27	7	53	14	0	74	6	1	8	2	17	20	21	27	0	68	186
Total	63	2	1	1	67	19	87	41	0	147	33	8	28	4	73	62	47	69	1	179	466
07:00 AM	31	0	0	1	32	8	81	17	0	106	12	6	13	3	34	23	59	35	0	117	289
07:15 AM	32	0	1	0	33	6	51	21	0	78	16	4	12	0	32	22	54	40	0	116	259
07:30 AM	25	0	0	0	25	6	48	22	0	76	20	1	7	2	30	22	36	34	0	92	223
07:45 AM	39	1	0	1	41	14	39	25	0	78	14	4	12	0	30	13	40	32	0	85	234
Total	127	1	1	2	131	34	219	85	0	338	62	15	44	5	126	80	189	141	0	410	1005
08:00 AM	37	3	0	0	40	5	41	17	2	65	12	9	5	1	27	15	39	36	1	91	223
08:15 AM	33	0	0	0	33	6	45	13	0	64	11	3	11	0	25	17	51	43	1	112	234
08:30 AM	32	0	0	0	32	6	29	15	0	50	11	4	6	0	21	18	38	45	0	101	204
08:45 AM	42	0	1	1	44	8	57	14	0	79	15	5	15	4	39	21	35	40	0	96	258
Total	144	3	1	1	149	25	172	59	2	258	49	21	37	5	112	71	163	164	2	400	919
11:00 AM	24	0	0	0	24	2	28	13	0	43	18	1	9	0	28	11	17	37	0	65	160
11:15 AM	33	0	0	0	33	8	41	7	0	56	12	3	10	2	27	7	24	43	1	75	191
11:30 AM	34	1	1	0	36	4	30	6	3	43	11	6	9	6	32	12	30	50	0	92	203
11:45 AM	53	1	0	0	54	7	51	13	0	71	14	2	8	1	25	6	31	53	0	90	240
Total	144	2	1	0	147	21	150	39	3	213	55	12	36	9	112	36	102	183	1	322	794
12:00 PM	55	2	0	0	57	6	35	7	0	48	16	5	6	0	27	9	30	52	0	91	223
12:15 PM	55	0	0	0	55	10	32	13	0	55	10	8	13	0	31	14	22	60	0	96	237
12:30 PM	62	0	1	0	63	3	55	9	0	67	13	6	6	0	25	15	37	52	0	104	259
12:45 PM	58	0	0	0	58	7	56	10	0	73	11	9	8	0	28	9	24	50	0	83	242
Total	230	2	1	0	233	26	178	39	0	243	50	28	33	0	111	47	113	214	0	374	961
03:00 PM	68	1	1	1	71	9	74	12	0	95	17	7	8	0	32	17	36	46	1	100	298
03:15 PM	54	3	0	1	58	10	65	15	0	90	18	3	12	0	33	13	54	40	0	107	288
03:30 PM	54	0	0	0	54	14	82	17	0	113	9	6	14	0	29	19	35	42	0	96	292
03:45 PM	54	1	0	0	55	4	86	16	0	106	12	10	7	0	29	16	51	48	0	115	305
Total	230	5	1	2	238	37	307	60	0	404	56	26	41	0	123	65	176	176	1	418	1183
04:00 PM	53	0	1	0	54	7	76	19	0	102	22	5	12	0	39	18	53	44	0	115	310
04:15 PM	51	0	0	0	51	9	106	17	0	132	28	2	17	0	47	18	54	30	0	102	332
04:30 PM	54	0	1	0	55	8	99	15	0	122	22	2	18	0	42	12	32	46	0	90	309
04:45 PM	51	0	0	0	51	11	97	24	0	132	26	2	11	0	39	21	42	45	1	109	331
Total	209	0	2	0	211	35	378	75	0	488	98	11	58	0	167	69	181	165	1	416	1282
05:00 PM	41	0	0	0	41	7	107	13	0	127	24	3	14	0	41	20	37	45	0	102	311
05:15 PM	43	0	1	0	44	5	132	18	0	155	23	4	13	0	40	11	68	40	0	119	358
05:30 PM	50	1	0	0	51	4	100	10	0	114	21	4	22	0	47	21	65	39	0	125	337
05:45 PM	47	0	0	0	47	5	96	14	0	115	26	4	9	0	39	12	63	41	0	116	317
Total	181	1	1	0	183	21	435	55	0	511	94	15	58	0	167	64	233	165	0	462	1323
06:00 PM	44	1	0	0	45	5	86	17	0	108	22	3	26	0	51	20	65	45	0	130	334
06:15 PM	59	1	2	0	62	2	85	12	0	99	15	2	12	0	29	14	45	52	0	111	301
06:30 PM	46	0	1	0	47	7	90	12	1	110	18	0	13	0	31	21	63	40	0	124	312
06:45 PM	45	0	0	0	45	7	92	7	0	106	10	6	14	0	30	16	56	40	0	112	293
Total	194	2	3	0	199	21	353	48	1	423	65	11	65	0	141	71	229	177	0	477	1240
Grand Total	1522	18	12	6	1558	239	2279	501	6	3025	562	147	400	23	1132	565	1433	1454	6	3458	9173
Apprch %	97.7	1.2	0.8	0.4		7.9	75.3	16.6	0.2		49.6	13	35.3	2		16.3	41.4	42	0.2		
Total %	16.6	0.2	0.1	0.1	17	2.6	24.8	5.5	0.1	33	6.1	1.6	4.4	0.3	12.3	6.2	15.6	15.9	0.1	37.7	

Tri-State Traffic Data, Inc.

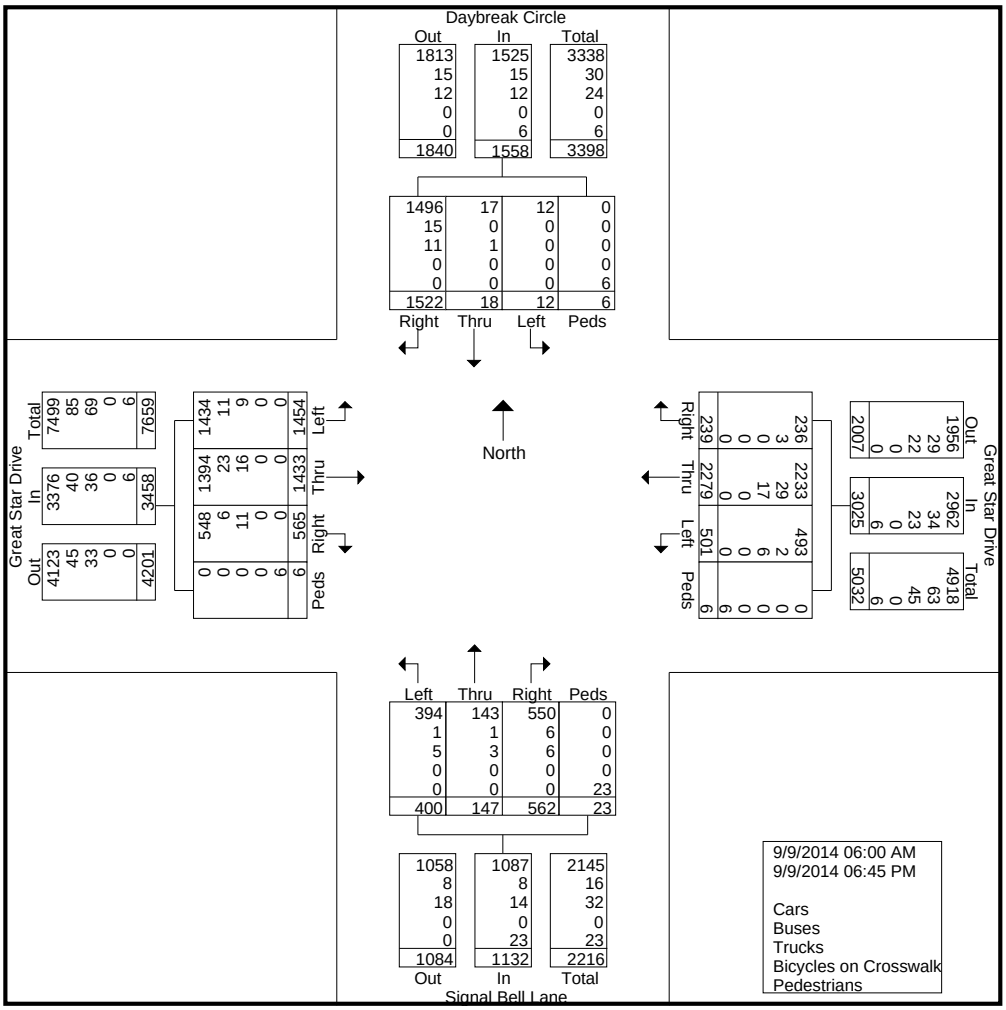
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 2

Groups Printed- Cars - Buses - Trucks - Bicycles on Crosswalk - Pedestrians

	Daybreak Circle Southbound					Great Star Drive Westbound					Signal Bell Lane Northbound					Great Star Drive Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Cars	1496	17	12	0	1525	236	2233	493	0	2962	550	143	394	0	1087	548	1394	1434	0	3376	8950
% Cars	98.3	94.4	100	0	97.9	98.7	98	98.4	0	97.9	97.9	97.3	98.5	0	96	97	97.3	98.6	0	97.6	97.6
Buses	15	0	0	0	15	3	29	2	0	34	6	1	1	0	8	6	23	11	0	40	97
% Buses	1	0	0	0	1	1.3	1.3	0.4	0	1.1	1.1	0.7	0.2	0	0.7	1.1	1.6	0.8	0	1.2	1.1
Trucks	11	1	0	0	12	0	17	6	0	23	6	3	5	0	14	11	16	9	0	36	85
% Trucks	0.7	5.6	0	0	0.8	0	0.7	1.2	0	0.8	1.1	2	1.2	0	1.2	1.9	1.1	0.6	0	1	0.9
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	6	6	0	0	0	6	6	0	0	0	23	23	0	0	0	6	6	41
% Pedestrians	0	0	0	100	0.4	0	0	0	100	0.2	0	0	0	100	2	0	0	0	100	0.2	0.4



Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
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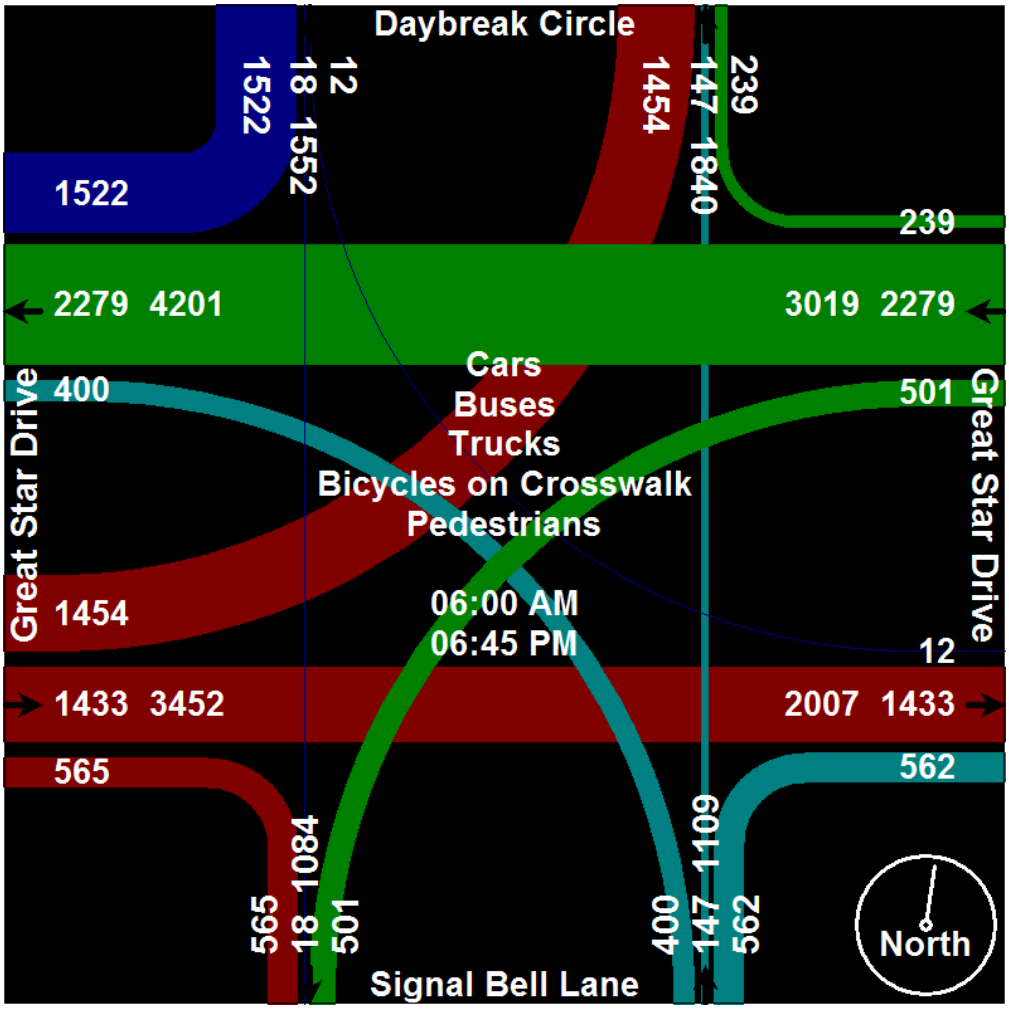
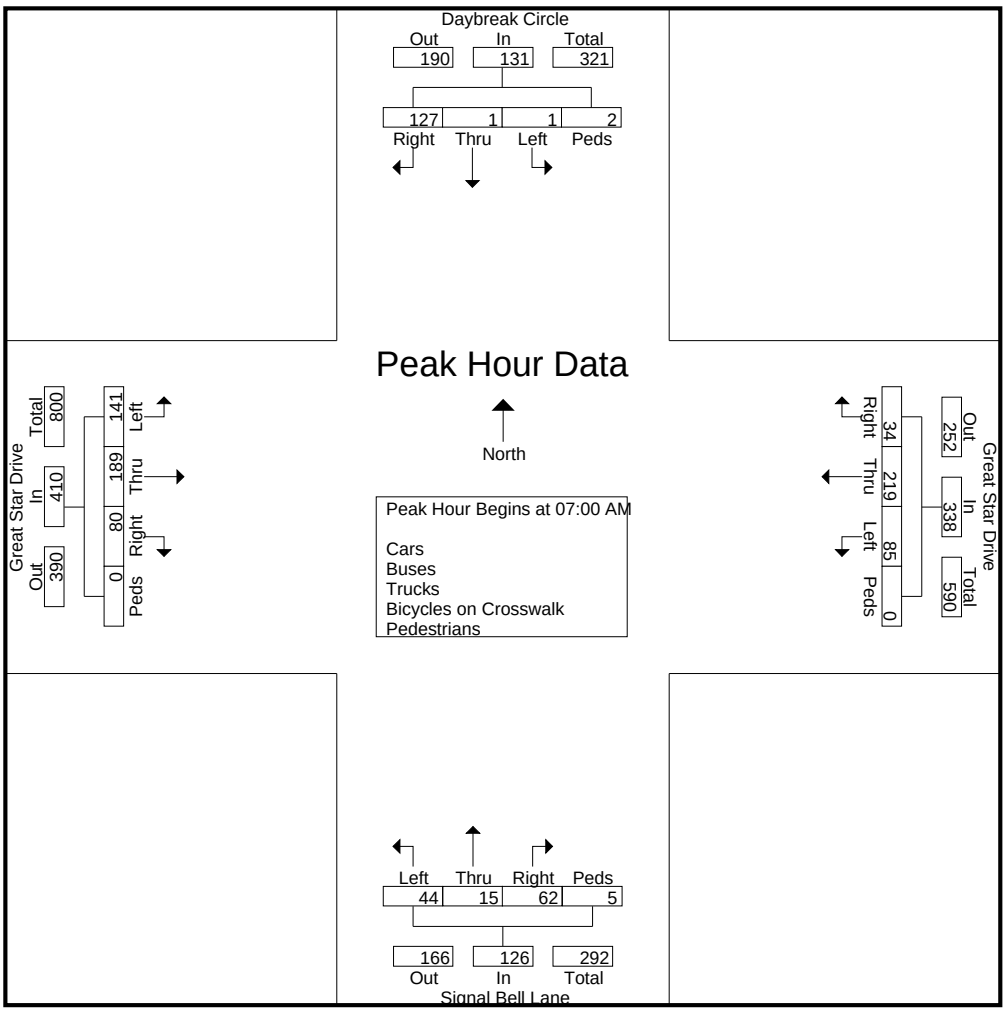


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 4

	Daybreak Circle Southbound					Great Star Drive Westbound					Signal Bell Lane Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	31	0	0	**1**	32	8	**81**	17	0	**106**	12	**6**	**13**	**3**	**34**	**23**	**59**	35	0	**117**	**289**
07:15 AM	32	0	**1**	0	33	6	51	21	0	78	16	4	12	0	32	22	54	**40**	0	116	259
07:30 AM	25	0	0	0	25	6	48	22	0	76	**20**	1	7	2	30	22	36	34	0	92	223
07:45 AM	**39**	**1**	0	1	**41**	**14**	39	**25**	0	78	14	4	12	0	30	13	40	32	0	85	234
Total Volume	127	1	1	2	131	34	219	85	0	338	62	15	44	5	126	80	189	141	0	410	1005
% App. Total	96.9	0.8	0.8	1.5		10.1	64.8	25.1	0		49.2	11.9	34.9	4		19.5	46.1	34.4	0		
PHF	.814	.250	.250	.500	.799	.607	.676	.850	.000	.797	.775	.625	.846	.417	.926	.870	.801	.881	.000	.876	.869

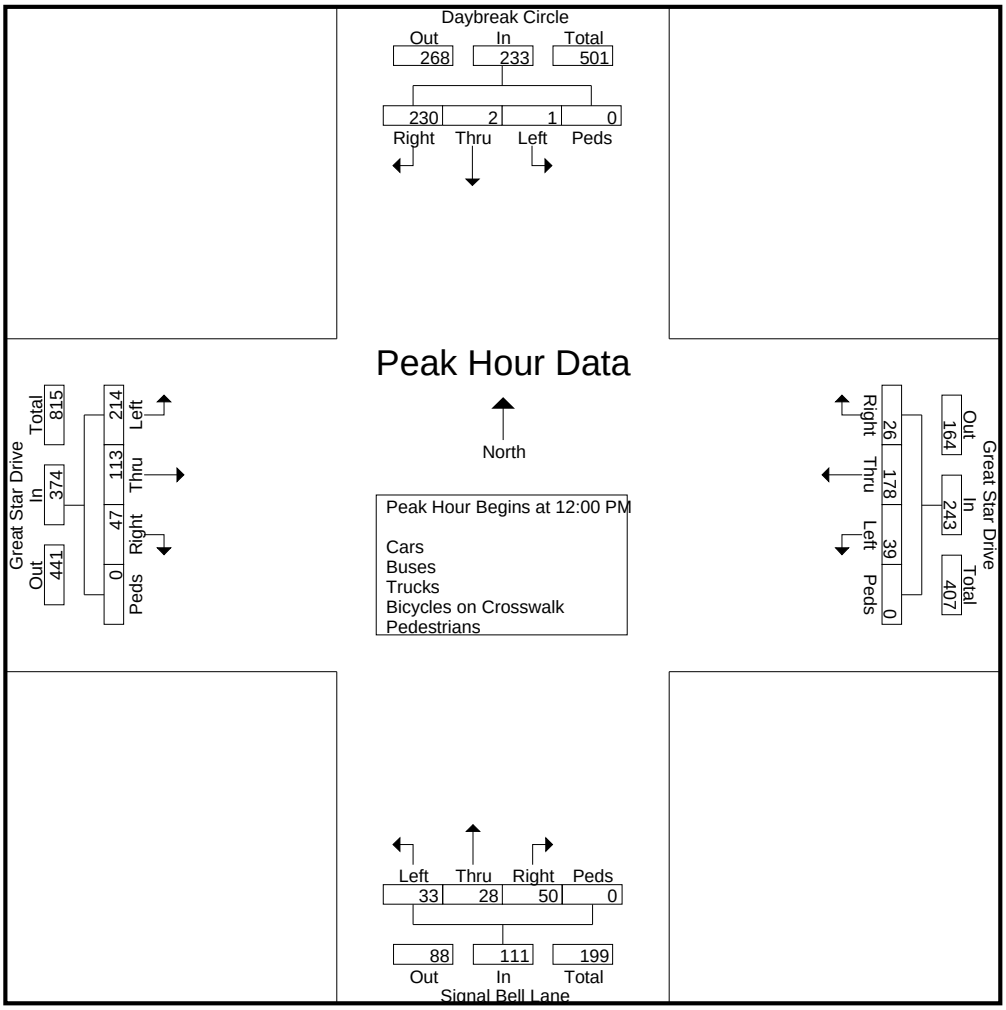


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 5

	Daybreak Circle Southbound					Great Star Drive Westbound					Signal Bell Lane Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	55	**2**	0	0	57	6	35	7	0	48	**16**	5	6	0	27	9	30	52	0	91	223
12:15 PM	55	0	0	0	55	**10**	32	**13**	0	55	10	8	**13**	0	**31**	14	22	**60**	0	96	237
12:30 PM	**62**	0	**1**	0	**63**	3	55	9	0	67	13	6	6	0	25	**15**	**37**	52	0	**104**	**259**
12:45 PM	58	0	0	0	58	7	**56**	10	0	**73**	11	**9**	8	0	28	9	24	50	0	83	242
Total Volume	230	2	1	0	233	26	178	39	0	243	50	28	33	0	111	47	113	214	0	374	961
% App. Total	98.7	0.9	0.4	0		10.7	73.3	16	0		45	25.2	29.7	0		12.6	30.2	57.2	0		
PHF	.927	.250	.250	.000	.925	.650	.795	.750	.000	.832	.781	.778	.635	.000	.895	.783	.764	.892	.000	.899	.928

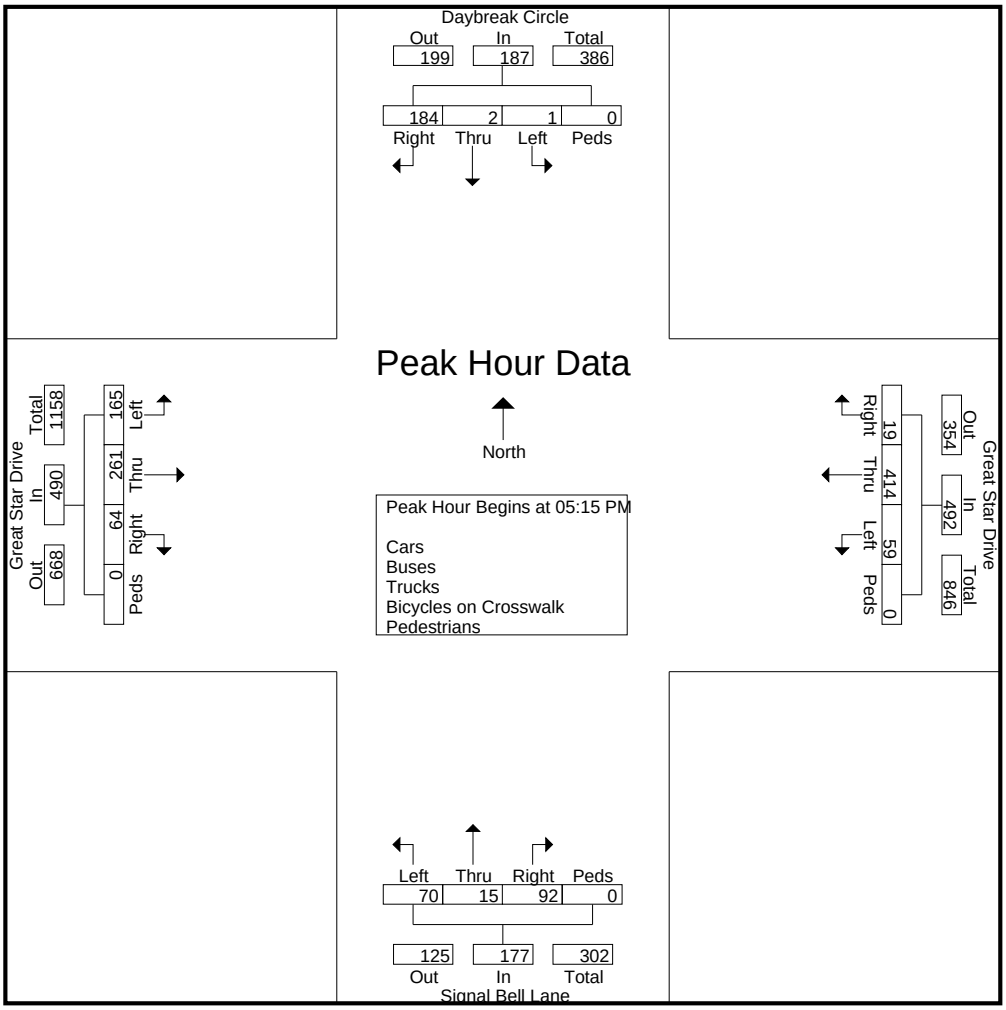


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 6

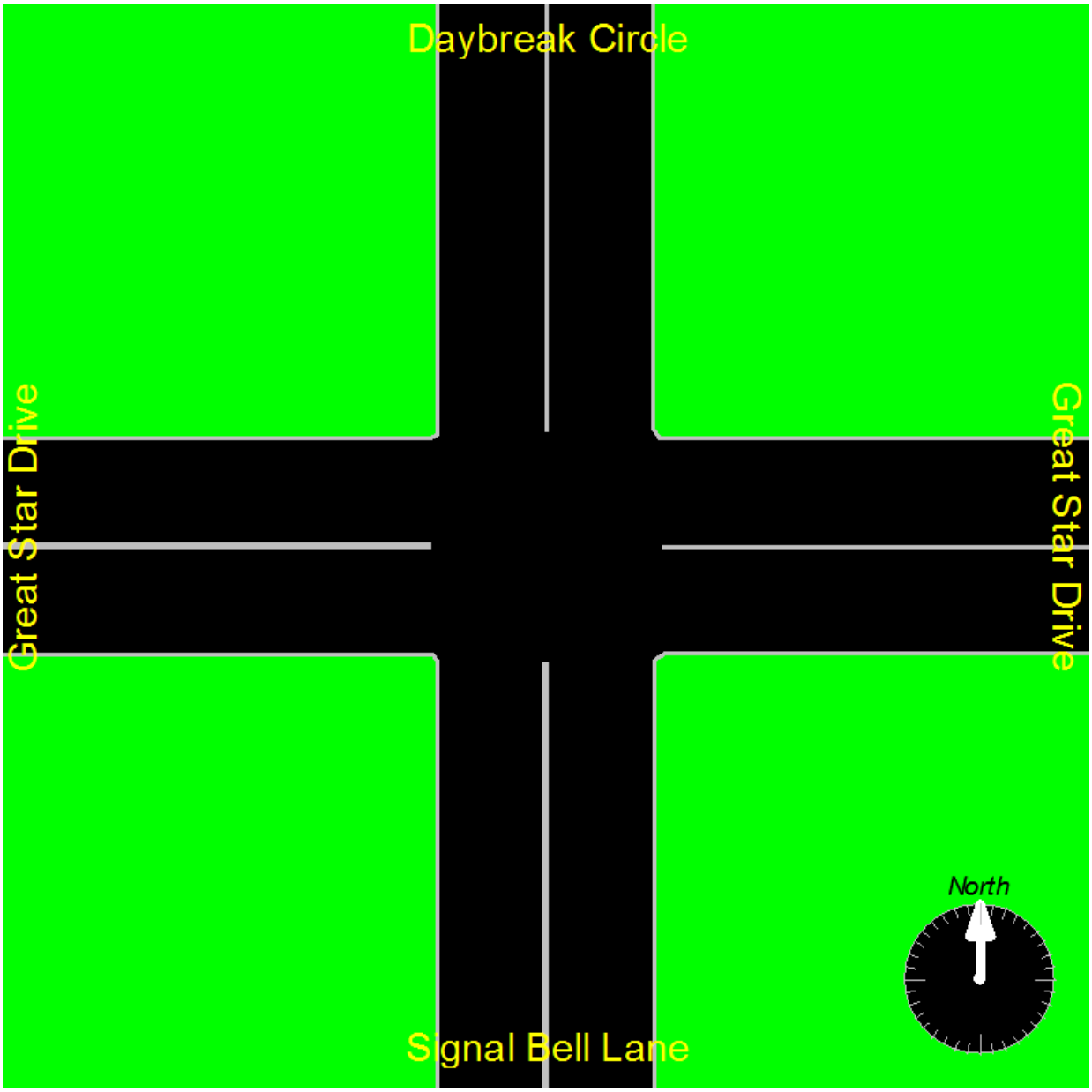
	Daybreak Circle Southbound					Great Star Drive Westbound					Signal Bell Lane Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:15 PM																					
05:15 PM	43	0	**1**	0	44	**5**	**132**	**18**	0	**155**	23	**4**	13	0	40	11	**68**	40	0	119	**358**
05:30 PM	**50**	**1**	0	0	**51**	4	100	10	0	114	21	4	22	0	47	**21**	65	39	0	125	337
05:45 PM	47	0	0	0	47	5	96	14	0	115	**26**	4	9	0	39	12	63	41	0	116	317
06:00 PM	44	1	0	0	45	5	86	17	0	108	22	3	**26**	0	**51**	20	65	**45**	0	**130**	334
Total Volume	184	2	1	0	187	19	414	59	0	492	92	15	70	0	177	64	261	165	0	490	1346
% App. Total	98.4	1.1	0.5	0		3.9	84.1	12	0		52	8.5	39.5	0		13.1	53.3	33.7	0		
PHF	.920	.500	.250	.000	.917	.950	.784	.819	.000	.794	.885	.938	.673	.000	.868	.762	.960	.917	.000	.942	.940



Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star Dr/Signal Bell
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 2
Site Code :
Start Date : 9/9/2014
Page No : 7



Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 1

Groups Printed- Cars - Buses - Trucks - Bicycles on Crosswalk - Pedestrians

	Daybreak Ct Southbound					Great Star Drive Westbound					Development Dr Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	1	0	5	0	6	11	17	0	0	28	1	1	0	4	6	0	11	2	0	13	53
06:15 AM	4	0	12	0	16	9	20	0	0	29	0	0	2	8	10	0	13	2	0	15	70
06:30 AM	4	0	17	0	21	7	26	0	0	33	3	0	4	1	8	2	22	2	0	26	88
06:45 AM	7	1	23	0	31	21	70	0	0	91	3	0	6	2	11	0	23	5	0	28	161
Total	16	1	57	0	74	48	133	0	0	181	7	1	12	15	35	2	69	11	0	82	372
07:00 AM	16	0	22	2	40	39	76	2	0	117	3	2	7	3	15	3	59	13	1	76	248
07:15 AM	17	2	23	0	42	18	58	0	0	76	6	2	3	2	13	5	53	9	1	68	199
07:30 AM	19	0	26	1	46	23	58	0	0	81	6	0	4	6	16	1	44	17	0	62	205
07:45 AM	16	2	25	0	43	18	53	1	0	72	5	0	3	3	11	0	38	12	0	50	176
Total	68	4	96	3	171	98	245	3	0	346	20	4	17	14	55	9	194	51	2	256	828
08:00 AM	16	0	27	0	43	18	43	2	0	63	6	0	2	2	10	1	41	10	1	53	169
08:15 AM	16	0	27	0	43	22	45	1	0	68	3	0	3	0	6	0	49	13	0	62	179
08:30 AM	18	0	17	0	35	14	37	0	0	51	3	0	0	1	4	1	32	13	0	46	136
08:45 AM	21	1	29	0	51	23	54	1	0	78	3	0	2	4	9	1	35	12	0	48	186
Total	71	1	100	0	172	77	179	4	0	260	15	0	7	7	29	3	157	48	1	209	670
11:00 AM	19	1	16	2	38	11	19	0	0	30	1	0	0	1	2	1	25	12	0	38	108
11:15 AM	21	1	14	0	36	15	34	0	0	49	1	1	1	3	6	1	18	18	0	37	128
11:30 AM	12	0	23	2	37	23	34	1	0	58	1	0	1	2	4	2	25	20	0	47	146
11:45 AM	23	0	19	1	43	19	45	1	0	65	0	0	1	3	4	3	26	11	0	40	152
Total	75	2	72	5	154	68	132	2	0	202	3	1	3	9	16	7	94	61	0	162	534
12:00 PM	14	0	30	2	46	17	30	1	0	48	0	0	1	0	1	2	29	15	1	47	142
12:15 PM	19	0	20	0	39	21	41	0	0	62	1	0	1	0	2	0	25	9	0	34	137
12:30 PM	24	0	24	2	50	24	40	1	0	65	2	1	0	0	3	1	28	18	0	47	165
12:45 PM	31	0	17	0	48	17	44	0	0	61	0	1	3	0	4	1	24	12	0	37	150
Total	88	0	91	4	183	79	155	2	0	236	3	2	5	0	10	4	106	54	1	165	594
03:00 PM	30	1	33	0	64	18	58	1	0	77	1	1	2	0	4	1	41	12	0	54	199
03:15 PM	32	0	21	0	53	32	61	1	2	96	1	0	2	6	9	3	50	17	0	70	228
03:30 PM	29	0	27	0	56	34	77	4	1	116	0	1	3	2	6	3	26	21	0	50	228
03:45 PM	27	1	27	0	55	31	80	3	1	115	4	0	4	1	9	2	42	21	0	65	244
Total	118	2	108	0	228	115	276	9	4	404	6	2	11	9	28	9	159	71	0	239	899
04:00 PM	26	1	24	0	51	30	78	2	0	110	0	0	1	5	6	2	52	21	0	75	242
04:15 PM	35	1	18	0	54	37	101	4	0	142	2	3	2	1	8	3	51	27	0	81	285
04:30 PM	21	1	24	1	47	24	93	6	0	123	0	0	5	0	5	4	29	21	0	54	229
04:45 PM	34	1	30	0	65	32	88	3	0	123	1	0	2	0	3	1	53	18	0	72	263
Total	116	4	96	1	217	123	360	15	0	498	3	3	10	6	22	10	185	87	0	282	1019
05:00 PM	27	1	30	0	58	43	104	2	0	149	3	0	2	1	6	1	42	22	0	65	278
05:15 PM	34	2	31	0	67	44	116	1	0	161	0	1	1	1	3	0	63	21	0	84	315
05:30 PM	34	0	30	0	64	43	81	5	0	129	1	3	3	1	8	6	60	30	0	96	297
05:45 PM	23	1	25	1	50	38	84	6	0	128	0	0	2	0	2	4	52	24	1	81	261
Total	118	4	116	1	239	168	385	14	0	567	4	4	8	3	19	11	217	97	1	326	1151
06:00 PM	26	0	24	0	50	47	80	0	0	127	1	0	3	1	5	7	63	16	0	86	268
06:15 PM	21	1	28	0	50	45	74	4	0	123	0	0	4	2	6	0	46	15	0	61	240
06:30 PM	36	0	26	0	62	35	67	0	0	102	3	0	2	0	5	3	55	24	0	82	251
06:45 PM	21	0	32	0	53	38	81	0	0	119	1	0	0	3	4	0	42	29	0	71	247
Total	104	1	110	0	215	165	302	4	0	471	5	0	9	6	20	10	206	84	0	300	1006
Grand Total	774	19	846	14	1653	941	2167	53	4	3165	66	17	82	69	234	65	1387	564	5	2021	7073
Apprch %	46.8	1.1	51.2	0.8		29.7	68.5	1.7	0.1		28.2	7.3	35	29.5		3.2	68.6	27.9	0.2		
Total %	10.9	0.3	12	0.2	23.4	13.3	30.6	0.7	0.1	44.7	0.9	0.2	1.2	1	3.3	0.9	19.6	8	0.1	28.6	

Tri-State Traffic Data, Inc.

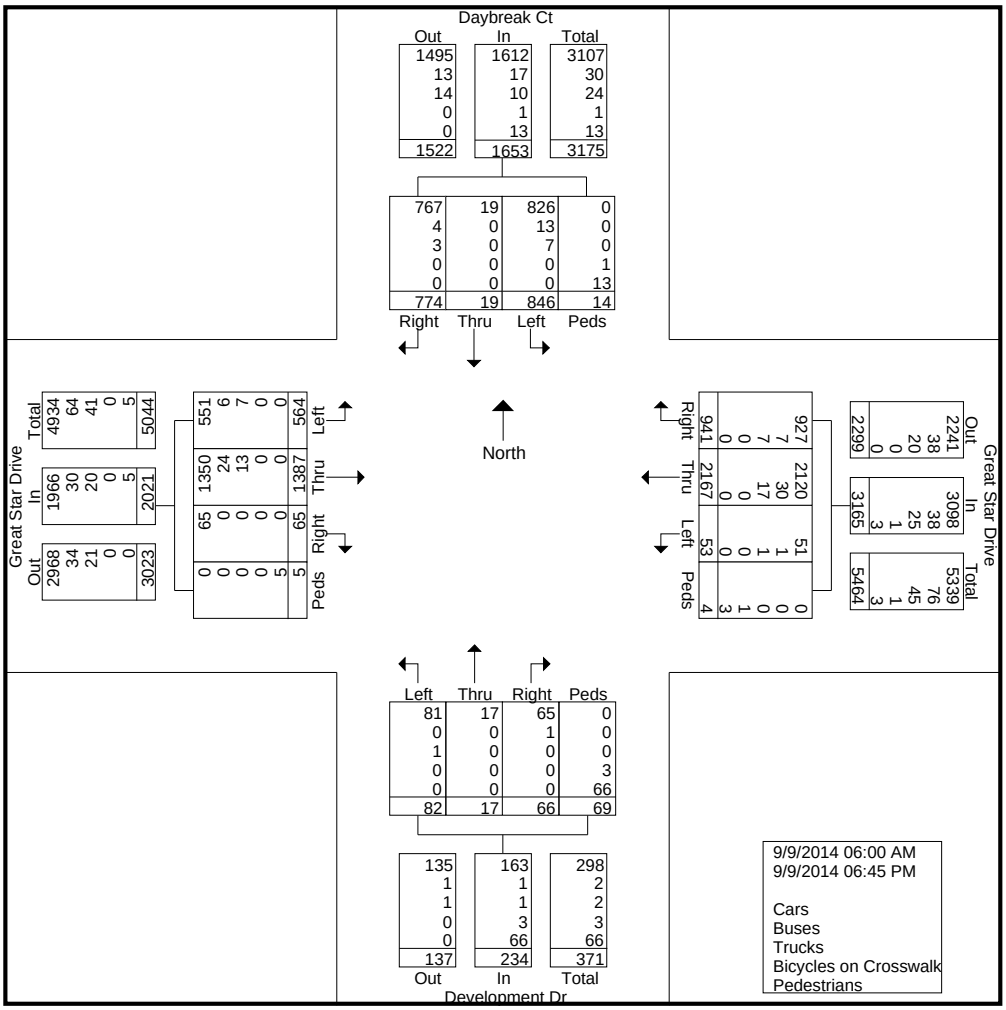
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 2

Groups Printed- Cars - Buses - Trucks - Bicycles on Crosswalk - Pedestrians

	Daybreak Ct Southbound					Great Star Drive Westbound					Development Dr Northbound					Great Star Drive Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Cars	767	19	826	0	1612	927	2120	51	0	3098	65	17	81	0	163	65	1350	551	0	1966	6839
% Cars	99.1	100	97.6	0	97.5	98.5	97.8	96.2	0	97.9	98.5	100	98.8	0	69.7	100	97.3	97.7	0	97.3	96.7
Buses	4	0	13	0	17	7	30	1	0	38	1	0	0	0	1	0	24	6	0	30	86
% Buses	0.5	0	1.5	0	1	0.7	1.4	1.9	0	1.2	1.5	0	0	0	0.4	0	1.7	1.1	0	1.5	1.2
Trucks	3	0	7	0	10	7	17	1	0	25	0	0	1	0	1	0	13	7	0	20	56
% Trucks	0.4	0	0.8	0	0.6	0.7	0.8	1.9	0	0.8	0	0	1.2	0	0.4	0	0.9	1.2	0	1	0.8
Bicycles on Crosswalk	0	0	0	1	1	0	0	0	1	1	0	0	0	3	3	0	0	0	0	0	5
% Bicycles on Crosswalk	0	0	0	7.1	0.1	0	0	0	25	0	0	0	0	4.3	1.3	0	0	0	0	0	0.1
Pedestrians	0	0	0	13	13	0	0	0	3	3	0	0	0	66	66	0	0	0	5	5	87
% Pedestrians	0	0	0	92.9	0.8	0	0	0	75	0.1	0	0	0	95.7	28.2	0	0	0	100	0.2	1.2



Tri-State Traffic Data, Inc.
610 466-1469
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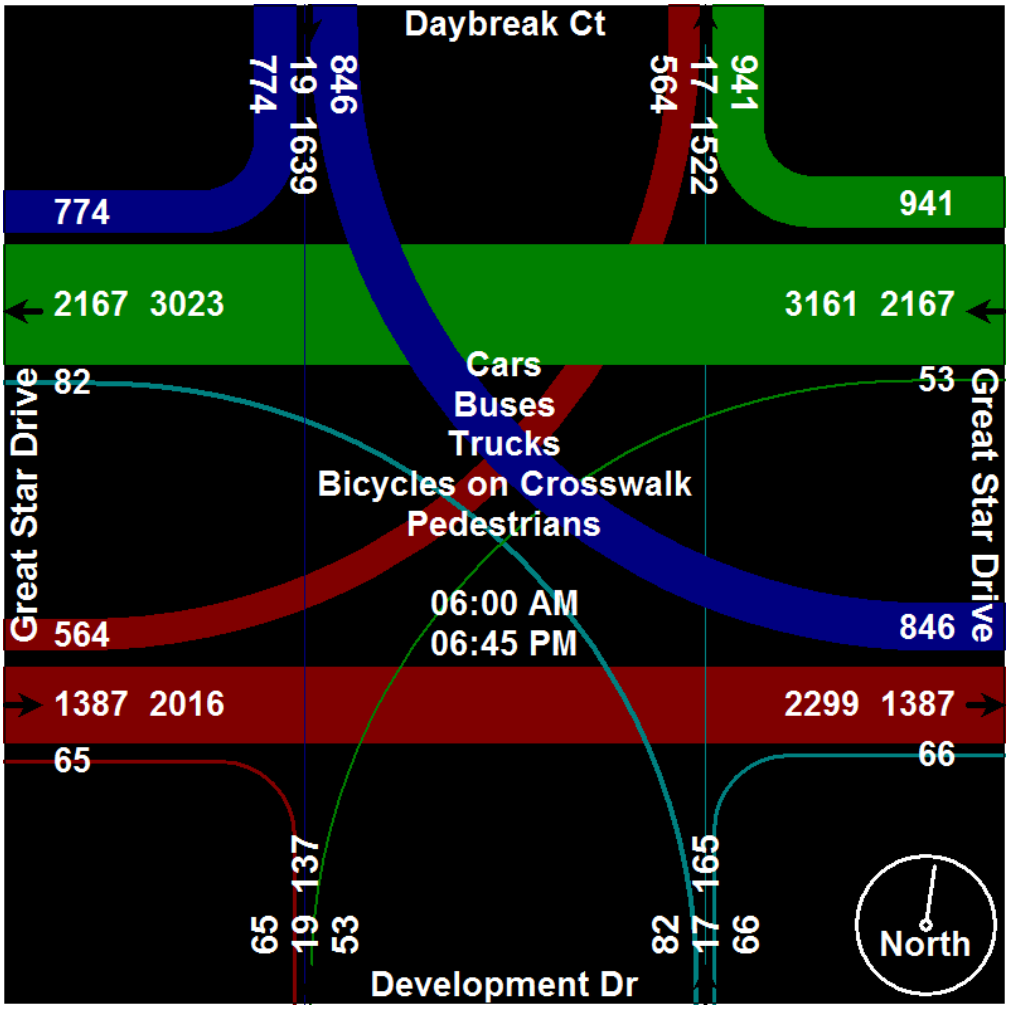
Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 3

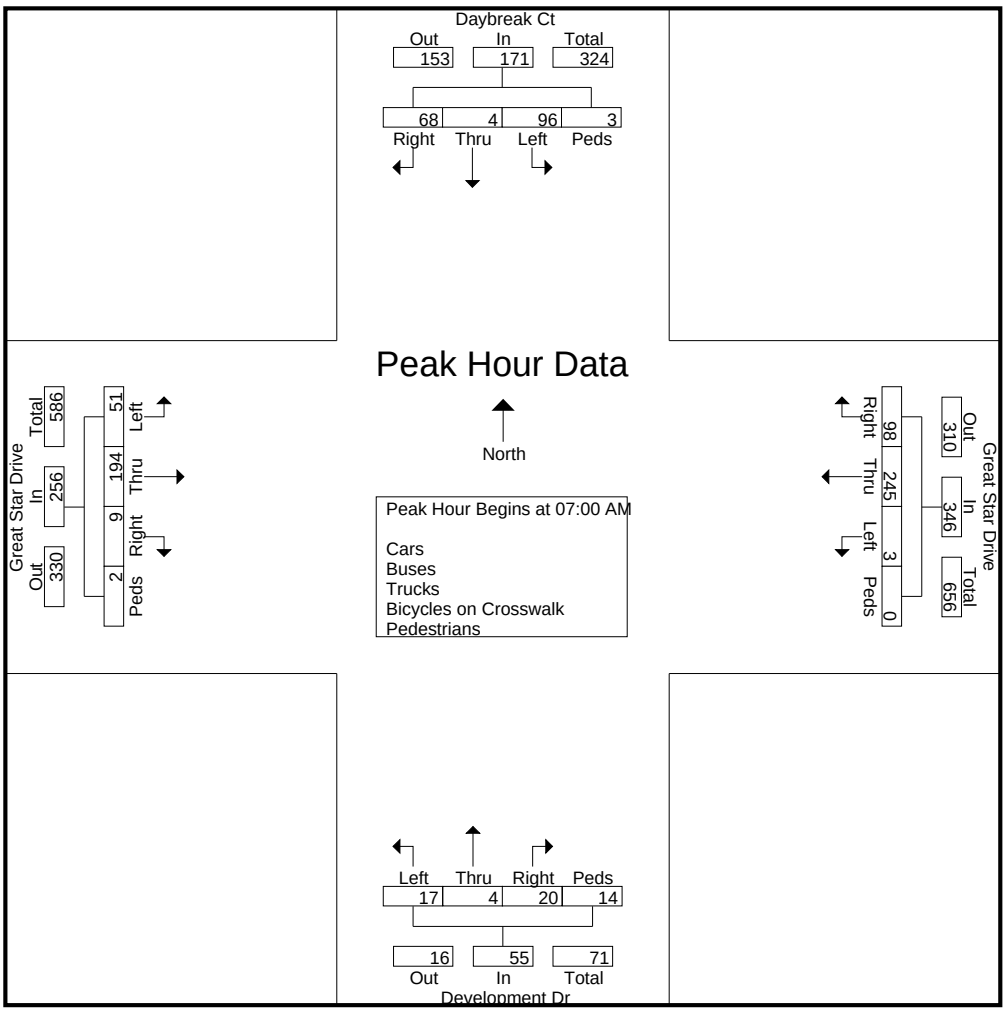


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 4

	Daybreak Ct Southbound					Great Star Drive Westbound					Development Dr Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	16	0	22	**2**	40	**39**	**76**	**2**	0	**117**	3	**2**	**7**	3	15	3	**59**	13	**1**	**76**	**248**
07:15 AM	17	**2**	23	0	42	18	58	0	0	76	**6**	2	3	2	13	**5**	53	9	1	68	199
07:30 AM	**19**	0	**26**	1	**46**	23	58	0	0	81	6	0	4	**6**	**16**	1	44	**17**	0	62	205
07:45 AM	16	2	25	0	43	18	53	1	0	72	5	0	3	3	11	0	38	12	0	50	176
Total Volume	68	4	96	3	171	98	245	3	0	346	20	4	17	14	55	9	194	51	2	256	828
% App. Total	39.8	2.3	56.1	1.8		28.3	70.8	0.9	0		36.4	7.3	30.9	25.5		3.5	75.8	19.9	0.8		
PHF	.895	.500	.923	.375	.929	.628	.806	.375	.000	.739	.833	.500	.607	.583	.859	.450	.822	.750	.500	.842	.835

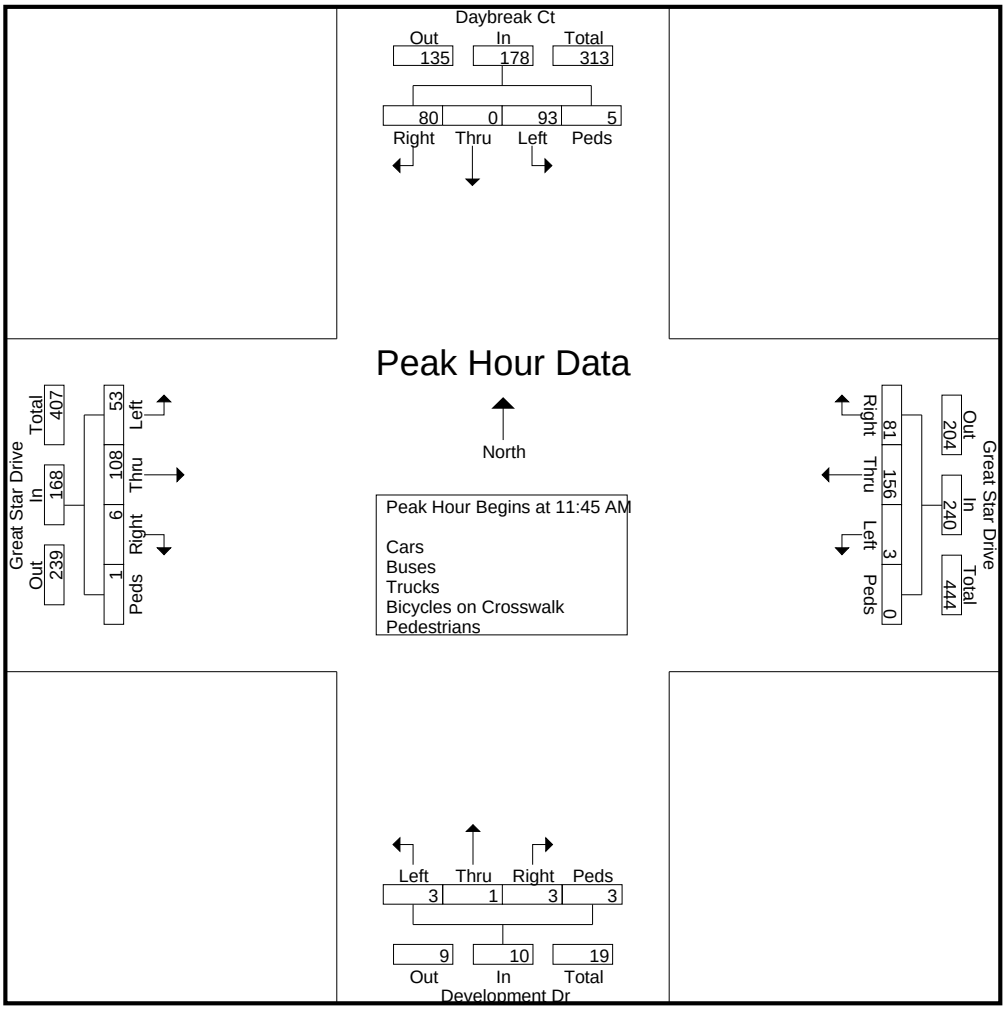


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 5

	Daybreak Ct Southbound					Great Star Drive Westbound					Development Dr Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	23	0	19	1	43	19	**45**	**1**	0	**65**	0	0	**1**	**3**	**4**	**3**	26	11	0	40	152
12:00 PM	14	0	**30**	**2**	46	17	30	1	0	48	0	0	1	0	1	2	**29**	15	**1**	**47**	142
12:15 PM	19	0	20	0	39	21	41	0	0	62	1	0	1	0	2	0	25	9	0	34	137
12:30 PM	**24**	0	24	2	**50**	**24**	40	1	0	65	**2**	**1**	0	0	3	1	28	**18**	0	47	**165**
Total Volume	80	0	93	5	178	81	156	3	0	240	3	1	3	3	10	6	108	53	1	168	596
% App. Total	44.9	0	52.2	2.8		33.8	65	1.2	0		30	10	30	30		3.6	64.3	31.5	0.6		
PHF	.833	.000	.775	.625	.890	.844	.867	.750	.000	.923	.375	.250	.750	.250	.625	.500	.931	.736	.250	.894	.903

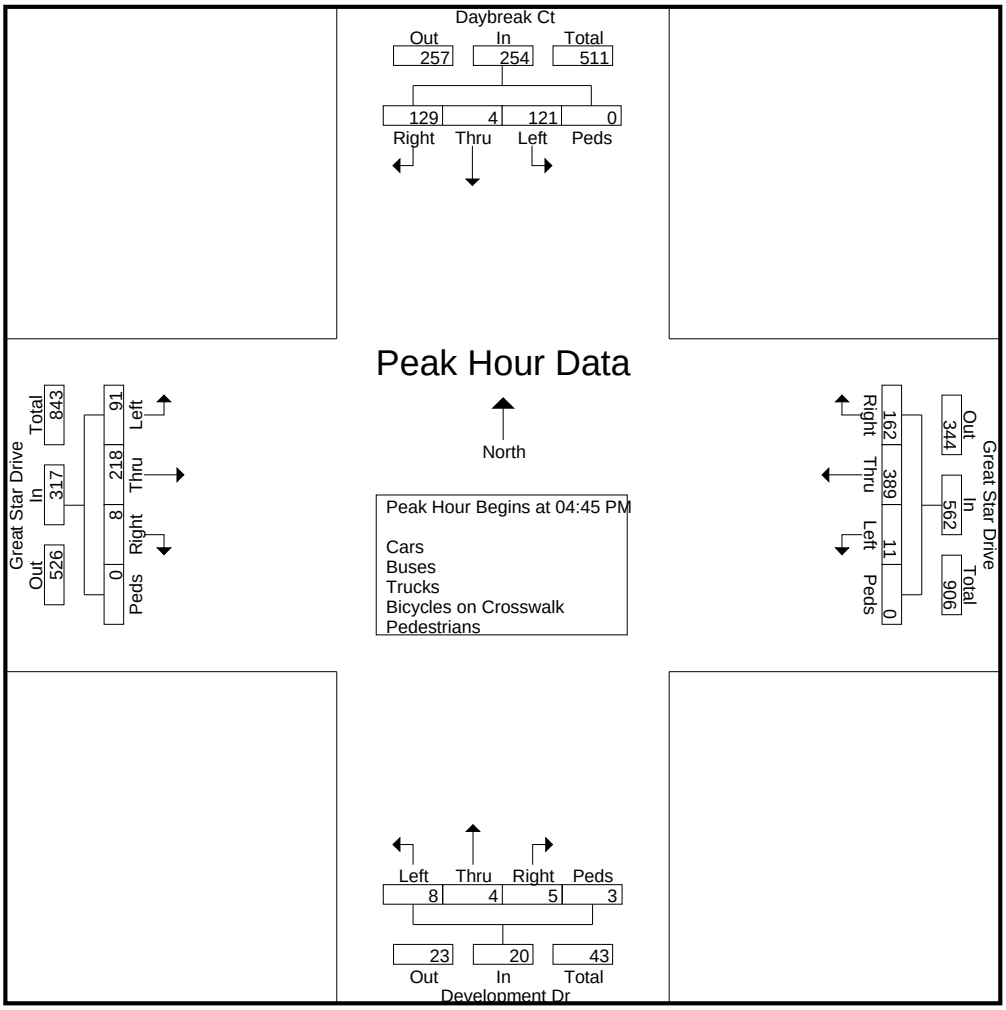


Tri-State Traffic Data, Inc.
610 466-1469
TSTData.com

Location: Clarksville, MD
Intersection: Great Star/Daybreak Ct
Date: Tuesday, September 9th, 2014
Counter: MIO

File Name : JM 0909 3
Site Code :
Start Date : 9/9/2014
Page No : 6

	Daybreak Ct Southbound					Great Star Drive Westbound					Development Dr Northbound					Great Star Drive Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	**34**	1	30	0	65	32	88	3	0	123	1	0	2	0	3	1	53	18	0	72	263
05:00 PM	27	1	30	0	58	43	104	2	0	149	**3**	0	2	**1**	6	1	42	22	0	65	278
05:15 PM	34	**2**	**31**	0	**67**	**44**	**116**	1	0	**161**	0	1	1	1	3	0	**63**	21	0	84	**315**
05:30 PM	34	0	30	0	64	43	81	**5**	0	129	1	**3**	**3**	1	**8**	**6**	60	**30**	0	**96**	297
Total Volume	129	4	121	0	254	162	389	11	0	562	5	4	8	3	20	8	218	91	0	317	1153
% App. Total	50.8	1.6	47.6	0		28.8	69.2	2	0		25	20	40	15		2.5	68.8	28.7	0		
PHF	.949	.500	.976	.000	.948	.920	.838	.550	.000	.873	.417	.333	.667	.750	.625	.333	.865	.758	.000	.826	.915



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Location: Clarksville, MD
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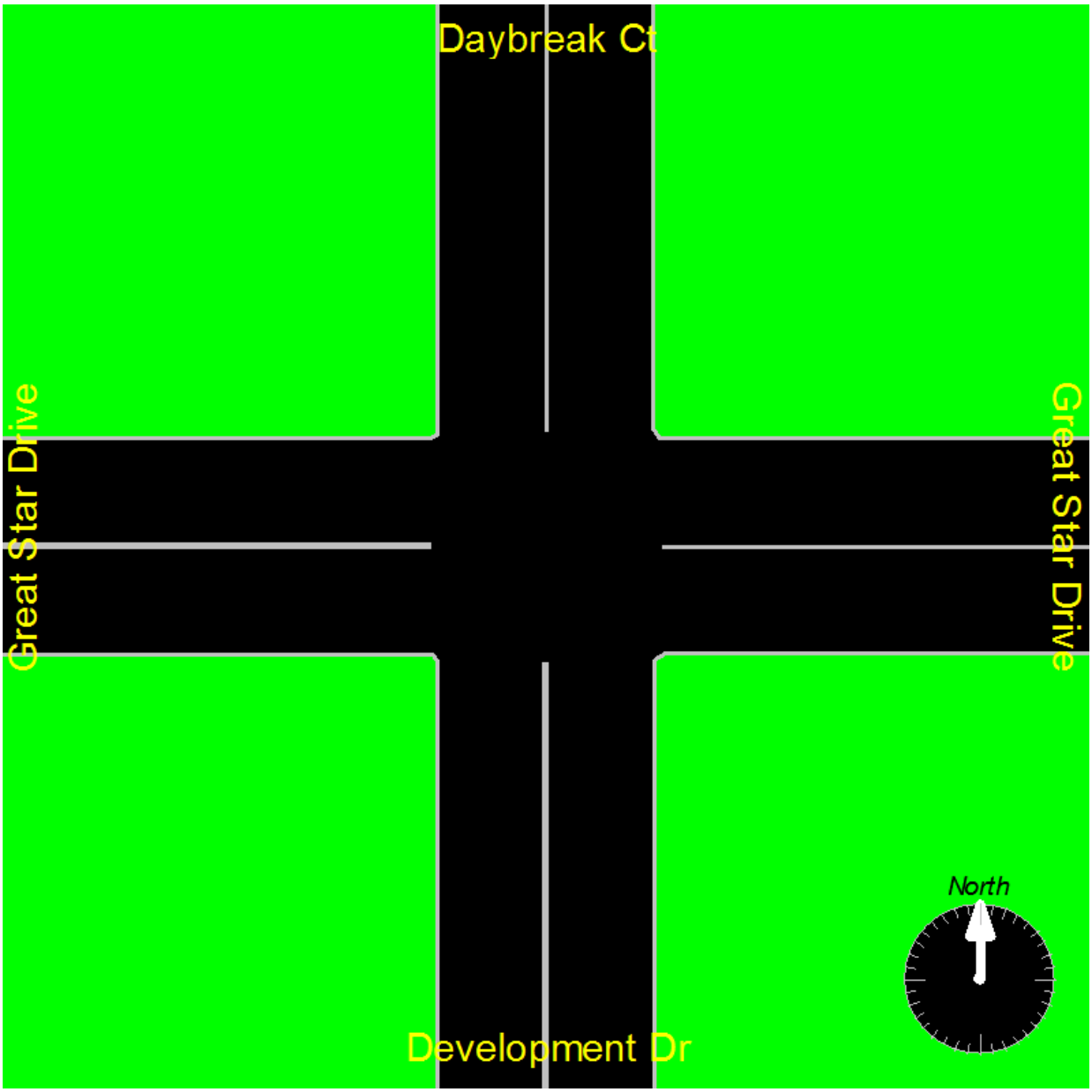
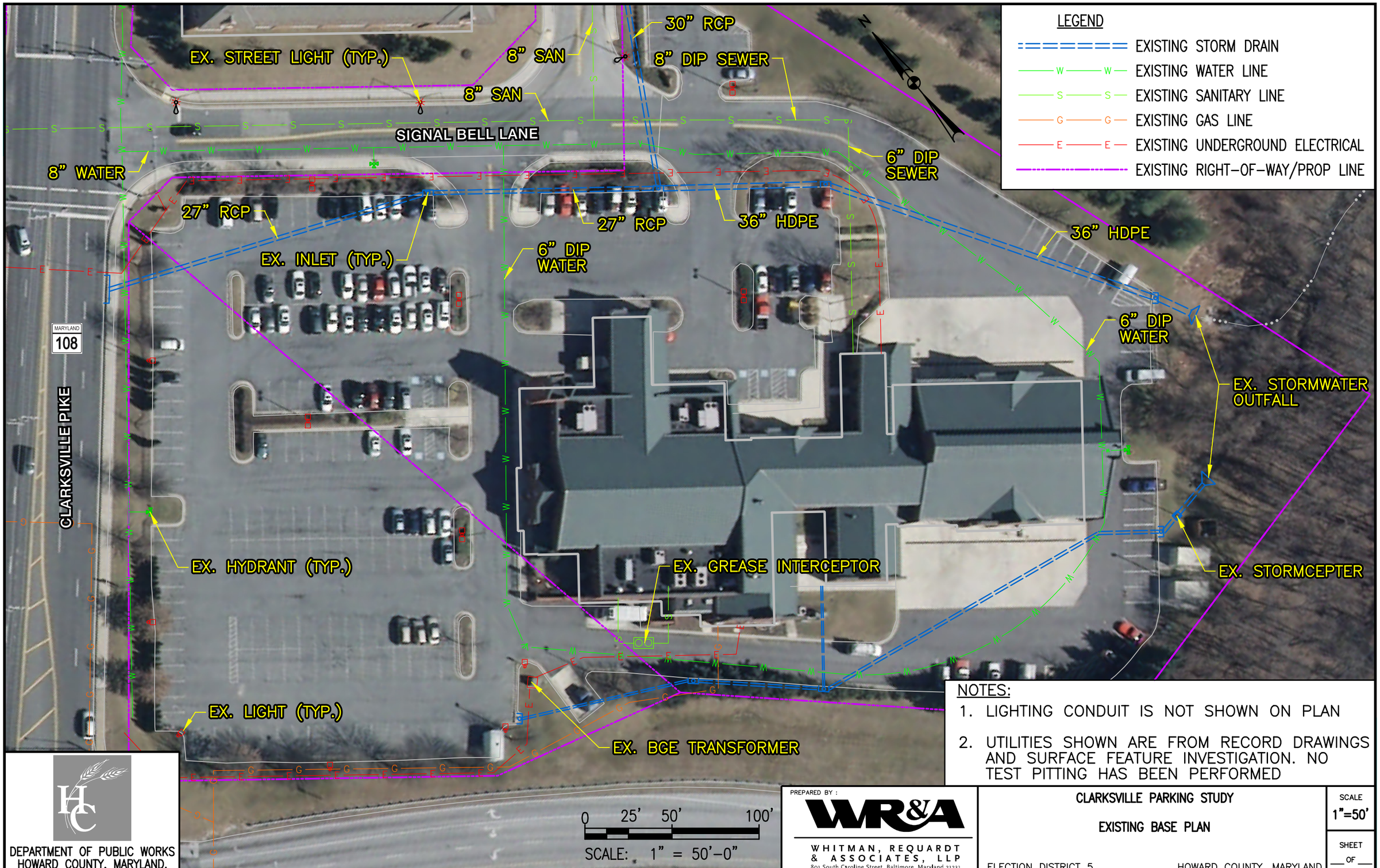


Appendix B: Existing Site Layout



NOTES:

1. LIGHTING CONDUIT IS NOT SHOWN ON PLAN
2. UTILITIES SHOWN ARE FROM RECORD DRAWINGS AND SURFACE FEATURE INVESTIGATION. NO TEST PITTING HAS BEEN PERFORMED

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND.

PREPARED BY :
WR&A
WHITMAN, REQUARDT & ASSOCIATES, LLP
801 South Caroline Street, Baltimore, Maryland 21231

CLARKSVILLE PARKING STUDY

EXISTING BASE PLAN

ELECTION DISTRICT 5 HOWARD COUNTY, MARYLAND

SCALE 1"=50'

SHEET ___ OF ___

N:\31760-009\CADD\H31760009-PS06.dgn
12/1/2014

Appendix C: Capacity Analyses - *Synchro*

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	482	487	82	15	37	593	693	466
v/c Ratio	1.01	1.02	0.14	0.10	0.13	0.57	0.74	0.46
Control Delay	87.5	89.5	0.5	41.9	12.4	20.3	8.3	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.6
Total Delay	87.5	89.5	0.5	41.9	12.4	20.8	8.5	1.8
Queue Length 50th (ft)	~402	~421	0	7	12	287	58	0
Queue Length 95th (ft)	#552	#642	0	30	20	397	98	0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	476	477	572	143	290	1032	936	1003
Starvation Cap Reductn	0	0	0	0	0	0	19	232
Spillback Cap Reductn	0	0	0	0	0	144	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	1.02	0.14	0.10	0.13	0.67	0.76	0.60

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	800	5	70	5	5	5	25	540	0	5	660	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			1.00	1.00
Satd. Flow (perm)	1681	1686	1583		1750		305	1863			1856	1583
Peak-hour factor, PHF	0.83	0.92	0.85	0.92	0.92	0.92	0.67	0.91	0.92	0.92	0.96	0.87
Adj. Flow (vph)	964	5	82	5	5	5	37	593	0	5	688	466
RTOR Reduction (vph)	0	0	59	0	5	0	0	0	0	0	0	199
Lane Group Flow (vph)	482	487	23	0	10	0	37	593	0	0	693	267
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	32.0	32.0	32.0		7.5		67.5	67.5			59.3	59.3
Effective Green, g (s)	34.0	34.0	34.0		9.5		65.5	70.0			62.3	62.3
Actuated g/C Ratio	0.28	0.28	0.28		0.08		0.55	0.58			0.52	0.52
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	476	477	448		138		242	1086			963	821
v/s Ratio Prot	0.29	c0.29			c0.01		0.01	c0.32				
v/s Ratio Perm			0.01				0.08				c0.37	0.17
v/c Ratio	1.01	1.02	0.05		0.08		0.15	0.55			0.72	0.33
Uniform Delay, d1	43.0	43.0	31.3		51.2		18.0	15.3			22.1	16.7
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.16	0.01
Incremental Delay, d2	44.4	46.6	0.0		0.2		0.3	0.4			2.0	0.2
Delay (s)	87.4	89.6	31.3		51.4		18.3	15.7			5.4	0.4
Level of Service	F	F	C		D		B	B			A	A
Approach Delay (s)		84.1			51.4			15.9			3.4	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	105	99	762	744	348	1084
v/c Ratio	0.79	0.34	0.68	0.65	0.88	0.67
Control Delay	91.5	3.2	12.2	8.4	75.9	27.2
Queue Delay	0.0	0.0	3.4	1.9	0.0	1.0
Total Delay	91.5	3.2	15.7	10.3	75.9	28.2
Queue Length 50th (ft)	85	0	222	101	271	356
Queue Length 95th (ft)	109	0	m270	m108	#370	455
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	133	289	1119	1137	420	1609
Starvation Cap Reductn	0	0	258	239	0	277
Spillback Cap Reductn	0	1	0	0	0	18
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.34	0.89	0.83	0.83	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	0	40	0	0	0	0	450	895	320	1030	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.93						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1602						1678	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.11	1.00	
Satd. Flow (perm)	1681	1602						1678	1504	196	3539	
Peak-hour factor, PHF	0.67	0.92	0.86	1.00	1.00	1.00	1.00	0.90	0.89	0.92	0.95	1.00
Adj. Flow (vph)	157	0	47	0	0	0	0	500	1006	348	1084	0
RTOR Reduction (vph)	0	91	0	0	0	0	0	16	148	0	0	0
Lane Group Flow (vph)	105	8	0	0	0	0	0	746	596	348	1084	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						76.0	75.5	58.5	49.8	
Effective Green, g (s)	9.5	9.5						75.5	79.0	60.5	52.8	
Actuated g/C Ratio	0.08	0.08						0.63	0.66	0.50	0.44	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	133	126						1055	990	393	1557	
v/s Ratio Prot								c0.44		c0.17	0.31	
v/s Ratio Perm	c0.06	0.00							c0.40	c0.28		
v/c Ratio	0.79	0.06						0.71	0.60	0.89	0.70	
Uniform Delay, d1	54.3	51.1						14.9	11.6	34.5	27.1	
Progression Factor	1.00	1.00						0.82	1.40	1.83	0.93	
Incremental Delay, d2	25.2	0.2						1.1	0.5	16.8	2.2	
Delay (s)	79.4	51.3						13.3	16.8	80.0	27.6	
Level of Service	E	D						B	B	F	C	
Approach Delay (s)		65.8			0.0			15.0			40.3	
Approach LOS		E			A			B			D	

Intersection Summary			
HCM 2000 Control Delay	29.8	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)	15.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	247	247	397	55	616	1115
v/c Ratio	0.45	0.45	0.77	0.18	0.28	0.63
Control Delay	34.2	34.2	47.1	4.1	10.3	16.0
Queue Delay	0.7	0.7	0.0	0.0	0.0	0.2
Total Delay	34.9	34.9	47.1	4.1	10.3	16.2
Queue Length 50th (ft)	154	154	268	3	73	378
Queue Length 95th (ft)	220	229	283	m3	86	137
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	552	552	520	451	2506	1779
Starvation Cap Reductn	0	0	0	0	0	170
Spillback Cap Reductn	107	107	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.56	0.76	0.12	0.25	0.69

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	430	0	290	50	505	0	0	920	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3484	
Flt Permitted				0.95	0.95	1.00	0.15	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	277	3539			3484	
Peak-hour factor, PHF	1.00	1.00	1.00	0.87	1.00	0.73	0.91	0.82	1.00	1.00	0.92	0.74
Adj. Flow (vph)	0	0	0	494	0	397	55	616	0	0	1000	115
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	247	247	397	55	616	0	0	1108	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				36.0	36.0	36.0	66.0	72.0			58.0	
Effective Green, g (s)				39.0	39.0	39.0	72.0	75.0			61.0	
Actuated g/C Ratio				0.32	0.32	0.32	0.60	0.62			0.51	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				546	546	514	303	2211			1771	
v/s Ratio Prot							0.02	c0.17			c0.32	
v/s Ratio Perm				0.15	0.15	c0.25	0.09					
v/c Ratio				0.45	0.45	0.77	0.18	0.28			0.63	
Uniform Delay, d1				32.0	32.0	36.5	25.5	10.2			21.3	
Progression Factor				1.00	1.00	1.00	0.23	0.93			0.65	
Incremental Delay, d2				0.6	0.6	7.1	0.2	0.1			1.6	
Delay (s)				32.6	32.6	43.6	6.0	9.6			15.5	
Level of Service				C	C	D	A	A			B	
Approach Delay (s)		0.0			37.5			9.3			15.5	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	96	93	22	193	759	12	1099
v/c Ratio	0.20	0.32	0.49	0.09	0.43	0.28	0.02	0.45
Control Delay	46.3	11.3	55.9	36.1	8.3	7.1	3.1	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1
Total Delay	46.3	11.3	55.9	36.1	8.3	7.3	3.1	11.6
Queue Length 50th (ft)	28	0	68	12	41	104	1	180
Queue Length 95th (ft)	59	6	66	21	46	149	m5	425
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	324	430	306	408	563	2739	748	2450
Starvation Cap Reductn	0	0	0	0	0	1090	0	444
Spillback Cap Reductn	0	4	0	0	0	0	0	145
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.23	0.30	0.05	0.34	0.46	0.02	0.55

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	5	55	50	10	5	135	615	45	10	900	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.97		1.00	0.99		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1785	1583	1770	1799		1770	3503		1770	3491	
Flt Permitted		0.77	1.00	0.73	1.00		0.21	1.00		0.36	1.00	
Satd. Flow (perm)		1440	1583	1362	1799		388	3503		678	3491	
Peak-hour factor, PHF	0.72	0.92	0.57	0.54	0.58	0.92	0.70	0.87	0.87	0.83	0.90	0.71
Adj. Flow (vph)	35	5	96	93	17	5	193	707	52	12	1000	99
RTOR Reduction (vph)	0	0	83	0	4	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	40	13	93	18	0	193	757	0	12	1095	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		13.6	13.6	13.6	13.6		94.9	88.0		83.5	81.1	
Effective Green, g (s)		16.6	16.6	16.6	16.6		96.9	91.0		87.5	84.1	
Actuated g/C Ratio		0.14	0.14	0.14	0.14		0.81	0.76		0.73	0.70	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		199	218	188	248		443	2656		534	2446	
v/s Ratio Prot					0.01		c0.04	0.22		0.00	c0.31	
v/s Ratio Perm		0.03	0.01	c0.07			0.31			0.02		
v/c Ratio		0.20	0.06	0.49	0.07		0.44	0.28		0.02	0.45	
Uniform Delay, d1		45.8	44.9	47.8	45.0		4.5	4.5		4.4	7.8	
Progression Factor		1.00	1.00	1.00	1.00		2.06	1.49		0.96	1.24	
Incremental Delay, d2		0.5	0.1	2.0	0.1		0.6	0.2		0.0	0.6	
Delay (s)		46.3	45.0	49.9	45.1		9.9	6.9		4.3	10.3	
Level of Service		D	D	D	D		A	A		A	B	
Approach Delay (s)		45.4			49.0			7.5			10.2	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.1	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)	8.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	15	121	116	209	5	718	207	830
v/c Ratio	0.20	0.63	0.62	0.51	0.01	0.34	0.37	0.32
Control Delay	45.1	62.2	62.2	10.4	5.2	7.0	7.8	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	62.2	62.2	10.4	5.2	7.0	7.8	8.3
Queue Length 50th (ft)	7	93	89	0	1	62	30	74
Queue Length 95th (ft)	29	145	152	66	m3	78	98	245
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	99	229	222	447	675	2143	654	2580
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	0.15	0.53	0.52	0.47	0.01	0.34	0.32	0.32

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	5	5	195	5	190	5	445	195	195	780	5
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3374		1770	3533	
Flt Permitted		0.44		0.75	0.72	1.00	0.34	1.00		0.32	1.00	
Satd. Flow (perm)		791		1323	1282	1583	625	3374		588	3533	
Peak-hour factor, PHF	0.92	0.92	0.92	0.84	0.92	0.91	0.92	0.90	0.87	0.94	0.95	0.58
Adj. Flow (vph)	5	5	5	232	5	209	5	494	224	207	821	9
RTOR Reduction (vph)	0	5	0	0	0	179	0	30	0	0	0	0
Lane Group Flow (vph)	0	10	0	121	116	30	5	688	0	207	830	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		4.0		15.5	15.5	15.5	70.2	69.0		83.5	77.8	
Effective Green, g (s)		6.0		17.5	17.5	17.5	74.2	72.0		85.5	80.8	
Actuated g/C Ratio		0.05		0.15	0.15	0.15	0.62	0.60		0.71	0.67	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		192	186	230	416	2024		537	2378	
v/s Ratio Prot							0.00	0.20		c0.04	0.23	
v/s Ratio Perm		c0.01		c0.09	0.09	0.02	0.01			c0.24		
v/c Ratio		0.26		0.63	0.62	0.13	0.01	0.34		0.39	0.35	
Uniform Delay, d1		54.9		48.2	48.2	44.6	8.8	12.1		6.5	8.4	
Progression Factor		1.00		1.00	1.00	1.00	0.69	0.56		1.00	1.00	
Incremental Delay, d2		3.6		6.6	6.4	0.3	0.0	0.4		0.5	0.4	
Delay (s)		58.5		54.8	54.5	44.9	6.1	7.3		7.0	8.8	
Level of Service		E		D	D	D	A	A		A	A	
Approach Delay (s)		58.5			50.1			7.2			8.4	
Approach LOS		E			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	165	160	70	60	185	30	45	20	50	0	0	160
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.80	0.85	0.87	0.75	0.78	0.62	0.58	0.82	0.92	0.92	0.86
Hourly flow rate (vph)	181	200	82	69	247	38	73	34	61	0	0	186
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked												
vC, conflicting volume	285			282			988	1027	241	1025	1030	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	285			282			988	1027	241	1025	1030	247
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			95			51	82	92	100	100	77
cM capacity (veh/h)	1277			1280			148	190	798	146	190	792

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	181	282	69	247	38	73	95	186
Volume Left	181	0	69	0	0	73	0	0
Volume Right	0	82	0	0	38	0	61	186
cSH	1277	1700	1280	1700	1700	148	370	792
Volume to Capacity	0.14	0.17	0.05	0.15	0.02	0.49	0.26	0.23
Queue Length 95th (ft)	12	0	4	0	0	58	25	23
Control Delay (s)	8.3	0.0	8.0	0.0	0.0	50.8	18.1	10.9
Lane LOS	A		A			F	C	B
Approach Delay (s)	3.2		1.6			32.2		10.9
Approach LOS						D		B

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	155	5	5	195	75	10	0	15	100	5	70
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.80	0.75	0.92	0.83	0.84	0.58	0.92	0.63	0.86	0.92	0.85
Hourly flow rate (vph)	54	194	7	5	235	89	17	0	24	116	5	82
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	324			200			595	641	197	605	600	280
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	324			200			595	641	197	605	600	280
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			95	100	97	70	99	89
cM capacity (veh/h)	1236			1372			353	374	844	384	395	759

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	54	200	5	324	41	204
Volume Left	54	0	5	0	17	116
Volume Right	0	7	0	89	24	82
cSH	1236	1700	1372	1700	841	644
Volume to Capacity	0.04	0.12	0.00	0.19	0.05	0.32
Queue Length 95th (ft)	3	0	0	0	4	34
Control Delay (s)	8.0	0.0	7.6	0.0	12.0	15.3
Lane LOS	A		A		B	C
Approach Delay (s)	1.7		0.1		12.0	15.3
Approach LOS					B	C

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	263	279	59	15	101	768	684	1016
v/c Ratio	0.76	0.80	0.14	0.10	0.28	0.64	0.64	0.79
Control Delay	70.6	74.2	0.7	50.6	11.9	19.8	2.2	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	1.0	39.5
Total Delay	70.6	74.2	0.7	50.6	11.9	20.1	3.2	55.6
Queue Length 50th (ft)	254	272	0	9	36	458	13	413
Queue Length 95th (ft)	358	264	0	34	53	601	20	317
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	392	394	475	149	367	1203	1066	1280
Starvation Cap Reductn	0	0	0	0	0	0	171	336
Spillback Cap Reductn	0	0	0	0	0	100	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.71	0.12	0.10	0.28	0.70	0.76	1.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	480	10	35	5	5	5	80	710	5	5	665	925
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1690	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.23	1.00			1.00	1.00
Satd. Flow (perm)	1681	1690	1583		1750		429	1861			1854	1583
Peak-hour factor, PHF	0.91	0.67	0.59	0.92	0.92	0.92	0.79	0.93	0.92	0.92	0.98	0.91
Adj. Flow (vph)	527	15	59	5	5	5	101	763	5	5	679	1016
RTOR Reduction (vph)	0	0	47	0	5	0	0	0	0	0	0	350
Lane Group Flow (vph)	263	279	12	0	10	0	101	768	0	0	684	666
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	28.8	28.8	28.8		10.2		95.0	95.0			86.8	86.8
Effective Green, g (s)	30.8	30.8	30.8		12.2		92.5	97.0			89.8	89.8
Actuated g/C Ratio	0.21	0.21	0.21		0.08		0.62	0.65			0.60	0.60
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	345	347	325		142		346	1203			1109	947
v/s Ratio Prot	0.16	c0.17			c0.01		0.02	c0.41				
v/s Ratio Perm			0.01				0.16				0.37	c0.42
v/c Ratio	0.76	0.80	0.04		0.07		0.29	0.64			0.62	0.70
Uniform Delay, d1	56.2	56.7	47.7		63.7		16.6	15.9			19.2	20.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	3.58
Incremental Delay, d2	9.9	13.0	0.1		0.2		0.5	1.1			0.4	1.0
Delay (s)	66.0	69.7	47.8		63.9		17.1	17.1			0.9	75.9
Level of Service	E	E	D		E		B	B			A	E
Approach Delay (s)		65.9			63.9			17.1			45.7	
Approach LOS		E			E			B			D	

Intersection Summary			
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	88	114	734	521	283	1626
v/c Ratio	0.65	0.44	0.58	0.43	0.69	0.85
Control Delay	88.1	9.9	8.3	1.9	59.8	22.5
Queue Delay	0.0	0.2	1.4	0.9	1.3	26.2
Total Delay	88.1	10.1	9.7	2.8	61.0	48.7
Queue Length 50th (ft)	88	0	313	34	237	690
Queue Length 95th (ft)	#152	37	425	45	333	833
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	139	260	1262	1221	473	1917
Starvation Cap Reductn	0	0	324	415	66	366
Spillback Cap Reductn	0	10	0	0	0	204
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.46	0.78	0.65	0.70	1.05

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	0	50	0	0	0	0	690	505	260	1545	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.90						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1568						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.17	1.00	
Satd. Flow (perm)	1681	1568						1770	1504	324	3539	
Peak-hour factor, PHF	0.83	0.92	0.67	1.00	1.00	1.00	1.00	0.94	0.97	0.92	0.95	1.00
Adj. Flow (vph)	127	0	75	0	0	0	0	734	521	283	1626	0
RTOR Reduction (vph)	0	105	0	0	0	0	0	0	148	0	0	0
Lane Group Flow (vph)	88	9	0	0	0	0	0	734	373	283	1626	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	10.2	10.2						104.0	102.5	90.0	78.3	
Effective Green, g (s)	12.2	12.2						103.5	107.0	92.0	81.3	
Actuated g/C Ratio	0.08	0.08						0.69	0.71	0.61	0.54	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	136	127						1221	1072	408	1918	
v/s Ratio Prot								c0.41		c0.10	c0.46	
v/s Ratio Perm	c0.05	0.01							0.25	0.32		
v/c Ratio	0.65	0.07						0.60	0.35	0.69	0.85	
Uniform Delay, d1	66.8	63.7						12.3	8.2	21.2	29.1	
Progression Factor	1.00	1.00						0.58	1.47	3.21	0.63	
Incremental Delay, d2	10.1	0.2						0.7	0.2	4.0	3.3	
Delay (s)	76.9	63.9						7.8	12.2	72.2	21.5	
Level of Service	E	E						A	B	E	C	
Approach Delay (s)		69.6			0.0			9.6			29.0	
Approach LOS		E			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	513	514	361	81	871	1096
v/c Ratio	0.82	0.82	0.61	0.30	0.41	0.62
Control Delay	54.9	55.0	43.8	10.7	12.1	25.6
Queue Delay	52.5	52.5	0.0	0.0	0.3	0.7
Total Delay	107.4	107.5	43.8	10.7	12.3	26.4
Queue Length 50th (ft)	474	476	286	19	204	472
Queue Length 95th (ft)	#652	#655	402	12	158	559
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	625	625	588	392	2347	1756
Starvation Cap Reductn	0	0	0	0	760	333
Spillback Cap Reductn	206	206	0	0	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.22	1.23	0.61	0.21	0.55	0.77

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	935	0	350	55	740	0	0	870	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3477	
Flt Permitted				0.95	0.95	1.00	0.15	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	275	3539			3477	
Peak-hour factor, PHF	1.00	1.00	1.00	0.91	0.92	0.97	0.68	0.85	1.00	1.00	0.90	0.97
Adj. Flow (vph)	0	0	0	1027	0	361	81	871	0	0	967	129
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	513	514	361	81	871	0	0	1089	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				52.8	52.8	52.8	80.7	86.2			72.5	
Effective Green, g (s)				55.8	55.8	55.8	86.7	89.2			75.5	
Actuated g/C Ratio				0.37	0.37	0.37	0.58	0.59			0.50	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				625	625	588	270	2104			1750	
v/s Ratio Prot							0.02	c0.25			c0.31	
v/s Ratio Perm				0.31	0.31	0.23	0.15					
v/c Ratio				0.82	0.82	0.61	0.30	0.41			0.62	
Uniform Delay, d1				42.6	42.6	38.3	36.8	16.3			26.9	
Progression Factor				1.00	1.00	1.00	0.41	0.70			0.89	
Incremental Delay, d2				8.5	8.6	1.9	0.6	0.1			1.6	
Delay (s)				51.1	51.2	40.2	15.6	11.5			25.7	
Level of Service				D	D	D	B	B			C	
Approach Delay (s)		0.0			48.3			11.9			25.7	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	44	184	67	73	56	1098	15	1014
v/c Ratio	0.25	0.55	0.48	0.33	0.12	0.38	0.03	0.36
Control Delay	63.5	14.2	73.3	24.7	2.0	3.7	2.7	9.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.2
Total Delay	63.5	14.3	73.3	24.7	2.0	3.8	2.7	9.7
Queue Length 50th (ft)	40	0	63	16	5	84	3	336
Queue Length 95th (ft)	46	34	101	22	m12	181	m5	m221
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	362	491	291	406	588	2903	575	2808
Starvation Cap Reductn	0	0	0	0	0	678	0	930
Spillback Cap Reductn	0	28	0	0	0	0	0	549
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.40	0.23	0.18	0.10	0.49	0.03	0.54

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	15	140	55	10	30	50	965	75	10	800	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected		0.98	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1829	1583	1770	1652		1770	3500		1770	3513	
Flt Permitted		0.88	1.00	0.71	1.00		0.25	1.00		0.24	1.00	
Satd. Flow (perm)		1647	1583	1326	1652		469	3500		450	3513	
Peak-hour factor, PHF	0.63	0.54	0.76	0.82	0.56	0.55	0.89	0.95	0.91	0.67	0.83	0.90
Adj. Flow (vph)	16	28	184	67	18	55	56	1016	82	15	964	50
RTOR Reduction (vph)	0	0	164	0	49	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	44	20	67	24	0	56	1096	0	15	1013	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		13.0	13.0	13.0	13.0		123.7	118.6		118.3	115.9	
Effective Green, g (s)		16.0	16.0	16.0	16.0		127.5	121.6		122.3	118.9	
Actuated g/C Ratio		0.11	0.11	0.11	0.11		0.85	0.81		0.82	0.79	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		175	168	141	176		460	2837		405	2784	
v/s Ratio Prot					0.01		c0.01	c0.31		0.00	0.29	
v/s Ratio Perm		0.03	0.01	c0.05			0.10			0.03		
v/c Ratio		0.25	0.12	0.48	0.14		0.12	0.39		0.04	0.36	
Uniform Delay, d1		61.5	60.6	63.0	60.7		2.4	3.9		2.8	4.5	
Progression Factor		1.00	1.00	1.00	1.00		0.78	0.85		1.24	1.88	
Incremental Delay, d2		0.8	0.3	2.5	0.4		0.1	0.4		0.0	0.3	
Delay (s)		62.3	60.9	65.6	61.1		2.0	3.7		3.5	8.9	
Level of Service		E	E	E	E		A	A		A	A	
Approach Delay (s)		61.2			63.2			3.6			8.8	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	68	155	172	425	15	1090	189	600
v/c Ratio	1.70	0.75	0.85	0.69	0.03	0.60	0.57	0.28
Control Delay	435.0	81.0	93.4	11.0	8.2	19.8	17.8	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	435.0	81.0	93.4	11.0	8.2	20.0	17.8	14.6
Queue Length 50th (ft)	~93	151	171	0	5	327	71	129
Queue Length 95th (ft)	#178	#252	#301	105	8	366	107	197
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	40	222	217	629	672	1826	431	2176
Starvation Cap Reductn	0	0	0	0	0	176	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.70	0.70	0.79	0.68	0.02	0.66	0.44	0.28

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	20	10	280	15	395	10	725	270	170	565	5
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.98		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1780		1681	1693	1583	1770	3388		1770	3535	
Flt Permitted		0.16		0.71	0.70	1.00	0.42	1.00		0.16	1.00	
Satd. Flow (perm)		290		1261	1234	1583	791	3388		294	3535	
Peak-hour factor, PHF	0.63	0.81	0.92	0.90	0.94	0.93	0.67	0.93	0.87	0.90	0.95	0.92
Adj. Flow (vph)	32	25	11	311	16	425	15	780	310	189	595	5
RTOR Reduction (vph)	0	4	0	0	0	355	0	24	0	0	0	0
Lane Group Flow (vph)	0	64	0	155	172	70	15	1066	0	189	600	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		16.5		22.8	22.8	22.8	79.4	76.8		93.7	86.6	
Effective Green, g (s)		18.5		24.8	24.8	24.8	83.4	79.8		95.7	89.6	
Actuated g/C Ratio		0.12		0.17	0.17	0.17	0.56	0.53		0.64	0.60	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		35		208	204	261	469	1802		329	2111	
v/s Ratio Prot							0.00	c0.31		c0.06	0.17	
v/s Ratio Perm		c0.22		0.12	c0.14	0.04	0.02			0.31		
v/c Ratio		1.82		0.75	0.84	0.27	0.03	0.59		0.57	0.28	
Uniform Delay, d1		65.8		59.6	60.7	54.7	14.9	24.0		16.7	14.6	
Progression Factor		1.00		1.00	1.00	1.00	0.77	0.78		1.00	1.00	
Incremental Delay, d2		459.5		13.5	25.8	0.6	0.0	1.4		2.4	0.3	
Delay (s)		525.2		73.1	86.5	55.2	11.5	20.0		19.1	15.0	
Level of Service		F		E	F	E	B	B		B	B	
Approach Delay (s)		525.2			66.1			19.8			16.0	
Approach LOS		F			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	44.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	165	230	65	55	440	20	60	15	95	0	0	190
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.86	0.76	0.76	0.82	0.75	0.66	0.94	0.90	0.92	0.92	0.91
Hourly flow rate (vph)	179	267	86	72	537	27	91	16	106	0	0	209
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	563			353			1350	1377	310	1421	1393	537
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	563			340			1348	1375	296	1420	1392	537
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			94			0	86	86	100	100	62
cM capacity (veh/h)	1008			1205			64	111	734	71	108	544

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	179	353	72	537	27	91	122	209
Volume Left	179	0	72	0	0	91	0	0
Volume Right	0	86	0	0	27	0	106	209
cSH	1008	1700	1205	1700	1700	64	423	544
Volume to Capacity	0.18	0.21	0.06	0.32	0.02	1.41	0.29	0.38
Queue Length 95th (ft)	16	0	5	0	0	193	29	45
Control Delay (s)	9.3	0.0	8.2	0.0	0.0	364.6	16.9	15.7
Lane LOS	A		A			F	C	C
Approach Delay (s)	3.1		0.9			165.7		15.7
Approach LOS						F		C

Intersection Summary			
Average Delay	25.6		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	95	220	10	15	385	170	10	5	5	115	5	120
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.86	0.46	0.58	0.83	0.96	0.67	0.33	0.33	0.94	0.50	0.87
Hourly flow rate (vph)	117	256	22	26	464	177	15	15	15	122	10	138
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	641			278			1091	1194	267	1110	1116	552
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	641			278			1091	1194	267	1110	1116	552
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	88			98			88	91	98	19	94	74
cM capacity (veh/h)	943			1285			122	160	772	152	178	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	117	278	26	641	45	270
Volume Left	117	0	26	0	15	122
Volume Right	0	22	0	177	15	138
cSH	943	1700	1285	1700	212	270
Volume to Capacity	0.12	0.16	0.02	0.38	0.21	1.00
Queue Length 95th (ft)	11	0	2	0	20	252
Control Delay (s)	9.4	0.0	7.9	0.0	28.1	96.0
Lane LOS	A		A		D	F
Approach Delay (s)	2.8		0.3		28.1	96.0
Approach LOS					D	F

Intersection Summary			
Average Delay	20.7		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	625	633	105	24	38	976	1090	646
v/c Ratio	1.35	1.37	0.19	0.21	0.23	0.91	1.16	0.62
Control Delay	207.8	213.7	1.0	44.6	13.3	35.7	91.2	1.7
Queue Delay	0.3	0.3	0.0	0.0	0.0	46.7	0.0	2.0
Total Delay	208.1	213.9	1.0	44.6	13.3	82.4	91.2	3.7
Queue Length 50th (ft)	~668	~681	0	12	12	634	~1019	0
Queue Length 95th (ft)	#906	#920	2	40	26	#953	m#1150	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	462	463	560	116	166	1078	937	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	241
Spillback Cap Reductn	14	14	0	0	0	217	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.40	1.41	0.19	0.21	0.23	1.13	1.16	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1150	7	97	7	7	7	35	898	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.93	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1736	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1250	8	105	8	8	8	38	976	0	8	1082	646
RTOR Reduction (vph)	0	0	76	0	8	0	0	0	0	0	0	177
Lane Group Flow (vph)	625	633	29	0	17	0	38	976	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	31.0	31.0	31.0		5.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	33.0	33.0	33.0		7.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.28	0.28	0.28		0.06		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	462	463	435		109		135	1125			962	877
v/s Ratio Prot	0.37	c0.38			c0.01		0.01	c0.52				
v/s Ratio Perm			0.02				0.15				c0.63	0.30
v/c Ratio	1.35	1.37	0.07		0.15		0.28	0.87			1.13	0.53
Uniform Delay, d1	43.5	43.5	32.1		53.2		26.3	19.8			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.20	0.09
Incremental Delay, d2	172.5	178.6	0.1		0.5		1.1	7.2			65.4	0.2
Delay (s)	216.0	222.1	32.2		53.7		27.5	26.9			70.8	1.8
Level of Service	F	F	C		D		C	C			E	A
Approach Delay (s)		204.7			53.7			27.0			45.1	
Approach LOS		F			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	93.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	153	137	1174	1060	597	1674
v/c Ratio	1.46	0.52	1.07	1.00	1.32	0.93
Control Delay	290.0	10.3	57.3	27.4	170.5	31.6
Queue Delay	0.0	9.5	12.5	36.5	1.1	7.3
Total Delay	290.0	19.8	69.8	63.9	171.6	38.9
Queue Length 50th (ft)	~170	0	~727	513	~564	470
Queue Length 95th (ft)	#314	32	m502	m327	m#542	m#737
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	105	266	1095	1062	453	1793
Starvation Cap Reductn	0	0	238	219	51	69
Spillback Cap Reductn	0	96	0	0	0	112
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.46	0.81	1.37	1.26	1.49	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.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	211	0	56	0	0	0	0	737	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.93						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1607						1685	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1607						1685	1504	191	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	0	61	0	0	0	0	801	1433	597	1674	0
RTOR Reduction (vph)	0	128	0	0	0	0	0	15	98	0	0	0
Lane Group Flow (vph)	153	9	0	0	0	0	0	1159	962	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	5.5	5.5						74.0	71.5	63.5	56.0	
Effective Green, g (s)	7.5	7.5						73.5	77.0	65.5	59.0	
Actuated g/C Ratio	0.06	0.06						0.61	0.64	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	105	100						1032	965	452	1740	
v/s Ratio Prot								c0.69		c0.29	0.47	
v/s Ratio Perm	c0.09	0.01							c0.64	c0.43		
v/c Ratio	1.46	0.09						1.12	1.00	1.32	0.96	
Uniform Delay, d1	56.2	53.0						23.2	21.4	37.1	29.4	
Progression Factor	1.00	1.00						1.04	1.19	0.75	0.88	
Incremental Delay, d2	250.6	0.3						56.7	8.0	145.8	8.5	
Delay (s)	306.8	53.3						80.9	33.5	173.6	34.4	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		187.1			0.0			58.4			71.0	
Approach LOS		F			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	72.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	114.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	510	79	951	1784
v/c Ratio	0.62	0.62	0.99	0.33	0.43	1.02
Control Delay	40.2	40.3	78.3	36.7	10.2	43.0
Queue Delay	0.2	0.2	0.0	0.0	1.1	31.6
Total Delay	40.4	40.5	78.3	36.7	11.4	74.7
Queue Length 50th (ft)	229	230	390	25	193	~774
Queue Length 95th (ft)	343	345	#631	m23	m165	#896
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	547	547	515	254	2241	1749
Starvation Cap Reductn	0	0	0	0	984	50
Spillback Cap Reductn	20	20	0	0	0	332
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.64	0.99	0.31	0.76	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	469	73	875	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	124	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	510	79	951	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	337	338	510	79	951	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				36.1	36.1	36.1	65.9	71.9			57.0	
Effective Green, g (s)				39.1	39.1	39.1	71.9	74.9			60.0	
Actuated g/C Ratio				0.33	0.33	0.33	0.60	0.62			0.50	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				547	547	515	237	2208			1741	
v/s Ratio Prot							0.03	c0.27			c0.51	
v/s Ratio Perm				0.20	0.20	c0.32	0.17					
v/c Ratio				0.62	0.62	0.99	0.33	0.43			1.02	
Uniform Delay, d1				34.1	34.1	40.3	46.9	11.6			30.0	
Progression Factor				1.00	1.00	1.00	1.36	0.88			0.62	
Incremental Delay, d2				2.1	2.1	37.0	0.1	0.0			23.3	
Delay (s)				36.2	36.2	77.3	63.8	10.2			41.9	
Level of Service				D	D	E	E	B			D	
Approach Delay (s)		0.0			53.9			14.3			41.9	
Approach LOS		A			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	114.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	91	75	23	227	1233	15	1751
v/c Ratio	0.34	0.33	0.50	0.11	0.66	0.44	0.04	0.74
Control Delay	54.7	10.1	61.5	36.1	38.6	1.5	2.5	10.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.2	0.0	1.1
Total Delay	54.7	10.2	61.5	36.1	38.6	1.6	2.5	11.2
Queue Length 50th (ft)	39	0	55	10	89	3	1	192
Queue Length 95th (ft)	82	38	106	36	m138	m87	m2	210
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	174	289	163	227	409	2832	396	2366
Starvation Cap Reductn	0	0	0	0	0	613	0	9
Spillback Cap Reductn	0	10	0	0	0	0	0	349
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.33	0.46	0.10	0.56	0.56	0.04	0.87

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	7	84	69	14	7	209	1073	62	14	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1786	1583	1770	1766		1770	3510		1770	3499	
Flt Permitted		0.75	1.00	0.70	1.00		0.07	1.00		0.23	1.00	
Satd. Flow (perm)		1396	1583	1309	1766		126	3510		423	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	8	91	75	15	8	227	1166	67	15	1617	134
RTOR Reduction (vph)	0	0	81	0	7	0	0	3	0	0	5	0
Lane Group Flow (vph)	0	55	10	75	16	0	227	1230	0	15	1746	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		10.8	10.8	10.8	10.8		97.7	91.0		80.2	78.0	
Effective Green, g (s)		13.8	13.8	13.8	13.8		99.7	94.0		84.2	81.0	
Actuated g/C Ratio		0.12	0.12	0.12	0.12		0.83	0.78		0.70	0.68	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		160	182	150	203		340	2749		343	2361	
v/s Ratio Prot					0.01		c0.10	0.35		0.00	c0.50	
v/s Ratio Perm		0.04	0.01	c0.06			0.46			0.03		
v/c Ratio		0.34	0.06	0.50	0.08		0.67	0.45		0.04	0.74	
Uniform Delay, d1		48.9	47.3	49.9	47.4		30.3	4.3		5.4	12.7	
Progression Factor		1.00	1.00	1.00	1.00		1.40	0.26		0.82	0.61	
Incremental Delay, d2		1.3	0.1	2.6	0.2		3.9	0.4		0.0	1.7	
Delay (s)		50.2	47.4	52.5	47.6		46.4	1.6		4.4	9.4	
Level of Service		D	D	D	D		D	A		A	A	
Approach Delay (s)		48.5			51.3			8.5			9.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	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)	8.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1454
v/c Ratio	0.38	0.78	0.78	0.67	0.03	0.71	0.84	0.59
Control Delay	56.1	73.0	73.8	10.7	5.0	18.0	44.5	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	73.0	73.8	10.7	5.0	18.0	44.5	12.8
Queue Length 50th (ft)	12	127	123	0	1	397	204	325
Queue Length 95th (ft)	42	#232	#228	92	m3	468	#350	497
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	251	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	2	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	0.36	0.72	0.72	0.65	0.03	0.72	0.77	0.59

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1330	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3536	
Flt Permitted		0.35		0.74	0.72	1.00	0.16	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	293	3406		178	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1446	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1454	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	180	1612		437	2286	
v/s Ratio Prot							0.00	0.35		c0.17	0.41	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.02			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.04	0.74		0.85	0.64	
Uniform Delay, d1		54.0		48.4	48.4	44.0	15.9	25.6		32.1	12.7	
Progression Factor		1.00		1.00	1.00	1.00	0.51	0.59		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.8		14.2	1.4	
Delay (s)		61.3		65.0	65.3	44.5	8.1	18.0		46.3	14.1	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.3			53.9			17.9			20.6	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	83	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	90	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1454	1499	382	1491	1507	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1452	1499	332	1491	1507	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			92			0	64	89	100	100	63
cM capacity (veh/h)	1119			1121			51	84	679	49	83	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	90	396	46	67	105	241
Volume Left	248	0	90	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	51	222	654
Volume to Capacity	0.22	0.26	0.08	0.23	0.03	1.32	0.47	0.37
Queue Length 95th (ft)	21	0	7	0	0	154	58	42
Control Delay (s)	9.1	0.0	8.5	0.0	0.0	363.8	35.0	13.7
Lane LOS	A		A			F	D	B
Approach Delay (s)	3.3		1.4			163.2		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	21.2		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	378	104	14	0	21	138	7	97
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	411	113	15	0	23	150	8	105
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	524			329			958	1015	326	966	962	467
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	524			329			958	1015	326	966	962	467
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			91	100	97	30	97	82
cM capacity (veh/h)	1043			1230			179	220	716	213	236	596

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	524	38	263
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	105
cSH	1043	1700	1230	1700	447	323
Volume to Capacity	0.07	0.19	0.01	0.31	0.09	0.81
Queue Length 95th (ft)	6	0	0	0	7	172
Control Delay (s)	8.7	0.0	7.9	0.0	16.9	50.8
Lane LOS	A		A		C	F
Approach Delay (s)	1.6		0.1		16.9	50.8
Approach LOS					C	F

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1186	1437
v/c Ratio	1.31	1.35	0.13	0.20	0.90	0.93	1.24	1.08
Control Delay	207.2	224.9	0.7	54.0	84.1	33.5	118.6	57.4
Queue Delay	0.6	0.6	0.0	0.0	0.0	45.5	0.0	10.0
Total Delay	207.8	225.5	0.7	54.0	84.1	79.0	118.6	67.5
Queue Length 50th (ft)	~500	~531	0	15	64	937	~1418	~599
Queue Length 95th (ft)	#720	#755	0	47	#192	#1398	m#1074	m257
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	291	292	388	118	135	1296	960	1333
Starvation Cap Reductn	0	0	0	0	0	0	0	279
Spillback Cap Reductn	14	14	0	0	0	288	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.37	1.42	0.13	0.20	0.90	1.20	1.24	1.36

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1084	1322
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.80	1.00
Satd. Flow (perm)	1681	1688	1583		1750		80	1861			1499	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1178	1437
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	299
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1186	1138
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	24.0	24.0	24.0		7.5		102.5	102.5			96.5	96.5
Effective Green, g (s)	26.0	26.0	26.0		9.5		100.0	104.5			99.5	99.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	291	292	274		110		132	1296			994	1050
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.79	0.72
v/c Ratio	1.31	1.35	0.03		0.15		0.92	0.93			1.19	1.08
Uniform Delay, d1	62.0	62.0	51.5		66.4		48.4	19.6			25.2	25.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.27
Incremental Delay, d2	160.3	179.6	0.1		0.6		53.1	11.7			87.9	39.5
Delay (s)	222.3	241.6	51.6		67.1		101.6	31.3			91.5	96.7
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		220.8			67.1			37.7			94.4	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	100.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	154.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	487	2542
v/c Ratio	1.43	0.64	0.98	0.74	1.12	1.18
Control Delay	287.2	24.1	32.9	10.4	104.4	105.2
Queue Delay	0.0	27.2	39.9	50.6	0.8	0.4
Total Delay	287.2	51.3	72.8	61.1	105.2	105.6
Queue Length 50th (ft)	~210	6	949	273	~507	~1575
Queue Length 95th (ft)	#368	83	m800	m182	m#438	m#1298
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1167	1095	434	2158
Starvation Cap Reductn	0	0	320	367	35	330
Spillback Cap Reductn	0	79	3	0	0	257
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.96	1.36	1.12	1.22	1.39

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	448	2339	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	111	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	487	2542	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	104	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	711	487	2542	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						95.9	93.9	98.0	88.5	
Effective Green, g (s)	9.5	9.5						95.4	98.9	100.0	91.5	
Actuated g/C Ratio	0.06	0.06						0.64	0.66	0.67	0.61	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1125	991	434	2158	
v/s Ratio Prot								c0.65		c0.24	c0.72	
v/s Ratio Perm	c0.09	0.01							0.47	0.51		
v/c Ratio	1.43	0.15						1.02	0.72	1.12	1.18	
Uniform Delay, d1	70.2	66.4						27.3	16.5	50.9	29.2	
Progression Factor	1.00	1.00						1.12	0.98	1.09	0.80	
Incremental Delay, d2	240.8	0.7						14.2	0.2	58.2	80.6	
Delay (s)	311.0	67.1						44.7	16.4	113.7	104.0	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			33.0			105.6	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	83.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	113.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	1790
v/c Ratio	1.12	1.12	1.03	0.43	0.64	1.11
Control Delay	112.4	112.9	87.3	32.6	7.5	85.8
Queue Delay	3.8	3.8	0.0	0.0	4.9	0.4
Total Delay	116.1	116.6	87.3	32.6	12.4	86.2
Queue Length 50th (ft)	~889	~891	~686	32	264	~1057
Queue Length 95th (ft)	#1154	#1156	#929	m34	m237	#1172
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	672	672	633	209	2017	1612
Starvation Cap Reductn	0	0	0	0	656	19
Spillback Cap Reductn	253	253	0	0	127	190
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.79	1.79	1.03	0.41	0.94	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1406	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3462	
Flt Permitted				0.95	0.95	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	107	3539			3462	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1528	262
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	1781	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				57.1	57.1	57.1	76.4	81.9			66.5	
Effective Green, g (s)				60.1	60.1	60.1	82.4	84.9			69.5	
Actuated g/C Ratio				0.40	0.40	0.40	0.55	0.57			0.46	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				673	673	634	201	2003			1604	
v/s Ratio Prot							0.04	c0.36			c0.51	
v/s Ratio Perm				0.45	0.45	0.41	0.20					
v/c Ratio				1.11	1.12	1.03	0.43	0.64			1.11	
Uniform Delay, d1				45.0	45.0	45.0	61.3	22.2			40.2	
Progression Factor				1.00	1.00	1.00	0.71	0.33			0.70	
Incremental Delay, d2				70.5	71.1	43.2	0.4	0.1			57.6	
Delay (s)				115.5	116.0	88.1	44.1	7.4			85.9	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			107.4			9.7			85.9	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	75.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	165.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	83	61	99	1836	15	1558
v/c Ratio	0.40	0.75	0.52	0.22	0.36	0.66	0.07	0.60
Control Delay	62.2	46.1	68.9	20.9	5.5	8.7	1.3	5.1
Queue Delay	0.0	0.3	0.0	0.0	0.0	2.4	0.0	0.5
Total Delay	62.2	46.4	68.9	21.0	5.5	11.0	1.3	5.7
Queue Length 50th (ft)	72	125	76	13	13	216	1	231
Queue Length 95th (ft)	119	212	126	54	m26	m721	m2	m260
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	289	419	233	377	308	2783	211	2604
Starvation Cap Reductn	0	0	0	0	0	237	0	188
Spillback Cap Reductn	0	18	0	9	0	778	0	567
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.61	0.36	0.17	0.32	0.92	0.07	0.76

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	76	14	42	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1770	1652		1770	3507		1770	3507	
Flt Permitted		0.75	1.00	0.61	1.00		0.12	1.00		0.09	1.00	
Satd. Flow (perm)		1403	1583	1131	1652		217	3507		163	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	83	15	46	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	99	0	39	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	80	147	83	22	0	99	1834	0	15	1556	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		18.5	18.5	18.5	18.5		120.0	113.2		110.6	108.3	
Effective Green, g (s)		21.5	21.5	21.5	21.5		122.0	116.2		114.6	111.3	
Actuated g/C Ratio		0.14	0.14	0.14	0.14		0.81	0.77		0.76	0.74	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		201	226	162	236		271	2716		170	2602	
v/s Ratio Prot					0.01		c0.02	c0.52		0.00	0.44	
v/s Ratio Perm		0.06	c0.09	0.07			0.27			0.06		
v/c Ratio		0.40	0.65	0.51	0.09		0.37	0.68		0.09	0.60	
Uniform Delay, d1		58.4	60.7	59.4	55.8		7.9	8.0		7.8	9.0	
Progression Factor		1.00	1.00	1.00	1.00		0.96	0.90		0.21	0.43	
Incremental Delay, d2		1.3	6.3	2.7	0.2		0.5	0.8		0.2	0.8	
Delay (s)		59.7	67.0	62.1	55.9		8.2	8.0		1.8	4.6	
Level of Service		E	E	E	E		A	A		A	A	
Approach Delay (s)		65.2			59.5			8.0			4.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1810	353	1130
v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.23	1.26	0.58
Control Delay	242.4	87.2	107.8	101.7	10.9	138.6	179.5	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	242.4	87.2	107.8	101.7	10.9	138.6	179.5	24.7
Queue Length 50th (ft)	~85	218	248	~471	3	~1143	~380	352
Queue Length 95th (ft)	#201	#374	#436	#720	m5	#1261	#588	483
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	254	249	599	232	1476	281	1937
Starvation Cap Reductn	0	0	0	0	0	17	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	37
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.24	1.26	0.59

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1271	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3414		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	348	3414		114	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1382	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	278	0	19	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	396	15	1791	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		28.5	28.5	28.5	63.0	61.0		83.0	76.5	
Effective Green, g (s)		23.5		30.5	30.5	30.5	67.0	64.0		85.0	79.5	
Actuated g/C Ratio		0.16		0.20	0.20	0.20	0.45	0.43		0.57	0.53	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		254	249	321	193	1456		279	1873	
v/s Ratio Prot							0.00	0.52		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	0.20	c0.25	0.03			c0.55		
v/c Ratio		1.28		0.86	0.97	1.23	0.08	1.23		1.27	0.60	
Uniform Delay, d1		63.2		57.7	59.3	59.8	24.1	43.0		51.6	24.4	
Progression Factor		1.00		1.00	1.00	1.00	0.73	0.82		1.00	1.00	
Incremental Delay, d2		215.1		23.8	47.5	129.2	0.1	108.3		144.7	1.4	
Delay (s)		278.3		81.4	106.8	188.9	17.6	143.4		196.3	25.8	
Level of Service		F		F	F	F	B	F		F	C	
Approach Delay (s)		278.3			150.8			142.4			66.4	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	121.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	21	132	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	23	143	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2038	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			472			1974	2007	418	2090	2028	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	34	75	100	100	30
cM capacity (veh/h)	833			992			9	35	578	9	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	166	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	143	287
cSH	833	1700	992	1700	1700	9	184	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.90	0.91	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	172	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	95.3	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			3578.4		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	418.5		
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	415	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	451	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			466			1558	1720	459	1592	1599	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			466			1558	1720	459	1592	1599	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			60	89	99	0	91	53
cM capacity (veh/h)	737			1095			38	71	602	66	84	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	466	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1095	1700	65	114
Volume to Capacity	0.19	0.27	0.02	0.55	0.47	3.16
Queue Length 95th (ft)	18	0	2	0	46	Err
Control Delay (s)	11.1	0.0	8.4	0.0	101.6	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.6		0.2		101.6	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1850.9		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	673	105	24	38	1038	1090	646
v/c Ratio	1.64	1.65	0.20	0.14	0.23	0.96	1.34	0.62
Control Delay	328.2	335.9	1.2	39.5	13.3	44.7	173.2	1.7
Queue Delay	0.8	0.8	0.0	0.0	0.0	26.5	0.0	2.0
Total Delay	329.0	336.7	1.2	39.5	13.3	71.2	173.2	3.7
Queue Length 50th (ft)	~782	~795	0	12	12	725	~1118	0
Queue Length 95th (ft)	#1023	#1038	2	39	26	#1057	m#1249	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	406	407	513	174	166	1078	812	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	243
Spillback Cap Reductn	32	32	0	0	0	100	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.78	1.79	0.20	0.14	0.23	1.06	1.34	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1223	7	97	7	7	7	35	955	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.81	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1504	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1329	8	105	8	8	8	38	1038	0	8	1082	646
RTOR Reduction (vph)	0	0	80	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	664	673	25	0	17	0	38	1038	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	27.0	27.0	27.0		9.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	29.0	29.0	29.0		11.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.24	0.24	0.24		0.10		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	406	407	382		167		135	1125			833	877
v/s Ratio Prot	0.39	c0.40			c0.01		0.01	c0.56				
v/s Ratio Perm			0.02				0.15				c0.72	0.30
v/c Ratio	1.64	1.65	0.07		0.10		0.28	0.92			1.31	0.53
Uniform Delay, d1	45.5	45.5	35.1		49.5		26.3	21.2			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.27	0.09
Incremental Delay, d2	296.9	304.9	0.1		0.2		1.1	12.3			142.2	0.2
Delay (s)	342.4	350.4	35.1		49.7		27.5	33.5			149.4	1.7
Level of Service	F	F	D		D		C	C			F	A
Approach Delay (s)		323.8			49.7			33.3			94.4	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	156.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	176	1315	1060	597	1674
v/c Ratio	1.44	0.56	1.20	0.95	1.52	0.93
Control Delay	268.9	14.6	115.5	21.3	260.5	32.4
Queue Delay	0.0	19.5	1.3	44.4	0.0	22.7
Total Delay	268.9	34.1	116.8	65.7	260.5	55.1
Queue Length 50th (ft)	~256	0	~1245	472	~614	716
Queue Length 95th (ft)	#426	70	m538	m143	m#529	m559
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	161	315	1098	1117	393	1793
Starvation Cap Reductn	0	0	252	290	0	69
Spillback Cap Reductn	0	125	8	0	0	192
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.44	0.93	1.55	1.28	1.52	1.05

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	319	0	56	0	0	0	0	867	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.95						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1625						1694	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1681	1625						1694	1504	173	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	347	0	61	0	0	0	0	942	1433	597	1674	0
RTOR Reduction (vph)	0	159	0	0	0	0	0	13	152	0	0	0
Lane Group Flow (vph)	232	17	0	0	0	0	0	1302	908	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	9.5	9.5						74.0	71.5	63.5	56.0	
Effective Green, g (s)	11.5	11.5						73.5	77.0	65.5	59.0	
Actuated g/C Ratio	0.10	0.10						0.61	0.64	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	161	155						1037	965	393	1740	
v/s Ratio Prot								c0.77		c0.28	0.47	
v/s Ratio Perm	c0.14	0.01							0.60	c0.54		
v/c Ratio	1.44	0.11						1.26	0.94	1.52	0.96	
Uniform Delay, d1	54.2	49.6						23.2	19.4	38.0	29.4	
Progression Factor	1.00	1.00						1.20	1.58	0.81	0.93	
Incremental Delay, d2	230.0	0.2						115.8	2.2	234.8	8.0	
Delay (s)	284.2	49.8						143.9	33.0	265.4	35.2	
Level of Service	F	D						F	C	F	D	
Approach Delay (s)		183.1			0.0			94.4			95.7	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	102.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	598	79	1210	1784
v/c Ratio	0.56	0.57	1.06	0.33	0.58	1.09
Control Delay	35.9	35.9	94.0	36.3	12.2	73.0
Queue Delay	0.9	0.9	0.0	0.0	4.0	3.4
Total Delay	36.8	36.9	94.0	36.3	16.2	76.5
Queue Length 50th (ft)	222	223	~517	27	283	~801
Queue Length 95th (ft)	325	327	#740	m22	m204	#945
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	597	597	562	253	2123	1632
Starvation Cap Reductn	0	0	0	0	811	44
Spillback Cap Reductn	91	91	0	0	134	241
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.67	1.06	0.31	0.92	1.28

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	550	73	1113	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	133	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	598	79	1210	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	598	79	1210	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				39.6	39.6	39.6	62.4	68.4			53.0	
Effective Green, g (s)				42.6	42.6	42.6	68.4	71.4			56.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.57	0.60			0.47	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				596	596	561	244	2105			1625	
v/s Ratio Prot							0.03	c0.34			c0.51	
v/s Ratio Perm				0.20	0.20	c0.38	0.15					
v/c Ratio				0.57	0.57	1.07	0.32	0.57			1.09	
Uniform Delay, d1				31.2	31.3	38.7	46.5	15.0			32.0	
Progression Factor				1.00	1.00	1.00	1.29	0.80			0.70	
Incremental Delay, d2				1.2	1.2	56.8	0.1	0.0			49.6	
Delay (s)				32.5	32.5	95.5	59.9	12.0			71.9	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			62.1			14.9			71.9	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	52.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	91	75	23	227	1580	155	1751
v/c Ratio	0.37	0.33	0.51	0.11	0.66	0.63	0.51	0.74
Control Delay	55.3	10.1	62.5	36.1	37.8	8.7	15.7	10.3
Queue Delay	0.0	0.5	2.4	0.0	0.0	0.1	0.0	0.7
Total Delay	55.3	10.6	64.9	36.1	37.8	8.8	15.7	11.0
Queue Length 50th (ft)	43	0	55	10	78	218	13	355
Queue Length 95th (ft)	88	38	106	36	m113	m338	m57	153
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	178	289	159	227	407	2522	356	2361
Starvation Cap Reductn	0	0	0	0	0	192	0	71
Spillback Cap Reductn	0	50	28	0	0	20	0	287
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.38	0.57	0.10	0.56	0.68	0.44	0.84

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	12	84	69	14	7	209	1073	381	143	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.95		1.00	0.96		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1583	1770	1766		1770	3400		1770	3499	
Flt Permitted		0.77	1.00	0.68	1.00		0.07	1.00		0.12	1.00	
Satd. Flow (perm)		1425	1583	1273	1766		125	3400		232	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	13	91	75	15	8	227	1166	414	155	1617	134
RTOR Reduction (vph)	0	0	81	0	7	0	0	26	0	0	5	0
Lane Group Flow (vph)	0	60	10	75	16	0	227	1554	0	155	1746	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		10.8	10.8	10.8	10.8		97.7	85.1		85.9	77.8	
Effective Green, g (s)		13.8	13.8	13.8	13.8		99.7	88.1		89.9	80.8	
Actuated g/C Ratio		0.12	0.12	0.12	0.12		0.83	0.73		0.75	0.67	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		163	182	146	203		342	2496		303	2355	
v/s Ratio Prot					0.01		c0.10	0.46		0.04	c0.50	
v/s Ratio Perm		0.04	0.01	c0.06			0.45			0.34		
v/c Ratio		0.37	0.06	0.51	0.08		0.66	0.62		0.51	0.74	
Uniform Delay, d1		49.1	47.3	49.9	47.4		30.4	7.8		6.8	12.8	
Progression Factor		1.00	1.00	1.00	1.00		1.40	1.01		1.69	0.62	
Incremental Delay, d2		1.4	0.1	3.0	0.2		3.2	0.8		1.1	1.6	
Delay (s)		50.5	47.4	53.0	47.6		45.9	8.6		12.6	9.5	
Level of Service		D	D	D	D		D	A		B	A	
Approach Delay (s)		48.6			51.7			13.3			9.8	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.9	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)	8.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1594
v/c Ratio	0.38	0.78	0.78	0.67	0.04	0.71	0.84	0.65
Control Delay	56.1	73.0	73.8	10.7	4.0	11.3	44.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	73.0	73.8	10.7	4.0	11.3	44.5	14.0
Queue Length 50th (ft)	12	127	123	0	2	425	204	383
Queue Length 95th (ft)	42	#232	#228	92	m2	373	#350	584
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	217	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	2	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	6
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.04	0.72	0.77	0.65

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1459	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3537	
Flt Permitted		0.35		0.74	0.72	1.00	0.12	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	224	3406		178	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1586	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1594	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	148	1612		437	2287	
v/s Ratio Prot							0.00	0.35		c0.17	0.45	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.03			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.70	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.4	25.6		32.1	13.6	
Progression Factor		1.00		1.00	1.00	1.00	0.40	0.34		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.4		14.2	1.8	
Delay (s)		61.3		65.0	65.3	44.5	6.6	11.2		46.3	15.4	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.3			53.9			11.2			21.3	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	144	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	157	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1586	1632	382	1624	1639	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1590	1638	332	1629	1645	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			86			0	53	89	100	100	63
cM capacity (veh/h)	1119			1121			39	64	679	33	64	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	157	396	46	67	105	241
Volume Left	248	0	157	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	39	181	654
Volume to Capacity	0.22	0.26	0.14	0.23	0.03	1.73	0.58	0.37
Queue Length 95th (ft)	21	0	12	0	0	178	79	42
Control Delay (s)	9.1	0.0	8.7	0.0	0.0	575.0	49.5	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		2.3			254.4		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	30.0		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	429	104	14	0	21	138	7	107
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	466	113	15	0	23	150	8	116
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	579			329			1019	1070	326	1021	1017	523
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	579			329			1019	1070	326	1021	1017	523
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			99			90	100	97	23	97	79
cM capacity (veh/h)	994			1230			155	203	716	195	218	554

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	579	38	274
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	116
cSH	994	1700	1230	1700	389	305
Volume to Capacity	0.08	0.19	0.01	0.34	0.10	0.90
Queue Length 95th (ft)	6	0	0	0	8	209
Control Delay (s)	8.9	0.0	7.9	0.0	18.4	66.4
Lane LOS	A		A		C	F
Approach Delay (s)	1.7		0.1		18.4	66.4
Approach LOS					C	F

Intersection Summary			
Average Delay	15.1		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1283	1572
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.28	1.17
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	138.9	98.4
Queue Delay	0.3	0.3	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.0	246.8	0.8	54.0	82.4	77.5	138.9	99.3
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1573	~858
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#88	m269
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1346
Starvation Cap Reductn	0	0	0	0	0	0	0	283
Spillback Cap Reductn	7	7	0	0	0	270	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.39	1.44	0.14	0.20	0.89	1.16	1.28	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1173	1446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1552	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1275	1572
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	302
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1283	1270
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.83	0.80
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.23	1.20
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			106.5	90.1
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			110.0	149.5
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			131.7	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	124.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	161.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	580	2774
v/c Ratio	1.43	0.64	0.99	0.76	1.31	1.27
Control Delay	287.2	24.1	36.1	12.4	178.1	146.9
Queue Delay	0.0	28.6	38.1	50.6	1.0	0.4
Total Delay	287.2	52.7	74.2	63.0	179.1	147.3
Queue Length 50th (ft)	~210	6	969	324	~689	~1813
Queue Length 95th (ft)	#368	83	m814	m217	m#505	m#1252
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1156	1078	444	2182
Starvation Cap Reductn	0	0	320	363	46	327
Spillback Cap Reductn	0	80	4	0	0	324
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.37	1.14	1.46	1.50

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	534	2552	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	110	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	580	2774	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	96	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	719	580	2774	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						95.0	93.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						94.5	98.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.63	0.65	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1115	982	444	2182	
v/s Ratio Prot								c0.65		c0.29	0.78	
v/s Ratio Perm	c0.09	0.01							0.48	c0.58		
v/c Ratio	1.43	0.15						1.03	0.73	1.31	1.27	
Uniform Delay, d1	70.2	66.4						27.8	17.3	50.6	28.8	
Progression Factor	1.00	1.00						1.15	1.04	1.01	0.81	
Incremental Delay, d2	240.8	0.7						17.6	0.3	139.4	122.4	
Delay (s)	311.0	67.1						49.6	18.3	190.7	145.6	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			36.6			153.4	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	118.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2137
v/c Ratio	1.24	1.24	1.14	0.43	0.60	1.22
Control Delay	161.8	162.4	127.1	37.1	7.4	130.1
Queue Delay	3.0	3.0	0.2	0.0	5.4	0.6
Total Delay	164.8	165.5	127.3	37.1	12.8	130.7
Queue Length 50th (ft)	~961	~963	~750	34	261	~1334
Queue Length 95th (ft)	#1226	#1228	#993	m39	m236	m#1306
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	605	605	570	209	2158	1753
Starvation Cap Reductn	0	0	0	0	804	142
Spillback Cap Reductn	186	186	16	0	598	311
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.79	1.79	1.18	0.41	0.95	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1705	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3469	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	99	3539			3469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1853	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2129	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				51.1	51.1	51.1	82.4	87.9			72.5	
Effective Green, g (s)				54.1	54.1	54.1	88.4	90.9			75.5	
Actuated g/C Ratio				0.36	0.36	0.36	0.59	0.61			0.50	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				606	606	570	202	2144			1746	
v/s Ratio Prot							0.04	c0.36			c0.61	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.24	1.24	1.14	0.43	0.60			1.22	
Uniform Delay, d1				48.0	48.0	48.0	61.3	18.3			37.2	
Progression Factor				1.00	1.00	1.00	0.85	0.39			0.84	
Incremental Delay, d2				120.6	121.3	84.1	0.4	0.0			100.5	
Delay (s)				168.6	169.3	132.0	52.5	7.2			131.9	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			157.8			10.1			131.9	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	112.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	174.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	658	317	99	1836	15	1558
v/c Ratio	0.16	0.33	1.17	0.42	0.68	1.04	0.11	0.97
Control Delay	26.9	17.8	133.8	22.5	41.6	59.5	10.2	37.9
Queue Delay	0.0	46.2	15.9	0.0	0.0	26.3	0.0	3.6
Total Delay	26.9	64.0	149.7	22.5	41.6	85.9	10.2	41.5
Queue Length 50th (ft)	47	92	~766	150	38	859	3	801
Queue Length 95th (ft)	85	161	475	119	m79	m#1087	m5	m#928
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	512	740	561	749	145	1768	139	1614
Starvation Cap Reductn	0	0	0	0	0	55	0	11
Spillback Cap Reductn	0	506	406	15	0	630	0	39
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	1.05	4.25	0.43	0.68	1.61	0.11	0.99

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	395	19	171	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1770	1612		1770	3507		1770	3507	
Flt Permitted		0.63	1.00	0.69	1.00		0.06	1.00		0.06	1.00	
Satd. Flow (perm)		1182	1583	1294	1612		106	3507		110	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	658	32	285	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	55	0	51	0	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	191	658	266	0	99	1833	0	15	1555	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		62.0	62.0	62.0	62.0		75.9	69.8		68.1	65.9	
Effective Green, g (s)		65.0	65.0	65.0	65.0		78.5	72.8		72.1	68.9	
Actuated g/C Ratio		0.43	0.43	0.43	0.43		0.52	0.49		0.48	0.46	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		512	685	560	698		145	1702		99	1610	
v/s Ratio Prot					0.17		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm		0.07	0.12	c0.51			0.32			0.07		
v/c Ratio		0.16	0.28	1.18	0.38		0.68	1.08		0.15	0.97	
Uniform Delay, d1		25.8	27.4	42.5	28.8		33.6	38.6		34.1	39.4	
Progression Factor		1.00	1.00	1.00	1.00		1.04	0.86		0.54	0.62	
Incremental Delay, d2		0.1	0.2	96.4	0.3		7.8	42.0		0.5	12.9	
Delay (s)		26.0	27.6	138.9	29.2		42.8	75.3		18.9	37.4	
Level of Service		C	C	F	C		D	E		B	D	
Approach Delay (s)		27.2			103.2			73.6			37.2	
Approach LOS		C			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	64.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1950	353	1130
v/c Ratio	1.36	0.89	1.00	1.18	0.06	1.26	1.32	0.57
Control Delay	286.5	92.7	117.1	126.4	5.8	142.5	203.8	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4
Total Delay	286.5	92.7	117.1	126.4	5.8	142.9	203.8	23.6
Queue Length 50th (ft)	~90	221	251	~524	1	~1251	~393	339
Queue Length 95th (ft)	#205	#384	#445	#773	m3	m#1220	#601	468
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	55	246	241	569	241	1545	268	1984
Starvation Cap Reductn	0	0	0	0	0	160	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	360
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.36	0.89	1.00	1.18	0.06	1.41	1.32	0.70

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1400	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3423		1770	3535	
Flt Permitted		0.18		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		332		1253	1226	1583	353	3423		109	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1522	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	258	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	416	15	1933	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		20.5		27.5	27.5	27.5	66.0	64.0		85.0	78.5	
Effective Green, g (s)		22.5		29.5	29.5	29.5	70.0	67.0		87.0	81.5	
Actuated g/C Ratio		0.15		0.20	0.20	0.20	0.47	0.45		0.58	0.54	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		49		246	241	311	202	1528		268	1920	
v/s Ratio Prot							0.00	0.56		c0.16	0.32	
v/s Ratio Perm		c0.21		0.17	0.20	c0.26	0.03			c0.60		
v/c Ratio		1.41		0.89	1.00	1.34	0.07	1.26		1.32	0.59	
Uniform Delay, d1		63.8		58.6	60.2	60.2	22.4	41.5		52.0	23.0	
Progression Factor		1.00		1.00	1.00	1.00	0.41	0.49		1.00	1.00	
Incremental Delay, d2		270.3		29.3	58.0	172.3	0.1	121.4		166.6	1.3	
Delay (s)		334.1		87.9	118.2	232.6	9.3	141.7		218.6	24.3	
Level of Service		F		F	F	F	A	F		F	C	
Approach Delay (s)		334.1			180.4			140.7			70.6	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	131.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	106.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	31	183	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	34	199	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2098	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			476			1972	2006	422	2155	2026	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	4	66	100	100	30
cM capacity (veh/h)	833			993			9	35	577	2	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	233	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	199	287
cSH	833	1700	993	1700	1700	9	178	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.84	1.31	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	335	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	224.3	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			2955.9		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	422.2		
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	466	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	507	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			522			1614	1775	514	1647	1655	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			522			1614	1775	514	1647	1655	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			56	88	99	0	90	53
cM capacity (veh/h)	737			1045			34	65	560	60	77	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	522	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1045	1700	60	105
Volume to Capacity	0.19	0.31	0.02	0.55	0.51	3.44
Queue Length 95th (ft)	18	0	2	0	50	Err
Control Delay (s)	11.1	0.0	8.5	0.0	115.8	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.4		0.2		115.8	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1800.0		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	673	105	24	38	1038	1090	646
v/c Ratio	1.64	1.65	0.20	0.14	0.23	0.96	1.34	0.62
Control Delay	328.2	335.9	1.2	39.5	13.3	44.7	173.0	1.7
Queue Delay	0.8	0.8	0.0	0.0	0.0	26.5	0.0	2.0
Total Delay	329.0	336.7	1.2	39.5	13.3	71.2	173.0	3.7
Queue Length 50th (ft)	~782	~795	0	12	12	725	~1118	0
Queue Length 95th (ft)	#1023	#1038	2	39	26	#1057	m#1249	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	406	407	513	174	166	1078	812	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	243
Spillback Cap Reductn	32	32	0	0	0	100	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.78	1.79	0.20	0.14	0.23	1.06	1.34	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1223	7	97	7	7	7	35	955	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.81	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1504	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1329	8	105	8	8	8	38	1038	0	8	1082	646
RTOR Reduction (vph)	0	0	80	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	664	673	25	0	17	0	38	1038	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	27.0	27.0	27.0		9.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	29.0	29.0	29.0		11.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.24	0.24	0.24		0.10		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	406	407	382		167		135	1125			833	877
v/s Ratio Prot	0.39	c0.40			c0.01		0.01	c0.56				
v/s Ratio Perm			0.02				0.15				c0.72	0.30
v/c Ratio	1.64	1.65	0.07		0.10		0.28	0.92			1.31	0.53
Uniform Delay, d1	45.5	45.5	35.1		49.5		26.3	21.2			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.26	0.09
Incremental Delay, d2	296.9	304.9	0.1		0.2		1.1	12.3			142.2	0.2
Delay (s)	342.4	350.4	35.1		49.7		27.5	33.5			149.1	1.7
Level of Service	F	F	D		D		C	C			F	A
Approach Delay (s)		323.8			49.7			33.3			94.2	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	156.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	176	1315	1060	597	1674
v/c Ratio	1.44	0.56	1.20	0.95	1.52	0.93
Control Delay	268.9	14.6	115.5	21.3	259.2	31.3
Queue Delay	0.0	19.5	1.3	44.4	0.0	22.7
Total Delay	268.9	34.1	116.8	65.7	259.2	54.0
Queue Length 50th (ft)	~256	0	~1245	472	~605	716
Queue Length 95th (ft)	#426	70	m538	m143	m#521	m539
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	161	315	1098	1117	393	1793
Starvation Cap Reductn	0	0	252	290	0	69
Spillback Cap Reductn	0	125	21	0	0	192
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.44	0.93	1.55	1.28	1.52	1.05

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	319	0	56	0	0	0	0	867	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.95						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1625						1694	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1681	1625						1694	1504	173	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	347	0	61	0	0	0	0	942	1433	597	1674	0
RTOR Reduction (vph)	0	159	0	0	0	0	0	13	152	0	0	0
Lane Group Flow (vph)	232	17	0	0	0	0	0	1302	908	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	9.5	9.5						74.0	71.5	63.5	56.0	
Effective Green, g (s)	11.5	11.5						73.5	77.0	65.5	59.0	
Actuated g/C Ratio	0.10	0.10						0.61	0.64	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	161	155						1037	965	393	1740	
v/s Ratio Prot								c0.77		c0.28	0.47	
v/s Ratio Perm	c0.14	0.01							0.60	c0.54		
v/c Ratio	1.44	0.11						1.26	0.94	1.52	0.96	
Uniform Delay, d1	54.2	49.6						23.2	19.4	38.0	29.4	
Progression Factor	1.00	1.00						1.20	1.58	0.72	0.89	
Incremental Delay, d2	230.0	0.2						115.8	2.2	234.8	8.0	
Delay (s)	284.2	49.8						143.9	33.0	262.1	34.0	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		183.1			0.0			94.4			94.0	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	101.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	598	79	1210	1784
v/c Ratio	0.56	0.57	1.06	0.33	0.58	1.09
Control Delay	35.9	35.9	94.0	39.2	13.9	68.8
Queue Delay	0.4	0.4	0.0	0.0	5.3	3.6
Total Delay	36.3	36.3	94.0	39.2	19.2	72.4
Queue Length 50th (ft)	222	223	~517	30	307	~798
Queue Length 95th (ft)	325	327	#740	m24	m221	#945
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	597	597	562	253	2123	1632
Starvation Cap Reductn	0	0	0	0	838	40
Spillback Cap Reductn	49	49	0	0	44	283
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.62	1.06	0.31	0.94	1.32

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	550	73	1113	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	133	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	598	79	1210	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	598	79	1210	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				39.6	39.6	39.6	62.4	68.4			53.0	
Effective Green, g (s)				42.6	42.6	42.6	68.4	71.4			56.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.57	0.60			0.47	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				596	596	561	244	2105			1625	
v/s Ratio Prot							0.03	c0.34			c0.51	
v/s Ratio Perm				0.20	0.20	c0.38	0.15					
v/c Ratio				0.57	0.57	1.07	0.32	0.57			1.09	
Uniform Delay, d1				31.2	31.3	38.7	46.5	15.0			32.0	
Progression Factor				1.00	1.00	1.00	1.39	0.92			0.56	
Incremental Delay, d2				1.2	1.2	56.8	0.1	0.0			48.8	
Delay (s)				32.5	32.5	95.5	64.7	13.7			66.8	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			62.1			16.9			66.8	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	50.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	91	37	53	8	227	1580	155	1751
v/c Ratio	0.37	0.36	0.24	0.34	0.04	0.75	0.71	0.56	0.82
Control Delay	58.1	8.5	54.9	57.6	0.3	48.3	6.6	25.3	16.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	3.1
Total Delay	58.1	8.6	54.9	57.6	0.3	48.3	6.7	25.3	19.6
Queue Length 50th (ft)	44	0	28	41	0	118	194	34	627
Queue Length 95th (ft)	90	30	66	86	0	m172	m232	m100	262
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	252	154	156	227	334	2239	319	2148
Starvation Cap Reductn	0	0	0	0	0	0	123	0	50
Spillback Cap Reductn	0	9	0	0	0	0	23	0	293
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.37	0.24	0.34	0.04	0.68	0.75	0.49	0.94

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	12	84	69	14	7	209	1073	381	143	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1583	1681	1708	1583	1770	3400		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.09	1.00	
Satd. Flow (perm)		1793	1583	1681	1708	1583	101	3400		173	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	13	91	75	15	8	227	1166	414	155	1617	134
RTOR Reduction (vph)	0	0	83	0	0	8	0	27	0	0	5	0
Lane Group Flow (vph)	0	60	8	37	53	0	227	1553	0	155	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	73.9		79.0	69.3	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	76.9		83.0	72.3	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.64		0.69	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	302	2178		275	2108	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.46		0.05	c0.50	
v/s Ratio Perm			0.01			0.00	0.46			0.33		
v/c Ratio		0.37	0.06	0.28	0.40	0.01	0.75	0.71		0.56	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	52.8	36.5	14.3		14.0	18.9	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.29	0.37		1.53	0.69	
Incremental Delay, d2		1.4	0.2	1.2	2.0	0.0	6.9	1.3		2.0	3.0	
Delay (s)		52.6	49.9	53.3	54.6	52.9	53.7	6.6		23.5	16.0	
Level of Service		D	D	D	D	D	D	A		C	B	
Approach Delay (s)		51.0			54.0			12.6			16.6	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.0	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)	11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1594
v/c Ratio	0.38	0.78	0.78	0.67	0.04	0.71	0.84	0.65
Control Delay	56.1	73.0	73.8	10.7	5.0	12.1	44.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	56.1	73.0	73.8	10.7	5.0	12.1	44.5	14.2
Queue Length 50th (ft)	12	127	123	0	2	407	204	383
Queue Length 95th (ft)	42	#232	#228	92	m2	434	#350	584
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	217	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	2	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	171
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.04	0.72	0.77	0.70

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1459	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3537	
Flt Permitted		0.35		0.74	0.72	1.00	0.12	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	224	3406		178	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1586	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1594	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	148	1612		437	2287	
v/s Ratio Prot							0.00	0.35		c0.17	0.45	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.03			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.70	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.4	25.6		32.1	13.6	
Progression Factor		1.00		1.00	1.00	1.00	0.50	0.38		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.2		14.2	1.8	
Delay (s)		61.3		65.0	65.3	44.5	8.3	12.0		46.3	15.4	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.3			53.9			12.0			21.3	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	144	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	157	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1586	1632	382	1624	1639	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1590	1638	332	1629	1645	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			86			0	53	89	100	100	63
cM capacity (veh/h)	1119			1121			39	64	679	33	64	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	157	396	46	67	105	241
Volume Left	248	0	157	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	39	181	654
Volume to Capacity	0.22	0.26	0.14	0.23	0.03	1.73	0.58	0.37
Queue Length 95th (ft)	21	0	12	0	0	178	79	42
Control Delay (s)	9.1	0.0	8.7	0.0	0.0	575.0	49.5	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		2.3			254.4		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	30.0		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	429	104	14	0	21	138	7	107
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	466	113	15	0	23	150	8	116
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	579			329			1019	1070	326	1021	1017	523
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	579			329			1019	1070	326	1021	1017	523
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			99			90	100	97	23	97	79
cM capacity (veh/h)	994			1230			155	203	716	195	218	554

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	579	38	274
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	116
cSH	994	1700	1230	1700	389	305
Volume to Capacity	0.08	0.19	0.01	0.34	0.10	0.90
Queue Length 95th (ft)	6	0	0	0	8	209
Control Delay (s)	8.9	0.0	7.9	0.0	18.4	66.4
Lane LOS	A		A		C	F
Approach Delay (s)	1.7		0.1		18.4	66.4
Approach LOS					C	F

Intersection Summary			
Average Delay	15.1		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1283	1572
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.28	1.17
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	138.9	98.4
Queue Delay	0.3	0.3	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.0	246.8	0.8	54.0	82.4	77.5	138.9	99.3
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1573	~858
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#88	m269
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1346
Starvation Cap Reductn	0	0	0	0	0	0	0	283
Spillback Cap Reductn	7	7	0	0	0	270	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.39	1.44	0.14	0.20	0.89	1.16	1.28	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1173	1446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1552	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1275	1572
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	302
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1283	1270
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.83	0.80
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.23	1.20
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			106.5	90.1
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			110.0	149.4
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			131.7	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	124.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	161.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	580	2774
v/c Ratio	1.43	0.64	0.99	0.76	1.31	1.27
Control Delay	287.2	24.1	36.1	12.4	178.1	146.9
Queue Delay	0.0	28.6	38.1	50.6	1.0	0.4
Total Delay	287.2	52.7	74.2	63.0	179.1	147.3
Queue Length 50th (ft)	~210	6	969	324	~689	~1813
Queue Length 95th (ft)	#368	83	m814	m217	m#505	m#1252
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1156	1078	444	2182
Starvation Cap Reductn	0	0	320	363	46	327
Spillback Cap Reductn	0	80	4	0	0	324
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.37	1.14	1.46	1.50

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	534	2552	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	110	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	580	2774	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	96	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	719	580	2774	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						95.0	93.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						94.5	98.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.63	0.65	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1115	982	444	2182	
v/s Ratio Prot								c0.65		c0.29	0.78	
v/s Ratio Perm	c0.09	0.01							0.48	c0.58		
v/c Ratio	1.43	0.15						1.03	0.73	1.31	1.27	
Uniform Delay, d1	70.2	66.4						27.8	17.3	50.6	28.8	
Progression Factor	1.00	1.00						1.15	1.04	1.01	0.81	
Incremental Delay, d2	240.8	0.7						17.6	0.3	139.4	122.4	
Delay (s)	311.0	67.1						49.6	18.3	190.7	145.6	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			36.6			153.4	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	118.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2137
v/c Ratio	1.24	1.24	1.14	0.43	0.60	1.22
Control Delay	161.8	162.4	127.1	37.1	7.4	128.2
Queue Delay	3.0	3.0	0.1	0.0	5.4	0.6
Total Delay	164.8	165.5	127.2	37.1	12.8	128.8
Queue Length 50th (ft)	~961	~963	~750	34	261	~1335
Queue Length 95th (ft)	#1226	#1228	#993	m39	m236	m#1467
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	605	605	570	209	2158	1753
Starvation Cap Reductn	0	0	0	0	804	134
Spillback Cap Reductn	186	186	11	0	484	311
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.79	1.79	1.17	0.41	0.95	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1705	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3469	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	99	3539			3469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1853	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2129	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				51.1	51.1	51.1	82.4	87.9			72.5	
Effective Green, g (s)				54.1	54.1	54.1	88.4	90.9			75.5	
Actuated g/C Ratio				0.36	0.36	0.36	0.59	0.61			0.50	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				606	606	570	202	2144			1746	
v/s Ratio Prot							0.04	c0.36			c0.61	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.24	1.24	1.14	0.43	0.60			1.22	
Uniform Delay, d1				48.0	48.0	48.0	61.3	18.3			37.2	
Progression Factor				1.00	1.00	1.00	0.85	0.39			0.73	
Incremental Delay, d2				120.6	121.3	84.1	0.4	0.0			101.4	
Delay (s)				168.6	169.3	132.0	52.5	7.2			128.5	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			157.8			10.1			128.5	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	111.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	174.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	329	361	285	99	1836	15	1558
v/c Ratio	0.42	0.97	0.86	0.94	0.63	0.64	0.90	0.11	0.83
Control Delay	69.9	89.8	78.0	90.2	31.7	45.1	27.4	6.8	20.4
Queue Delay	0.0	36.3	62.0	55.2	0.6	0.0	46.9	0.0	5.9
Total Delay	69.9	126.2	140.0	145.4	32.3	45.1	74.4	6.8	26.3
Queue Length 50th (ft)	74	154	328	369	121	46	775	2	733
Queue Length 95th (ft)	132	#336	275	303	89	m85	m827	m3	m355
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	191	253	381	383	454	155	2048	139	1876
Starvation Cap Reductn	0	0	0	0	0	0	68	0	17
Spillback Cap Reductn	0	28	228	230	30	0	725	0	272
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	1.09	2.15	2.36	0.67	0.64	1.39	0.11	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	395	19	171	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1692	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.05	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1692	1583	91	3507		94	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	658	32	285	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	85	0	0	117	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	161	329	361	168	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		13.0	13.0	31.0	31.0	31.0	88.5	81.8		79.3	77.1	
Effective Green, g (s)		16.0	16.0	34.0	34.0	32.0	90.5	84.8		83.3	80.1	
Actuated g/C Ratio		0.11	0.11	0.23	0.23	0.21	0.60	0.57		0.56	0.53	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		191	168	381	383	337	154	1982		99	1872	
v/s Ratio Prot		0.04		0.20	c0.21		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.11	0.35			0.08		
v/c Ratio		0.42	0.96	0.86	0.94	0.50	0.64	0.92		0.15	0.83	
Uniform Delay, d1		62.7	66.7	55.8	57.0	51.9	31.6	29.7		30.9	29.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.31	0.81		0.48	0.57	
Incremental Delay, d2		1.5	56.7	17.9	31.4	1.2	5.4	5.8		0.5	3.4	
Delay (s)		64.1	123.3	73.7	88.5	53.1	46.9	29.9		15.3	20.2	
Level of Service		E	F	E	F	D	D	C		B	C	
Approach Delay (s)		108.8			73.2			30.8			20.2	
Approach LOS		F			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1950	353	1130
v/c Ratio	1.36	0.89	1.00	1.18	0.06	1.26	1.32	0.57
Control Delay	286.5	92.7	117.1	126.4	6.1	145.2	203.8	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Total Delay	286.5	92.7	117.1	126.4	6.1	145.2	203.8	23.4
Queue Length 50th (ft)	~90	221	251	~524	2	~1251	~393	339
Queue Length 95th (ft)	#205	#384	#445	#773	m3	#1372	#601	468
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	55	246	241	569	241	1545	268	1984
Starvation Cap Reductn	0	0	0	0	0	25	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	236
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.36	0.89	1.00	1.18	0.06	1.28	1.32	0.65

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1400	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3423		1770	3535	
Flt Permitted		0.18		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		332		1253	1226	1583	353	3423		109	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1522	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	258	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	416	15	1933	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		20.5		27.5	27.5	27.5	66.0	64.0		85.0	78.5	
Effective Green, g (s)		22.5		29.5	29.5	29.5	70.0	67.0		87.0	81.5	
Actuated g/C Ratio		0.15		0.20	0.20	0.20	0.47	0.45		0.58	0.54	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		49		246	241	311	202	1528		268	1920	
v/s Ratio Prot							0.00	0.56		c0.16	0.32	
v/s Ratio Perm		c0.21		0.17	0.20	c0.26	0.03			c0.60		
v/c Ratio		1.41		0.89	1.00	1.34	0.07	1.26		1.32	0.59	
Uniform Delay, d1		63.8		58.6	60.2	60.2	22.4	41.5		52.0	23.0	
Progression Factor		1.00		1.00	1.00	1.00	0.43	0.57		1.00	1.00	
Incremental Delay, d2		270.3		29.3	58.0	172.3	0.1	122.1		166.6	1.3	
Delay (s)		334.1		87.9	118.2	232.6	9.8	145.7		218.6	24.3	
Level of Service		F		F	F	F	A	F		F	C	
Approach Delay (s)		334.1			180.4			144.6			70.6	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	132.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	106.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	31	183	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	34	199	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2098	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			476			1972	2006	422	2155	2026	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	4	66	100	100	30
cM capacity (veh/h)	833			993			9	35	577	2	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	233	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	199	287
cSH	833	1700	993	1700	1700	9	178	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.84	1.31	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	335	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	224.3	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			2955.9		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	422.2		
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	466	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	507	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			522			1614	1775	514	1647	1655	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			522			1614	1775	514	1647	1655	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			56	88	99	0	90	53
cM capacity (veh/h)	737			1045			34	65	560	60	77	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	522	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1045	1700	60	105
Volume to Capacity	0.19	0.31	0.02	0.55	0.51	3.44
Queue Length 95th (ft)	18	0	2	0	50	Err
Control Delay (s)	11.1	0.0	8.5	0.0	115.8	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.4		0.2		115.8	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1800.0		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	673	105	24	38	1038	1090	646
v/c Ratio	1.64	1.65	0.20	0.14	0.23	0.96	1.34	0.62
Control Delay	328.2	335.9	1.2	39.5	13.3	44.7	173.1	1.7
Queue Delay	0.8	0.8	0.0	0.0	0.0	26.5	0.0	2.0
Total Delay	329.0	336.7	1.2	39.5	13.3	71.2	173.1	3.7
Queue Length 50th (ft)	~782	~795	0	12	12	725	~1118	0
Queue Length 95th (ft)	#1023	#1038	2	39	26	#1057	m#1249	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	406	407	513	174	166	1078	812	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	243
Spillback Cap Reductn	32	32	0	0	0	100	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.78	1.79	0.20	0.14	0.23	1.06	1.34	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1223	7	97	7	7	7	35	955	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.81	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1504	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1329	8	105	8	8	8	38	1038	0	8	1082	646
RTOR Reduction (vph)	0	0	80	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	664	673	25	0	17	0	38	1038	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	27.0	27.0	27.0		9.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	29.0	29.0	29.0		11.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.24	0.24	0.24		0.10		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	406	407	382		167		135	1125			833	877
v/s Ratio Prot	0.39	c0.40			c0.01		0.01	c0.56				
v/s Ratio Perm			0.02				0.15				c0.72	0.30
v/c Ratio	1.64	1.65	0.07		0.10		0.28	0.92			1.31	0.53
Uniform Delay, d1	45.5	45.5	35.1		49.5		26.3	21.2			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.26	0.09
Incremental Delay, d2	296.9	304.9	0.1		0.2		1.1	12.3			142.2	0.2
Delay (s)	342.4	350.4	35.1		49.7		27.5	33.5			149.1	1.7
Level of Service	F	F	D		D		C	C			F	A
Approach Delay (s)		323.8			49.7			33.3			94.2	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	156.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	176	1315	1060	597	1674
v/c Ratio	1.44	0.56	1.20	0.95	1.52	0.93
Control Delay	268.9	14.6	115.5	21.3	259.2	31.3
Queue Delay	0.0	19.5	1.3	44.4	0.0	22.7
Total Delay	268.9	34.1	116.8	65.7	259.2	54.1
Queue Length 50th (ft)	~256	0	~1245	472	~606	716
Queue Length 95th (ft)	#426	70	m538	m143	m#521	m539
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	161	315	1098	1117	393	1793
Starvation Cap Reductn	0	0	252	290	0	69
Spillback Cap Reductn	0	125	21	0	0	192
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.44	0.93	1.55	1.28	1.52	1.05

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	319	0	56	0	0	0	0	867	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.95						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1625						1694	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1681	1625						1694	1504	173	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	347	0	61	0	0	0	0	942	1433	597	1674	0
RTOR Reduction (vph)	0	159	0	0	0	0	0	13	152	0	0	0
Lane Group Flow (vph)	232	17	0	0	0	0	0	1302	908	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	9.5	9.5						74.0	71.5	63.5	56.0	
Effective Green, g (s)	11.5	11.5						73.5	77.0	65.5	59.0	
Actuated g/C Ratio	0.10	0.10						0.61	0.64	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	161	155						1037	965	393	1740	
v/s Ratio Prot								c0.77		c0.28	0.47	
v/s Ratio Perm	c0.14	0.01							0.60	c0.54		
v/c Ratio	1.44	0.11						1.26	0.94	1.52	0.96	
Uniform Delay, d1	54.2	49.6						23.2	19.4	38.0	29.4	
Progression Factor	1.00	1.00						1.20	1.58	0.72	0.89	
Incremental Delay, d2	230.0	0.2						115.8	2.2	234.8	8.0	
Delay (s)	284.2	49.8						143.9	33.0	262.1	34.1	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		183.1			0.0			94.4			94.0	
Approach LOS		F			A			F			F	

Intersection Summary			
HCM 2000 Control Delay	101.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	598	79	1210	1784
v/c Ratio	0.56	0.57	1.06	0.33	0.58	1.09
Control Delay	35.9	35.9	94.0	39.2	13.9	68.6
Queue Delay	0.4	0.4	0.0	0.0	5.3	3.6
Total Delay	36.3	36.3	94.0	39.2	19.2	72.2
Queue Length 50th (ft)	222	223	~517	30	307	~801
Queue Length 95th (ft)	325	327	#740	m24	m221	#945
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	597	597	562	253	2123	1632
Starvation Cap Reductn	0	0	0	0	838	40
Spillback Cap Reductn	49	49	0	0	35	285
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.62	1.06	0.31	0.94	1.32

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	550	73	1113	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	133	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	598	79	1210	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	598	79	1210	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				39.6	39.6	39.6	62.4	68.4			53.0	
Effective Green, g (s)				42.6	42.6	42.6	68.4	71.4			56.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.57	0.60			0.47	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				596	596	561	244	2105			1625	
v/s Ratio Prot							0.03	c0.34			c0.51	
v/s Ratio Perm				0.20	0.20	c0.38	0.15					
v/c Ratio				0.57	0.57	1.07	0.32	0.57			1.09	
Uniform Delay, d1				31.2	31.3	38.7	46.5	15.0			32.0	
Progression Factor				1.00	1.00	1.00	1.39	0.92			0.55	
Incremental Delay, d2				1.2	1.2	56.8	0.1	0.0			48.8	
Delay (s)				32.5	32.5	95.5	64.7	13.7			66.6	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			62.1			16.9			66.6	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	91	37	53	75	227	1580	155	1751
v/c Ratio	0.37	0.36	0.24	0.34	0.33	0.75	0.71	0.56	0.82
Control Delay	58.1	8.5	54.9	57.6	6.4	48.3	6.1	25.4	16.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	3.3
Total Delay	58.1	8.6	54.9	57.6	6.4	48.3	6.3	25.4	19.9
Queue Length 50th (ft)	44	0	28	41	0	118	185	34	628
Queue Length 95th (ft)	90	30	66	86	15	m172	m226	m100	260
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	252	154	156	227	334	2239	319	2148
Starvation Cap Reductn	0	0	0	0	0	0	123	0	50
Spillback Cap Reductn	0	9	0	0	1	0	53	0	299
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.37	0.24	0.34	0.33	0.68	0.75	0.49	0.95

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	12	84	69	14	69	209	1073	381	143	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1583	1681	1708	1583	1770	3400		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.09	1.00	
Satd. Flow (perm)		1793	1583	1681	1708	1583	101	3400		173	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	13	91	75	15	75	227	1166	414	155	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	27	0	0	5	0
Lane Group Flow (vph)	0	60	8	37	53	5	227	1553	0	155	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	73.9		79.0	69.3	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	76.9		83.0	72.3	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.64		0.69	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	302	2178		275	2108	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.46		0.05	c0.50	
v/s Ratio Perm			0.01			0.00	0.46			0.33		
v/c Ratio		0.37	0.06	0.28	0.40	0.05	0.75	0.71		0.56	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	53.0	36.5	14.3		14.0	18.9	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.28	0.34		1.54	0.69	
Incremental Delay, d2		1.4	0.2	1.2	2.0	0.2	6.9	1.3		2.0	3.0	
Delay (s)		52.6	49.9	53.3	54.6	53.2	53.7	6.2		23.5	16.1	
Level of Service		D	D	D	D	D	D	A		C	B	
Approach Delay (s)		51.0			53.7			12.1			16.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	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)	11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1594
v/c Ratio	0.38	0.79	0.79	0.61	0.04	0.75	0.86	0.65
Control Delay	55.8	69.3	70.1	10.6	5.1	14.6	50.9	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.3	70.1	10.6	5.1	14.6	50.9	13.8
Queue Length 50th (ft)	12	128	124	33	2	460	216	375
Queue Length 95th (ft)	42	#237	#234	110	m2	#538	#368	575
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	220	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	6	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	181
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.04	0.75	0.79	0.70

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1459	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3537	
Flt Permitted		0.36		0.74	0.72	1.00	0.12	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	227	3413		149	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1586	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1594	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	150	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.45	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.69	
Uniform Delay, d1		54.2		48.7	48.6	44.0	16.2	26.0		34.8	13.3	
Progression Factor		1.00		0.90	0.90	1.05	0.52	0.44		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.5	0.4	0.1	2.7		17.6	1.7	
Delay (s)		61.4		61.9	62.2	46.6	8.6	14.2		52.5	15.1	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.4			54.4			14.2			22.1	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	144	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	157	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1586	1632	382	1534	1639	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			389			1590	1638	334	1535	1645	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			86			100	100	84	100	100	63
cM capacity (veh/h)	1119			1121			39	65	679	57	64	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	157	396	46	105	241
Volume Left	248	0	157	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1119	1700	1121	1700	1700	679	654
Volume to Capacity	0.22	0.26	0.14	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	12	0	0	14	42
Control Delay (s)	9.1	0.0	8.7	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		2.3			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	579	15	23	158	116
v/c Ratio	0.18	0.24	0.01	0.48	0.11	0.02	0.73	0.10
Control Delay	2.1	3.5	4.7	12.0	41.6	0.0	66.1	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	3.5	4.7	12.0	41.6	0.0	66.1	1.6
Queue Length 50th (ft)	4	14	1	191	10	0	118	0
Queue Length 95th (ft)	m10	m143	6	346	29	0	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	590	1387	791	1217	215	1087	338	1212
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	0.18	0.24	0.01	0.48	0.07	0.02	0.47	0.10

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	429	104	14	0	21	138	7	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1808			1770	1583		1778	1583
Flt Permitted	0.35	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	656	1856		1046	1808			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	466	113	15	0	23	150	8	116
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	32
Lane Group Flow (vph)	105	329	0	8	573	0	0	15	15	0	158	84
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	569	1337		718	1211			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.32							
v/s Ratio Perm	0.13			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.47			0.11	0.01		0.73	0.07
Uniform Delay, d1	5.1	5.7		6.2	9.6			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.3			0.3	0.0		11.5	0.1
Delay (s)	2.0	3.4		6.2	10.9			43.4	6.6		59.4	5.1
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.8			21.1			36.4	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1283	1572
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.28	1.17
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	138.9	98.4
Queue Delay	0.3	0.3	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.0	246.8	0.8	54.0	82.4	77.5	138.9	99.3
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1573	~858
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#88	m269
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1346
Starvation Cap Reductn	0	0	0	0	0	0	0	283
Spillback Cap Reductn	7	7	0	0	0	270	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.39	1.44	0.14	0.20	0.89	1.16	1.28	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1173	1446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1552	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1275	1572
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	302
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1283	1270
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.83	0.80
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.23	1.20
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			106.5	90.1
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			110.0	149.4
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			131.7	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	124.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	161.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	580	2774
v/c Ratio	1.43	0.64	0.99	0.76	1.31	1.27
Control Delay	287.2	24.1	36.1	12.4	178.5	146.9
Queue Delay	0.0	28.6	38.1	50.6	1.0	0.4
Total Delay	287.2	52.7	74.2	63.0	179.5	147.4
Queue Length 50th (ft)	~210	6	969	324	~689	~1813
Queue Length 95th (ft)	#368	83	m814	m217	m#504	m#1252
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1156	1078	444	2182
Starvation Cap Reductn	0	0	320	363	45	335
Spillback Cap Reductn	0	80	1	0	0	324
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.37	1.14	1.45	1.50

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	534	2552	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	110	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	580	2774	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	96	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	719	580	2774	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						95.0	93.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						94.5	98.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.63	0.65	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1115	982	444	2182	
v/s Ratio Prot								c0.65		c0.29	0.78	
v/s Ratio Perm	c0.09	0.01							0.48	c0.58		
v/c Ratio	1.43	0.15						1.03	0.73	1.31	1.27	
Uniform Delay, d1	70.2	66.4						27.8	17.3	50.6	28.8	
Progression Factor	1.00	1.00						1.15	1.04	1.03	0.81	
Incremental Delay, d2	240.8	0.7						17.6	0.3	139.4	122.4	
Delay (s)	311.0	67.1						49.6	18.3	191.5	145.7	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			36.6			153.7	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	118.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2137
v/c Ratio	1.24	1.24	1.14	0.43	0.60	1.22
Control Delay	161.8	162.4	127.1	36.1	6.9	128.2
Queue Delay	3.3	3.3	0.1	0.0	4.8	0.6
Total Delay	165.1	165.7	127.2	36.1	11.7	128.8
Queue Length 50th (ft)	~961	~963	~750	34	250	~1335
Queue Length 95th (ft)	#1226	#1228	#993	m38	m225	m#1467
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	605	605	570	209	2158	1753
Starvation Cap Reductn	0	0	0	0	793	134
Spillback Cap Reductn	197	197	11	0	500	310
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.84	1.84	1.17	0.41	0.94	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1705	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3469	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	99	3539			3469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1853	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2129	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				51.1	51.1	51.1	82.4	87.9			72.5	
Effective Green, g (s)				54.1	54.1	54.1	88.4	90.9			75.5	
Actuated g/C Ratio				0.36	0.36	0.36	0.59	0.61			0.50	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				606	606	570	202	2144			1746	
v/s Ratio Prot							0.04	c0.36			c0.61	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.24	1.24	1.14	0.43	0.60			1.22	
Uniform Delay, d1				48.0	48.0	48.0	61.3	18.3			37.2	
Progression Factor				1.00	1.00	1.00	0.83	0.37			0.73	
Incremental Delay, d2				120.6	121.3	84.1	0.4	0.0			101.4	
Delay (s)				168.6	169.3	132.0	51.0	6.8			128.5	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			157.8			9.5			128.5	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	110.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	174.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	329	361	423	99	1836	15	1558
v/c Ratio	0.42	0.97	0.86	0.94	0.93	0.64	0.90	0.11	0.83
Control Delay	69.9	89.8	78.0	90.2	65.3	44.2	28.1	6.7	21.7
Queue Delay	0.0	36.3	63.4	56.6	13.4	0.0	47.1	0.0	4.4
Total Delay	69.9	126.2	141.4	146.8	78.7	44.2	75.2	6.7	26.0
Queue Length 50th (ft)	74	154	328	369	282	45	775	2	733
Queue Length 95th (ft)	132	#336	275	303	196	m85	m817	m3	m420
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	191	253	381	383	454	155	2048	139	1876
Starvation Cap Reductn	0	0	0	0	0	0	68	0	17
Spillback Cap Reductn	0	28	239	241	33	0	793	0	249
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	1.09	2.32	2.54	1.00	0.64	1.46	0.11	0.96

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	395	19	254	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1692	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.05	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1692	1583	91	3507		94	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	658	32	423	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	85	0	0	117	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	161	329	361	306	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		13.0	13.0	31.0	31.0	31.0	88.5	81.8		79.3	77.1	
Effective Green, g (s)		16.0	16.0	34.0	34.0	32.0	90.5	84.8		83.3	80.1	
Actuated g/C Ratio		0.11	0.11	0.23	0.23	0.21	0.60	0.57		0.56	0.53	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		191	168	381	383	337	154	1982		99	1872	
v/s Ratio Prot		0.04		0.20	c0.21		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.19	0.35			0.08		
v/c Ratio		0.42	0.96	0.86	0.94	0.91	0.64	0.92		0.15	0.83	
Uniform Delay, d1		62.7	66.7	55.8	57.0	57.6	31.6	29.7		30.9	29.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.28	0.84		0.48	0.62	
Incremental Delay, d2		1.5	56.7	17.9	31.4	26.8	5.4	5.8		0.5	3.3	
Delay (s)		64.1	123.3	73.7	88.5	84.3	45.8	30.6		15.3	21.5	
Level of Service		E	F	E	F	F	D	C		B	C	
Approach Delay (s)		108.8			82.5			31.4			21.4	
Approach LOS		F			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	2040	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.28	1.26	0.55
Control Delay	242.4	120.1	158.1	80.3	6.3	154.3	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Total Delay	242.4	120.1	158.1	80.3	6.3	154.4	181.6	21.4
Queue Length 50th (ft)	~85	~237	~295	~352	3	~1324	~380	321
Queue Length 95th (ft)	#201	m#406	m#468	#588	m3	#1446	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1593	280	2055
Starvation Cap Reductn	0	0	0	0	0	37	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	307
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.31	1.26	0.65

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1483	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3428		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3428		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1612	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	274	0	16	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	310	15	2024	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1576		279	1991	
v/s Ratio Prot							0.00	0.59		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.28		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.85	0.49	0.64		1.00	1.00	
Incremental Delay, d2		215.1		64.1	108.2	99.5	0.1	130.3		144.7	1.2	
Delay (s)		278.3		122.0	166.1	152.7	10.5	156.2		197.2	22.2	
Level of Service		F		F	F	F	B	F		F	C	
Approach Delay (s)		278.3			149.4			155.1			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	126.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	214	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	233	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.75	0.75	0.92	0.75	0.75	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496			481			1830	1871	428	1765	1895	454
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	60	100	100	33
cM capacity (veh/h)	760			993			10	34	576	21	32	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	233	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	233	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.40	0.67
Queue Length 95th (ft)	36	0	7	0	0	49	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	15.4	28.4
Lane LOS	B		A			C	D
Approach Delay (s)	3.7		0.9			15.4	28.4
Approach LOS						C	D

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	177	522	23	928	23	8	181	180
v/c Ratio	0.51	0.38	0.04	0.75	0.10	0.03	0.83	0.54
Control Delay	5.6	3.8	4.9	21.4	52.0	0.1	90.2	34.0
Queue Delay	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	4.4	4.9	21.4	52.0	0.1	90.2	34.0
Queue Length 50th (ft)	14	68	5	545	19	0	172	80
Queue Length 95th (ft)	m15	m83	12	873	47	0	#259	158
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	398	1378	639	1233	278	364	258	377
Starvation Cap Reductn	0	474	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	0.44	0.58	0.04	0.75	0.08	0.02	0.70	0.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	466	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1855		1770	1786			1804	1583		1778	1583
Flt Permitted	0.17	1.00		0.45	1.00			0.77	1.00		0.72	1.00
Satd. Flow (perm)	324	1855		838	1786			1441	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	507	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	8	0	0	0	7	0	0	75
Lane Group Flow (vph)	177	521	0	23	920	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.6	109.8		105.7	102.9			24.4	24.4		24.4	24.4
Effective Green, g (s)	116.6	109.8		105.7	102.9			24.4	24.4		24.4	24.4
Actuated g/C Ratio	0.78	0.73		0.70	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	345	1357		607	1225			234	257		217	257
v/s Ratio Prot	c0.03	0.28		0.00	c0.52							
v/s Ratio Perm	0.36			0.03				0.02	0.00		c0.14	0.07
v/c Ratio	0.51	0.38		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.5	7.5		6.7	15.3			53.4	52.6		60.8	56.3
Progression Factor	0.67	0.43		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.4		0.0	4.3			0.2	0.0		23.2	1.1
Delay (s)	11.1	3.6		6.7	19.5			53.6	52.6		84.0	57.4
Level of Service	B	A		A	B			D	D		F	E
Approach Delay (s)		5.5			19.2			53.4			70.7	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	673	105	24	38	1038	1090	646
v/c Ratio	1.32	1.33	0.18	0.13	0.18	0.57	0.69	0.59
Control Delay	191.6	197.7	0.9	38.5	15.5	21.8	1.5	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.6	2.1	7.0
Total Delay	191.6	197.7	0.9	38.5	15.5	22.3	3.5	9.7
Queue Length 50th (ft)	~698	~712	0	11	14	281	14	0
Queue Length 95th (ft)	#940	#955	2	39	31	346	m16	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	504	505	596	189	217	1813	1584	1089
Starvation Cap Reductn	0	0	0	0	0	0	335	390
Spillback Cap Reductn	0	0	0	0	0	375	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	1.33	0.18	0.13	0.18	0.72	0.87	0.92

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1223	7	97	7	7	7	35	955	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.13	1.00			0.95	1.00
Satd. Flow (perm)	1681	1686	1583		1750		242	3539			3347	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1329	8	105	8	8	8	38	1038	0	8	1082	646
RTOR Reduction (vph)	0	0	74	0	7	0	0	0	0	0	0	331
Lane Group Flow (vph)	664	673	32	0	17	0	38	1038	0	0	1090	315
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	34.0	34.0	34.0		10.5		60.5	60.5			55.5	55.5
Effective Green, g (s)	36.0	36.0	36.0		12.5		60.0	64.5			58.5	58.5
Actuated g/C Ratio	0.30	0.30	0.30		0.10		0.50	0.54			0.49	0.49
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	504	505	474		182		184	1902			1631	771
v/s Ratio Prot	0.39	c0.40			c0.01		0.01	c0.29				
v/s Ratio Perm			0.02				0.09				c0.33	0.20
v/c Ratio	1.32	1.33	0.07		0.09		0.21	0.55			0.67	0.41
Uniform Delay, d1	42.0	42.0	30.0		48.6		18.8	18.2			23.4	19.7
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	1.45
Incremental Delay, d2	156.4	162.8	0.1		0.2		0.6	0.3			0.1	0.0
Delay (s)	198.4	204.8	30.1		48.8		19.4	18.4			1.2	28.6
Level of Service	F	F	C		D		B	B			A	C
Approach Delay (s)		189.1			48.8			18.5			11.4	
Approach LOS		F			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	73.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	232	176	1315	1060	597	1674
v/c Ratio	1.33	0.54	0.67	1.04	1.28	1.08
Control Delay	222.3	13.7	10.3	45.8	153.2	69.3
Queue Delay	0.0	0.0	34.5	22.2	1.0	10.4
Total Delay	222.3	13.7	44.9	68.0	154.2	79.7
Queue Length 50th (ft)	~245	0	232	~215	~552	~792
Queue Length 95th (ft)	#414	69	m208	m385	m#468	m#785
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	175	327	1951	1015	467	1557
Starvation Cap Reductn	0	0	716	115	50	46
Spillback Cap Reductn	0	1	31	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.33	0.54	1.06	1.18	1.43	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.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	319	0	56	0	0	0	0	867	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.95						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1625						3246	1441	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.13	1.00	
Satd. Flow (perm)	1681	1625						3246	1441	248	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	347	0	61	0	0	0	0	942	1433	597	1674	0
RTOR Reduction (vph)	0	158	0	0	0	0	0	34	163	0	0	0
Lane Group Flow (vph)	232	18	0	0	0	0	0	1281	897	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	10.5	10.5						68.0	65.5	55.5	48.0	
Effective Green, g (s)	12.5	12.5						67.5	71.0	57.5	51.0	
Actuated g/C Ratio	0.10	0.10						0.56	0.59	0.48	0.42	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	175	169						1825	852	467	1504	
v/s Ratio Prot								0.39		c0.29	0.47	
v/s Ratio Perm	c0.14	0.01							c0.62	c0.32		
v/c Ratio	1.33	0.11						0.70	1.05	1.28	1.11	
Uniform Delay, d1	53.8	48.7						19.0	24.5	35.8	34.5	
Progression Factor	1.00	1.00						0.63	1.13	0.77	0.85	
Incremental Delay, d2	180.6	0.2						0.3	31.7	126.8	55.7	
Delay (s)	234.3	48.9						12.2	59.5	154.3	84.9	
Level of Service	F	D						B	E	F	F	
Approach Delay (s)		154.3			0.0			33.3			103.1	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	74.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	598	79	1210	1784
v/c Ratio	0.56	0.57	1.06	0.33	0.58	1.09
Control Delay	35.9	35.9	94.0	40.1	13.6	68.6
Queue Delay	0.4	0.4	0.0	0.0	3.2	4.0
Total Delay	36.3	36.3	94.0	40.1	16.8	72.6
Queue Length 50th (ft)	222	223	~517	29	268	~801
Queue Length 95th (ft)	325	327	#740	m55	m286	#945
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	597	597	562	253	2123	1632
Starvation Cap Reductn	0	0	0	0	785	40
Spillback Cap Reductn	50	50	0	0	35	422
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.62	1.06	0.31	0.90	1.47

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	550	73	1113	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	133	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	598	79	1210	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	598	79	1210	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				39.6	39.6	39.6	62.4	68.4			53.0	
Effective Green, g (s)				42.6	42.6	42.6	68.4	71.4			56.0	
Actuated g/C Ratio				0.36	0.36	0.36	0.57	0.60			0.47	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				596	596	561	244	2105			1625	
v/s Ratio Prot							0.03	c0.34			c0.51	
v/s Ratio Perm				0.20	0.20	c0.38	0.15					
v/c Ratio				0.57	0.57	1.07	0.32	0.57			1.09	
Uniform Delay, d1				31.2	31.3	38.7	46.5	15.0			32.0	
Progression Factor				1.00	1.00	1.00	1.34	0.86			0.55	
Incremental Delay, d2				1.2	1.2	56.8	0.6	0.2			48.8	
Delay (s)				32.5	32.5	95.5	62.7	13.0			66.6	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			62.1			16.1			66.6	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	91	37	53	75	227	1580	155	1751
v/c Ratio	0.37	0.36	0.24	0.34	0.33	0.75	0.71	0.56	0.82
Control Delay	58.1	8.5	54.9	57.6	6.4	48.3	6.2	25.4	16.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	3.3
Total Delay	58.1	8.6	54.9	57.6	6.4	48.3	6.4	25.4	19.9
Queue Length 50th (ft)	44	0	28	41	0	117	188	34	628
Queue Length 95th (ft)	90	30	66	86	15	m172	m228	m100	260
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	252	154	156	227	334	2239	319	2148
Starvation Cap Reductn	0	0	0	0	0	0	123	0	50
Spillback Cap Reductn	0	9	0	0	2	0	61	0	299
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.37	0.24	0.34	0.33	0.68	0.75	0.49	0.95

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	12	84	69	14	69	209	1073	381	143	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1583	1681	1708	1583	1770	3400		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.09	1.00	
Satd. Flow (perm)		1793	1583	1681	1708	1583	101	3400		173	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	13	91	75	15	75	227	1166	414	155	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	27	0	0	5	0
Lane Group Flow (vph)	0	60	8	37	53	5	227	1553	0	155	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	73.9		79.0	69.3	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	76.9		83.0	72.3	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.64		0.69	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	302	2178		275	2108	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.46		0.05	c0.50	
v/s Ratio Perm			0.01			0.00	0.46			0.33		
v/c Ratio		0.37	0.06	0.28	0.40	0.05	0.75	0.71		0.56	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	53.0	36.5	14.3		14.0	18.9	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.28	0.35		1.54	0.69	
Incremental Delay, d2		1.4	0.2	1.2	2.0	0.2	6.9	1.3		2.0	3.0	
Delay (s)		52.6	49.9	53.3	54.6	53.2	53.6	6.3		23.5	16.1	
Level of Service		D	D	D	D	D	D	A		C	B	
Approach Delay (s)		51.0			53.7			12.2			16.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	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)	11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1594
v/c Ratio	0.38	0.79	0.79	0.61	0.04	0.75	0.86	0.65
Control Delay	55.8	69.3	70.1	10.6	5.1	14.6	50.9	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.3	70.1	10.6	5.1	14.6	50.9	13.8
Queue Length 50th (ft)	12	128	124	33	2	458	216	375
Queue Length 95th (ft)	42	#237	#234	110	m2	#536	#368	575
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	220	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	6	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	181
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.04	0.75	0.79	0.70

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1459	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3537	
Flt Permitted		0.36		0.74	0.72	1.00	0.12	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	227	3413		149	3537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1586	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1594	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	150	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.45	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.69	
Uniform Delay, d1		54.2		48.7	48.6	44.0	16.2	26.0		34.8	13.3	
Progression Factor		1.00		0.90	0.90	1.05	0.53	0.44		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.5	0.4	0.1	2.7		17.6	1.7	
Delay (s)		61.4		61.9	62.2	46.6	8.6	14.3		52.5	15.1	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.4			54.4			14.2			22.1	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	144	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	157	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1586	1632	382	1534	1639	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			389			1590	1638	334	1535	1645	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			86			100	100	84	100	100	63
cM capacity (veh/h)	1119			1121			39	65	679	57	64	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	157	396	46	105	241
Volume Left	248	0	157	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1119	1700	1121	1700	1700	679	654
Volume to Capacity	0.22	0.26	0.14	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	12	0	0	14	42
Control Delay (s)	9.1	0.0	8.7	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		2.3			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	579	15	23	158	116
v/c Ratio	0.18	0.24	0.01	0.48	0.11	0.02	0.73	0.10
Control Delay	2.1	3.5	4.7	12.0	41.6	0.0	66.1	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	3.5	4.7	12.0	41.6	0.0	66.1	1.6
Queue Length 50th (ft)	4	14	1	191	10	0	118	0
Queue Length 95th (ft)	m10	m143	6	346	29	0	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	590	1387	791	1217	215	1087	338	1212
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	0.18	0.24	0.01	0.48	0.07	0.02	0.47	0.10

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	429	104	14	0	21	138	7	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1808			1770	1583		1778	1583
Flt Permitted	0.35	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	656	1856		1046	1808			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	466	113	15	0	23	150	8	116
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	32
Lane Group Flow (vph)	105	329	0	8	573	0	0	15	15	0	158	84
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	569	1337		718	1211			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.32							
v/s Ratio Perm	0.13			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.47			0.11	0.01		0.73	0.07
Uniform Delay, d1	5.1	5.7		6.2	9.6			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.3			0.3	0.0		11.5	0.1
Delay (s)	2.0	3.4		6.2	10.9			43.4	6.6		59.4	5.1
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.8			21.1			36.4	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1283	1572
v/c Ratio	1.36	1.41	0.14	0.20	0.45	0.48	0.59	1.15
Control Delay	227.7	246.4	0.8	54.0	11.9	10.8	0.5	92.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	24.3	1.0
Total Delay	227.7	246.4	0.8	54.0	11.9	11.1	24.8	93.6
Queue Length 50th (ft)	~512	~543	0	15	33	257	8	~842
Queue Length 95th (ft)	#732	#767	0	47	54	302	m10	m269
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	269	2487	2163	1362
Starvation Cap Reductn	0	0	0	0	0	0	925	298
Spillback Cap Reductn	0	0	0	0	0	605	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.36	1.41	0.14	0.20	0.45	0.64	1.04	1.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1173	1446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.15	1.00			0.94	1.00
Satd. Flow (perm)	1681	1688	1583		1750		279	3536			3344	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1275	1572
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	316
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1283	1256
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		257	2486			2240	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.02	c0.34				
v/s Ratio Perm			0.01				0.29				0.38	c0.79
v/c Ratio	1.36	1.41	0.03		0.15		0.47	0.48			0.57	1.18
Uniform Delay, d1	62.5	62.5	52.4		66.4		12.5	10.0			13.3	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.68
Incremental Delay, d2	182.3	202.6	0.1		0.6		1.4	0.1			0.0	84.1
Delay (s)	244.8	265.1	52.4		67.1		13.9	10.2			0.4	150.5
Level of Service	F	F	D		E		B	B			A	F
Approach Delay (s)		242.4			67.1			10.5			83.0	
Approach LOS		F			E			B			F	

Intersection Summary			
HCM 2000 Control Delay	90.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	133.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	580	2774
v/c Ratio	1.43	0.64	0.58	0.85	1.02	1.27
Control Delay	287.2	24.1	18.7	28.7	63.5	146.7
Queue Delay	0.0	0.9	4.8	4.5	31.6	0.4
Total Delay	287.2	25.1	23.5	33.1	95.1	147.0
Queue Length 50th (ft)	~210	6	320	474	~593	~1812
Queue Length 95th (ft)	#368	83	m305	m461	m474	m#1252
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1991	956	570	2182
Starvation Cap Reductn	0	0	758	89	169	295
Spillback Cap Reductn	0	13	63	0	0	215
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.67	0.93	0.94	1.45	1.47

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	534	2552	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						3390	1441	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1681	1590						3390	1441	150	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	580	2774	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	111	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	704	580	2774	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						85.1	83.1	99.0	89.5	
Effective Green, g (s)	9.5	9.5						84.6	88.1	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.56	0.59	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1911	846	569	2182	
v/s Ratio Prot								0.34		c0.29	c0.78	
v/s Ratio Perm	c0.09	0.01							c0.49	0.39		
v/c Ratio	1.43	0.15						0.60	0.83	1.02	1.27	
Uniform Delay, d1	70.2	66.4						21.6	25.0	45.1	28.8	
Progression Factor	1.00	1.00						0.93	1.36	1.14	0.79	
Incremental Delay, d2	240.8	0.7						0.3	4.1	16.6	122.4	
Delay (s)	311.0	67.1						20.3	37.9	68.2	145.3	
Level of Service	F	E						C	D	E	F	
Approach Delay (s)		190.7			0.0			27.6			132.0	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	98.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2137
v/c Ratio	1.24	1.24	1.14	0.43	0.60	1.22
Control Delay	161.8	162.4	127.1	43.4	10.8	128.2
Queue Delay	2.1	2.1	0.1	0.0	0.7	0.7
Total Delay	163.9	164.6	127.2	43.4	11.5	128.9
Queue Length 50th (ft)	~961	~963	~750	39	358	~1335
Queue Length 95th (ft)	#1226	#1228	#993	101	m375	m#1467
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	605	605	570	209	2158	1753
Starvation Cap Reductn	0	0	0	0	497	134
Spillback Cap Reductn	142	142	10	0	480	345
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.62	1.62	1.16	0.41	0.77	1.52

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1705	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3469	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	99	3539			3469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1853	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2129	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				51.1	51.1	51.1	82.4	87.9			72.5	
Effective Green, g (s)				54.1	54.1	54.1	88.4	90.9			75.5	
Actuated g/C Ratio				0.36	0.36	0.36	0.59	0.61			0.50	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				606	606	570	202	2144			1746	
v/s Ratio Prot							0.04	c0.36			c0.61	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.24	1.24	1.14	0.43	0.60			1.22	
Uniform Delay, d1				48.0	48.0	48.0	61.3	18.3			37.2	
Progression Factor				1.00	1.00	1.00	0.91	0.54			0.73	
Incremental Delay, d2				120.6	121.3	84.1	1.2	0.3			101.4	
Delay (s)				168.6	169.3	132.0	57.2	10.1			128.6	
Level of Service				F	F	F	E	B			F	
Approach Delay (s)		0.0			157.8			13.1			128.6	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	111.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	140.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	329	362	423	99	1836	15	1558
v/c Ratio	0.42	0.97	0.86	0.95	0.93	0.64	0.90	0.11	0.83
Control Delay	69.9	89.8	78.0	90.7	65.3	44.8	26.8	6.4	22.5
Queue Delay	0.0	36.3	62.0	54.9	12.2	0.0	47.0	0.0	5.9
Total Delay	69.9	126.2	140.0	145.6	77.5	44.8	73.8	6.4	28.4
Queue Length 50th (ft)	74	154	328	370	282	46	729	2	733
Queue Length 95th (ft)	132	#336	275	304	196	m85	m774	m4	m570
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	191	253	381	383	454	155	2048	139	1876
Starvation Cap Reductn	0	0	0	0	0	0	68	0	17
Spillback Cap Reductn	0	28	228	230	31	0	745	0	272
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	1.09	2.15	2.37	1.00	0.64	1.41	0.11	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	395	20	254	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1693	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.05	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1693	1583	91	3507		94	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	658	33	423	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	85	0	0	117	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	161	329	362	306	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		13.0	13.0	31.0	31.0	31.0	88.5	81.8		79.3	77.1	
Effective Green, g (s)		16.0	16.0	34.0	34.0	32.0	90.5	84.8		83.3	80.1	
Actuated g/C Ratio		0.11	0.11	0.23	0.23	0.21	0.60	0.57		0.56	0.53	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		191	168	381	383	337	154	1982		99	1872	
v/s Ratio Prot		0.04		0.20	c0.21		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.19	0.35			0.08		
v/c Ratio		0.42	0.96	0.86	0.95	0.91	0.64	0.92		0.15	0.83	
Uniform Delay, d1		62.7	66.7	55.8	57.1	57.6	31.6	29.7		30.9	29.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.30	0.79		0.46	0.65	
Incremental Delay, d2		1.5	56.7	17.9	31.9	26.8	5.4	5.8		0.5	3.3	
Delay (s)		64.1	123.3	73.7	89.0	84.3	46.5	29.3		14.6	22.3	
Level of Service		E	F	E	F	F	D	C		B	C	
Approach Delay (s)		108.8			82.7			30.2			22.2	
Approach LOS		F			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	44.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	2040	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.28	1.26	0.55
Control Delay	242.4	120.1	158.1	80.3	6.9	153.7	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3
Total Delay	242.4	120.1	158.1	80.3	6.9	153.8	181.6	21.4
Queue Length 50th (ft)	~85	~237	~295	~352	3	~1325	~380	321
Queue Length 95th (ft)	#201	m#406	m#468	#588	m4	#1445	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1593	280	2055
Starvation Cap Reductn	0	0	0	0	0	37	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	352
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.31	1.26	0.66

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1483	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3428		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3428		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1612	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	274	0	16	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	310	15	2024	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1576		279	1991	
v/s Ratio Prot							0.00	0.59		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.28		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.85	0.54	0.61		1.00	1.00	
Incremental Delay, d2		215.1		64.1	108.2	99.5	0.1	130.3		144.7	1.2	
Delay (s)		278.3		122.0	166.1	152.7	11.4	155.1		197.2	22.2	
Level of Service		F		F	F	F	B	F		F	C	
Approach Delay (s)		278.3			149.4			154.0			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	126.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	214	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	233	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.75	0.75	0.92	0.75	0.75	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496			481			1830	1871	428	1765	1895	454
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	60	100	100	33
cM capacity (veh/h)	760			993			10	34	576	21	32	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	233	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	233	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.40	0.67
Queue Length 95th (ft)	36	0	7	0	0	49	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	15.4	28.4
Lane LOS	B		A			C	D
Approach Delay (s)	3.7		0.9			15.4	28.4
Approach LOS						C	D

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	177	522	23	928	23	8	181	180
v/c Ratio	0.51	0.38	0.04	0.75	0.10	0.03	0.83	0.54
Control Delay	5.6	3.9	4.9	21.4	52.0	0.1	90.2	34.0
Queue Delay	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.6	4.5	4.9	21.4	52.0	0.1	90.2	34.0
Queue Length 50th (ft)	14	68	5	545	19	0	172	80
Queue Length 95th (ft)	m15	m92	12	873	47	0	#259	158
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	398	1376	641	1233	278	364	258	377
Starvation Cap Reductn	0	472	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	0.44	0.58	0.04	0.75	0.08	0.02	0.70	0.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	163	466	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1855		1770	1786			1804	1583		1778	1583
Flt Permitted	0.17	1.00		0.45	1.00			0.77	1.00		0.72	1.00
Satd. Flow (perm)	324	1855		836	1786			1441	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	507	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	8	0	0	0	7	0	0	75
Lane Group Flow (vph)	177	521	0	23	920	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.6	109.6		105.9	102.9			24.4	24.4		24.4	24.4
Effective Green, g (s)	116.6	109.6		105.9	102.9			24.4	24.4		24.4	24.4
Actuated g/C Ratio	0.78	0.73		0.71	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	345	1355		608	1225			234	257		217	257
v/s Ratio Prot	c0.03	0.28		0.00	c0.52							
v/s Ratio Perm	0.36			0.03				0.02	0.00		c0.14	0.07
v/c Ratio	0.51	0.38		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.5	7.6		6.6	15.3			53.4	52.6		60.8	56.3
Progression Factor	0.67	0.43		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.4		0.0	4.3			0.2	0.0		23.2	1.1
Delay (s)	11.1	3.7		6.7	19.5			53.6	52.6		84.0	57.4
Level of Service	B	A		A	B			D	D		F	E
Approach Delay (s)		5.6			19.2			53.4			70.7	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	890	447	105	24	38	1038	1090	646
v/c Ratio	1.11	1.11	0.20	0.15	0.14	0.51	0.60	0.56
Control Delay	106.8	119.9	1.1	40.5	11.3	16.1	1.5	1.3
Queue Delay	0.1	0.2	0.0	0.0	0.0	0.5	0.9	2.6
Total Delay	106.9	120.1	1.1	40.5	11.3	16.6	2.4	3.9
Queue Length 50th (ft)	~431	~434	0	12	12	238	14	0
Queue Length 95th (ft)	#567	#657	2	39	26	293	m18	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	805	403	525	160	265	2049	1807	1152
Starvation Cap Reductn	0	0	0	0	0	0	409	373
Spillback Cap Reductn	16	8	0	0	0	544	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.13	1.13	0.20	0.15	0.14	0.69	0.78	0.83

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1223	7	97	7	7	7	35	955	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1616	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			0.95	1.00
Satd. Flow (perm)	3221	1616	1583		1750		302	3539			3348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1329	8	105	8	8	8	38	1038	0	8	1082	646
RTOR Reduction (vph)	0	0	79	0	7	0	0	0	0	0	0	288
Lane Group Flow (vph)	890	447	26	0	17	0	38	1038	0	0	1090	358
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	28.0	28.0	28.0		8.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	30.0	30.0	30.0		10.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.25	0.25	0.25		0.09		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	805	404	395		153		232	2138			1855	877
v/s Ratio Prot	0.28	c0.28			c0.01		0.01	c0.29				
v/s Ratio Perm			0.02				0.09				c0.33	0.23
v/c Ratio	1.11	1.11	0.07		0.11		0.16	0.49			0.59	0.41
Uniform Delay, d1	45.0	45.0	34.3		50.4		14.1	13.3			17.7	15.4
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	0.41
Incremental Delay, d2	64.7	76.8	0.1		0.2		0.3	0.1			0.2	0.1
Delay (s)	109.7	121.8	34.4		50.7		14.5	13.4			1.0	6.4
Level of Service	F	F	C		D		B	B			A	A
Approach Delay (s)		108.0			50.7			13.5			3.0	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	41.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	509	266	52	24	121	1205	1283	1572
v/c Ratio	1.25	1.30	0.16	0.20	0.41	0.46	0.56	1.14
Control Delay	183.0	214.2	1.1	54.0	8.9	8.1	0.4	83.6
Queue Delay	0.1	0.2	0.0	0.0	0.0	0.3	10.2	0.8
Total Delay	183.1	214.4	1.1	54.0	8.9	8.4	10.6	84.4
Queue Length 50th (ft)	~340	~364	0	15	28	217	7	~758
Queue Length 95th (ft)	#465	#567	0	47	45	255	m10	m286
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	407	205	321	118	297	2628	2296	1380
Starvation Cap Reductn	0	0	0	0	0	0	993	255
Spillback Cap Reductn	6	3	0	0	0	657	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.27	1.32	0.16	0.20	0.41	0.61	0.98	1.40

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1173	1446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1619	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			0.94	1.00
Satd. Flow (perm)	3221	1619	1583		1750		301	3536			3344	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1275	1572
RTOR Reduction (vph)	0	0	45	0	7	0	0	0	0	0	0	272
Lane Group Flow (vph)	509	266	7	0	17	0	121	1205	0	0	1283	1300
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	17.0	17.0	17.0		7.5		109.5	109.5			103.5	103.5
Effective Green, g (s)	19.0	19.0	19.0		9.5		107.0	111.5			106.5	106.5
Actuated g/C Ratio	0.13	0.13	0.13		0.06		0.71	0.74			0.71	0.71
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	407	205	200		110		283	2628			2374	1123
v/s Ratio Prot	0.16	c0.16			c0.01		0.02	c0.34				
v/s Ratio Perm			0.00				0.28				0.38	c0.82
v/c Ratio	1.25	1.30	0.03		0.15		0.43	0.46			0.54	1.16
Uniform Delay, d1	65.5	65.5	57.4		66.4		9.6	7.5			10.2	21.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.45
Incremental Delay, d2	131.7	165.0	0.1		0.6		1.0	0.1			0.0	72.0
Delay (s)	197.2	230.5	57.5		67.1		10.7	7.6			0.3	125.2
Level of Service	F	F	E		E		B	A			A	F
Approach Delay (s)		199.1			67.1			7.9			69.1	
Approach LOS		F			E			A			E	

Intersection Summary			
HCM 2000 Control Delay	74.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	133.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	659	105	24	38	1016	1090	646
v/c Ratio	1.50	1.51	0.20	0.15	0.23	0.96	1.34	0.63
Control Delay	269.0	276.2	1.1	40.5	13.7	44.0	171.2	1.9
Queue Delay	0.6	0.6	0.0	0.0	0.0	43.2	0.0	2.2
Total Delay	269.5	276.7	1.1	40.5	13.7	87.3	171.2	4.1
Queue Length 50th (ft)	~734	~748	0	12	12	707	~1117	0
Queue Length 95th (ft)	#975	#989	2	39	27	#1034	m#1217	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	160	167	1063	813	1025
Starvation Cap Reductn	0	0	0	0	0	0	0	240
Spillback Cap Reductn	25	25	0	0	0	203	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.59	1.61	0.20	0.15	0.23	1.18	1.34	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1197	7	97	7	7	7	35	935	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.82	1.00
Satd. Flow (perm)	1681	1686	1583		1750		120	1863			1531	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	8	105	8	8	8	38	1016	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	178
Lane Group Flow (vph)	650	659	27	0	17	0	38	1016	0	0	1090	468
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		8.5		67.5	67.5			62.5	62.5
Effective Green, g (s)	31.0	31.0	31.0		10.5		67.0	71.5			65.5	65.5
Actuated g/C Ratio	0.26	0.26	0.26		0.09		0.56	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		153		135	1110			835	864
v/s Ratio Prot	0.39	c0.39			c0.01		0.01	c0.55				
v/s Ratio Perm			0.02				0.14				c0.71	0.30
v/c Ratio	1.50	1.51	0.07		0.11		0.28	0.92			1.31	0.54
Uniform Delay, d1	44.5	44.5	33.6		50.4		26.3	21.6			27.2	17.6
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.23	0.11
Incremental Delay, d2	235.8	243.3	0.1		0.2		1.1	11.5			140.6	0.2
Delay (s)	280.3	287.8	33.7		50.7		27.4	33.1			146.9	2.2
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		265.5			50.7			32.9			93.1	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	135.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	204	161	1265	1060	597	1674
v/c Ratio	1.39	0.53	1.15	0.96	1.46	0.95
Control Delay	251.3	12.6	93.9	21.2	231.4	32.7
Queue Delay	0.0	14.0	1.2	43.0	0.0	28.5
Total Delay	251.3	26.6	95.1	64.2	231.4	61.2
Queue Length 50th (ft)	~221	0	~1167	481	~567	~736
Queue Length 95th (ft)	#384	55	m525	m181	m#499	m#617
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	147	303	1098	1103	409	1763
Starvation Cap Reductn	0	0	244	262	0	69
Spillback Cap Reductn	0	119	12	0	0	188
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.39	0.88	1.48	1.26	1.46	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.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	0	56	0	0	0	0	821	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1619						1691	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1619						1691	1504	182	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	0	61	0	0	0	0	892	1433	597	1674	0
RTOR Reduction (vph)	0	147	0	0	0	0	0	14	138	0	0	0
Lane Group Flow (vph)	204	14	0	0	0	0	0	1251	922	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	8.5	8.5						74.0	71.5	62.5	55.0	
Effective Green, g (s)	10.5	10.5						73.5	77.0	64.5	58.0	
Actuated g/C Ratio	0.09	0.09						0.61	0.64	0.54	0.48	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	147	141						1035	965	408	1710	
v/s Ratio Prot								c0.74		c0.29	0.47	
v/s Ratio Perm	c0.12	0.01							c0.61	c0.50		
v/c Ratio	1.39	0.10						1.21	0.96	1.46	0.98	
Uniform Delay, d1	54.8	50.4						23.2	19.9	37.7	30.4	
Progression Factor	1.00	1.00						1.11	1.39	0.64	0.85	
Incremental Delay, d2	210.8	0.2						95.0	2.9	209.7	10.6	
Delay (s)	265.5	50.6						120.8	30.6	233.7	36.5	
Level of Service	F	D						F	C	F	D	
Approach Delay (s)		170.7			0.0			79.7			88.4	
Approach LOS		F			A			E			F	

Intersection Summary			
HCM 2000 Control Delay	90.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.42		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	566	79	1117	1784
v/c Ratio	0.57	0.58	1.03	0.33	0.53	1.07
Control Delay	36.7	36.8	83.9	41.8	14.8	63.7
Queue Delay	0.1	0.1	0.0	0.0	2.8	11.7
Total Delay	36.8	36.8	83.9	41.8	17.6	75.4
Queue Length 50th (ft)	221	222	~451	32	290	~812
Queue Length 95th (ft)	329	331	#696	m26	m223	#933
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	587	587	552	253	2152	1661
Starvation Cap Reductn	0	0	0	0	890	45
Spillback Cap Reductn	7	7	0	0	0	370
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.58	1.03	0.31	0.89	1.38

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	521	73	1028	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	131	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	566	79	1117	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	566	79	1117	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				38.9	38.9	38.9	63.1	69.1			54.0	
Effective Green, g (s)				41.9	41.9	41.9	69.1	72.1			57.0	
Actuated g/C Ratio				0.35	0.35	0.35	0.58	0.60			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				586	586	552	240	2126			1654	
v/s Ratio Prot							0.03	c0.32			c0.51	
v/s Ratio Perm				0.20	0.20	c0.36	0.16					
v/c Ratio				0.58	0.58	1.03	0.33	0.53			1.07	
Uniform Delay, d1				31.8	31.8	39.0	46.8	14.0			31.5	
Progression Factor				1.00	1.00	1.00	1.49	1.04			0.64	
Incremental Delay, d2				1.4	1.4	44.9	0.1	0.0			42.1	
Delay (s)				33.2	33.2	84.0	69.6	14.6			62.3	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			56.3			18.2			62.3	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	48.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	91	75	23	227	1455	104	1751
v/c Ratio	0.36	0.33	0.51	0.11	0.66	0.56	0.33	0.74
Control Delay	55.1	10.1	62.2	36.1	38.5	3.5	4.2	10.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.1	0.0	1.4
Total Delay	55.1	10.2	62.2	36.1	38.5	3.5	4.2	11.6
Queue Length 50th (ft)	42	0	55	10	93	121	6	159
Queue Length 95th (ft)	85	38	106	36	m142	m131	m13	175
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	176	289	160	227	409	2588	322	2365
Starvation Cap Reductn	0	0	0	0	0	196	0	50
Spillback Cap Reductn	0	11	0	0	0	6	0	392
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.33	0.47	0.10	0.56	0.61	0.32	0.89

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	10	84	69	14	7	209	1073	266	96	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.95		1.00	0.97		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583	1770	1766		1770	3434		1770	3499	
Flt Permitted		0.76	1.00	0.69	1.00		0.07	1.00		0.16	1.00	
Satd. Flow (perm)		1414	1583	1288	1766		126	3434		292	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	11	91	75	15	8	227	1166	289	104	1617	134
RTOR Reduction (vph)	0	0	81	0	7	0	0	17	0	0	5	0
Lane Group Flow (vph)	0	58	10	75	16	0	227	1438	0	104	1746	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		10.8	10.8	10.8	10.8		97.7	86.9		84.3	78.0	
Effective Green, g (s)		13.8	13.8	13.8	13.8		99.7	89.9		88.3	81.0	
Actuated g/C Ratio		0.12	0.12	0.12	0.12		0.83	0.75		0.74	0.68	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		162	182	148	203		340	2572		317	2361	
v/s Ratio Prot					0.01		c0.10	0.42		0.02	c0.50	
v/s Ratio Perm		0.04	0.01	c0.06			0.46			0.22		
v/c Ratio		0.36	0.06	0.51	0.08		0.67	0.56		0.33	0.74	
Uniform Delay, d1		49.0	47.3	49.9	47.4		30.3	6.5		5.2	12.7	
Progression Factor		1.00	1.00	1.00	1.00		1.43	0.44		0.61	0.61	
Incremental Delay, d2		1.4	0.1	2.7	0.2		3.5	0.6		0.5	1.6	
Delay (s)		50.4	47.4	52.6	47.6		46.9	3.5		3.6	9.4	
Level of Service		D	D	D	D		D	A		A	A	
Approach Delay (s)		48.6			51.4			9.3			9.1	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	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)	8.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1543
v/c Ratio	0.38	0.78	0.78	0.67	0.03	0.71	0.84	0.63
Control Delay	56.1	73.0	73.8	10.7	6.0	13.3	44.5	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	73.0	73.8	10.7	6.0	13.3	44.5	13.6
Queue Length 50th (ft)	12	127	123	0	2	388	204	361
Queue Length 95th (ft)	42	#232	#228	92	m3	424	#350	551
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	229	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	1	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.03	0.72	0.77	0.63

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1412	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3536	
Flt Permitted		0.35		0.74	0.72	1.00	0.13	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	248	3406		178	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1535	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1543	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	159	1612		437	2286	
v/s Ratio Prot							0.00	0.35		c0.17	0.44	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.02			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.67	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.2	25.6		32.1	13.3	
Progression Factor		1.00		1.00	1.00	1.00	0.61	0.42		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.6		14.2	1.6	
Delay (s)		61.3		65.0	65.3	44.5	10.0	13.2		46.3	14.9	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.3			53.9			13.2			21.0	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	123	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	134	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1541	1586	382	1578	1593	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1543	1590	332	1582	1598	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			88			0	57	89	100	100	63
cM capacity (veh/h)	1119			1121			43	71	679	38	70	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	134	396	46	67	105	241
Volume Left	248	0	134	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	43	195	654
Volume to Capacity	0.22	0.26	0.12	0.23	0.03	1.57	0.54	0.37
Queue Length 95th (ft)	21	0	10	0	0	170	71	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	494.1	43.5	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		2.0			219.2		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	26.7		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	411	104	14	0	21	138	7	104
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	447	113	15	0	23	150	8	113
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	560			329			998	1051	326	1002	998	503
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	560			329			998	1051	326	1002	998	503
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			91	100	97	25	97	80
cM capacity (veh/h)	1011			1230			163	209	716	201	224	568

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	560	38	271
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	113
cSH	1011	1700	1230	1700	408	312
Volume to Capacity	0.07	0.19	0.01	0.33	0.09	0.87
Queue Length 95th (ft)	6	0	0	0	8	195
Control Delay (s)	8.8	0.0	7.9	0.0	17.8	60.2
Lane LOS	A		A		C	F
Approach Delay (s)	1.6		0.1		17.8	60.2
Approach LOS					C	F

Intersection Summary			
Average Delay	13.8		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Melanie Earnest opened 2/10/2015 3:39:21 PM 0 Melanie Earnest closed 2/10/2015 3:43:16 PM 235

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1248	1524
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.24	1.13
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	122.6	82.4
Queue Delay	0.8	0.8	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.5	247.2	0.8	54.0	82.4	77.6	122.6	83.3
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1500	~759
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#90	m266
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1345
Starvation Cap Reductn	0	0	0	0	0	0	0	282
Spillback Cap Reductn	17	17	0	0	0	282	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.44	1.50	0.14	0.20	0.89	1.17	1.24	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1141	1402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1551	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1240	1524
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1248	1223
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.80	0.77
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.20	1.15
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			91.4	70.3
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			95.0	129.7
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			114.1	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	158.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	547	2691
v/c Ratio	1.43	0.64	0.97	0.74	1.30	1.23
Control Delay	287.2	24.1	32.1	11.3	176.1	129.9
Queue Delay	0.0	27.2	41.7	50.7	0.8	0.5
Total Delay	287.2	51.3	73.8	62.0	176.8	130.4
Queue Length 50th (ft)	~210	6	952	298	~644	~1724
Queue Length 95th (ft)	#368	83	m785	m196	m#468	m#1264
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1180	1099	421	2182
Starvation Cap Reductn	0	0	330	374	32	345
Spillback Cap Reductn	0	79	0	0	0	300
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.96	1.35	1.12	1.41	1.46

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	503	2476	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	107	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	547	2691	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	97	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	718	547	2691	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						97.0	95.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						96.5	100.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.64	0.67	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1138	1002	421	2182	
v/s Ratio Prot								c0.65		c0.27	0.76	
v/s Ratio Perm	c0.09	0.01							0.48	c0.60		
v/c Ratio	1.43	0.15						1.01	0.72	1.30	1.23	
Uniform Delay, d1	70.2	66.4						26.8	16.0	51.4	28.8	
Progression Factor	1.00	1.00						1.18	1.07	1.04	0.81	
Incremental Delay, d2	240.8	0.7						10.5	0.2	136.3	105.4	
Delay (s)	311.0	67.1						42.1	17.2	189.8	128.7	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			31.8			139.0	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	103.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2013
v/c Ratio	1.20	1.20	1.10	0.43	0.61	1.18
Control Delay	143.8	144.4	111.9	35.4	7.3	113.0
Queue Delay	3.8	3.8	0.2	0.0	4.3	0.6
Total Delay	147.6	148.2	112.0	35.4	11.6	113.5
Queue Length 50th (ft)	~937	~940	~729	36	262	~1223
Queue Length 95th (ft)	#1202	#1204	#972	m37	m236	m#1337
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	627	627	591	208	2111	1706
Starvation Cap Reductn	0	0	0	0	736	110
Spillback Cap Reductn	230	230	12	0	545	269
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.89	1.89	1.13	0.41	0.93	1.40

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1598	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3466	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	101	3539			3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1737	276
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2004	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				53.1	53.1	53.1	80.4	85.9			70.5	
Effective Green, g (s)				56.1	56.1	56.1	86.4	88.9			73.5	
Actuated g/C Ratio				0.37	0.37	0.37	0.58	0.59			0.49	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				628	628	592	201	2097			1698	
v/s Ratio Prot							0.04	c0.36			c0.58	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.19	1.20	1.10	0.43	0.61			1.18	
Uniform Delay, d1				47.0	47.0	47.0	61.3	19.5			38.2	
Progression Factor				1.00	1.00	1.00	0.79	0.37			0.76	
Incremental Delay, d2				102.5	103.1	67.8	0.4	0.0			84.7	
Delay (s)				149.4	150.0	114.8	48.8	7.2			113.9	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			139.1			9.8			113.9	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	98.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	171.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	467	235	99	1836	15	1558
v/c Ratio	0.17	0.38	1.00	0.36	0.63	0.92	0.11	0.85
Control Delay	33.5	22.5	87.4	23.2	42.6	31.9	8.3	19.7
Queue Delay	0.0	8.5	43.8	0.0	0.0	46.8	0.0	3.2
Total Delay	33.5	31.0	131.2	23.2	42.6	78.7	8.3	22.8
Queue Length 50th (ft)	53	104	455	104	43	801	2	746
Queue Length 95th (ft)	95	182	341	88	m84	m#833	m4	m400
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	461	641	469	647	157	2002	138	1825
Starvation Cap Reductn	0	0	0	0	0	66	0	16
Spillback Cap Reductn	0	350	271	19	0	813	0	179
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.85	2.36	0.37	0.63	1.54	0.11	0.95

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	280	17	124	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1770	1617		1770	3507		1770	3507	
Flt Permitted		0.68	1.00	0.69	1.00		0.05	1.00		0.05	1.00	
Satd. Flow (perm)		1259	1583	1279	1617		94	3507		97	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	467	28	207	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	61	0	54	0	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	185	467	181	0	99	1833	0	15	1555	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		52.0	52.0	52.0	52.0		86.5	79.8		77.2	75.0	
Effective Green, g (s)		55.0	55.0	55.0	55.0		88.5	82.8		81.2	78.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37		0.59	0.55		0.54	0.52	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		461	580	468	592		156	1935		99	1823	
v/s Ratio Prot					0.11		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm		0.06	0.12	c0.37			0.34			0.08		
v/c Ratio		0.17	0.32	1.00	0.30		0.63	0.95		0.15	0.85	
Uniform Delay, d1		32.1	34.1	47.4	33.9		31.4	31.5		32.7	31.0	
Progression Factor		1.00	1.00	1.00	1.00		1.22	0.89		0.57	0.50	
Incremental Delay, d2		0.2	0.3	40.7	0.3		5.1	7.7		0.5	4.0	
Delay (s)		32.3	34.4	88.2	34.2		43.4	35.7		19.2	19.5	
Level of Service		C	C	F	C		D	D		B	B	
Approach Delay (s)		33.9			70.1			36.1			19.5	
Approach LOS		C			E			D			B	

Intersection Summary			
HCM 2000 Control Delay	35.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1899	353	1130
v/c Ratio	1.25	0.89	1.00	1.15	0.06	1.27	1.26	0.58
Control Delay	242.4	92.7	117.1	110.7	5.4	148.5	181.3	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Total Delay	242.4	92.7	117.1	110.7	5.4	148.9	181.3	24.0
Queue Length 50th (ft)	~85	221	251	~486	2	~1221	~380	345
Queue Length 95th (ft)	#201	#384	#445	#734	m2	#1366	#588	476
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	246	241	587	237	1499	280	1961
Starvation Cap Reductn	0	0	0	0	0	172	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	109
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.89	1.00	1.15	0.06	1.43	1.26	0.61

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1353	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3420		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	353	3420		112	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1471	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	276	0	18	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	398	15	1881	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		27.5	27.5	27.5	64.0	62.0		84.0	77.5	
Effective Green, g (s)		23.5		29.5	29.5	29.5	68.0	65.0		86.0	80.5	
Actuated g/C Ratio		0.16		0.20	0.20	0.20	0.45	0.43		0.57	0.54	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		246	241	311	197	1482		279	1897	
v/s Ratio Prot							0.00	0.55		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	0.20	c0.25	0.03			c0.56		
v/c Ratio		1.28		0.89	1.00	1.28	0.08	1.27		1.27	0.60	
Uniform Delay, d1		63.2		58.6	60.2	60.2	23.5	42.5		51.7	23.7	
Progression Factor		1.00		1.00	1.00	1.00	0.36	0.60		1.00	1.00	
Incremental Delay, d2		215.1		29.3	58.0	147.9	0.1	124.1		144.7	1.4	
Delay (s)		278.3		87.9	118.2	208.1	8.6	149.4		196.5	25.0	
Level of Service		F		F	F	F	A	F		F	C	
Approach Delay (s)		278.3			165.9			148.3			65.9	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	128.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	105.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	28	165	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	30	179	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2077	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			474			1973	2007	420	2133	2027	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	13	69	100	100	30
cM capacity (veh/h)	833			992			9	35	577	4	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	210	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	179	287
cSH	833	1700	992	1700	1700	9	177	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.87	1.18	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	279	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	178.8	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			3132.0		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	420.0		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	448	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	487	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			502			1594	1755	495	1628	1635	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			502			1594	1755	495	1628	1635	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			57	89	99	0	90	53
cM capacity (veh/h)	737			1062			36	67	575	62	79	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	502	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1062	1700	61	108
Volume to Capacity	0.19	0.30	0.02	0.55	0.50	3.34
Queue Length 95th (ft)	18	0	2	0	49	Err
Control Delay (s)	11.1	0.0	8.5	0.0	110.5	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.5		0.2		110.5	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1817.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

2/11/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	659	105	24	38	1016	1090	646
v/c Ratio	1.50	1.51	0.20	0.15	0.23	0.96	1.34	0.63
Control Delay	269.0	276.2	1.1	40.5	13.7	44.0	171.4	1.9
Queue Delay	0.6	0.6	0.0	0.0	0.0	43.2	0.0	2.2
Total Delay	269.5	276.7	1.1	40.5	13.7	87.3	171.4	4.1
Queue Length 50th (ft)	~734	~748	0	12	12	707	~1116	0
Queue Length 95th (ft)	#975	#989	2	39	27	#1034	m#1218	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	160	167	1063	813	1025
Starvation Cap Reductn	0	0	0	0	0	0	0	240
Spillback Cap Reductn	25	25	0	0	0	203	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.59	1.61	0.20	0.15	0.23	1.18	1.34	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1197	7	97	7	7	7	35	935	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.82	1.00
Satd. Flow (perm)	1681	1686	1583		1750		120	1863			1531	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	8	105	8	8	8	38	1016	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	178
Lane Group Flow (vph)	650	659	27	0	17	0	38	1016	0	0	1090	468
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		8.5		67.5	67.5			62.5	62.5
Effective Green, g (s)	31.0	31.0	31.0		10.5		67.0	71.5			65.5	65.5
Actuated g/C Ratio	0.26	0.26	0.26		0.09		0.56	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		153		135	1110			835	864
v/s Ratio Prot	0.39	c0.39			c0.01		0.01	c0.55				
v/s Ratio Perm			0.02				0.14				c0.71	0.30
v/c Ratio	1.50	1.51	0.07		0.11		0.28	0.92			1.31	0.54
Uniform Delay, d1	44.5	44.5	33.6		50.4		26.3	21.6			27.2	17.6
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.24	0.11
Incremental Delay, d2	235.8	243.3	0.1		0.2		1.1	11.5			140.6	0.2
Delay (s)	280.3	287.8	33.7		50.7		27.4	33.1			147.2	2.2
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		265.5			50.7			32.9			93.3	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	135.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	204	161	1265	1060	597	1674
v/c Ratio	1.39	0.53	1.15	0.96	1.46	0.95
Control Delay	251.3	12.6	93.9	21.2	232.8	33.2
Queue Delay	0.0	14.0	1.2	43.0	0.0	28.7
Total Delay	251.3	26.6	95.1	64.2	232.8	62.0
Queue Length 50th (ft)	~221	0	~1167	481	~593	~735
Queue Length 95th (ft)	#384	55	m525	m181	m#523	m#617
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	147	303	1098	1103	409	1763
Starvation Cap Reductn	0	0	244	262	0	66
Spillback Cap Reductn	0	119	0	0	0	189
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.39	0.88	1.48	1.26	1.46	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.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	0	56	0	0	0	0	821	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1619						1691	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1619						1691	1504	182	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	0	61	0	0	0	0	892	1433	597	1674	0
RTOR Reduction (vph)	0	147	0	0	0	0	0	14	138	0	0	0
Lane Group Flow (vph)	204	14	0	0	0	0	0	1251	922	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	8.5	8.5						74.0	71.5	62.5	55.0	
Effective Green, g (s)	10.5	10.5						73.5	77.0	64.5	58.0	
Actuated g/C Ratio	0.09	0.09						0.61	0.64	0.54	0.48	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	147	141						1035	965	408	1710	
v/s Ratio Prot								c0.74		c0.29	0.47	
v/s Ratio Perm	c0.12	0.01							c0.61	c0.50		
v/c Ratio	1.39	0.10						1.21	0.96	1.46	0.98	
Uniform Delay, d1	54.8	50.4						23.2	19.9	37.7	30.4	
Progression Factor	1.00	1.00						1.11	1.39	0.72	0.87	
Incremental Delay, d2	210.8	0.2						95.0	2.9	209.7	10.6	
Delay (s)	265.5	50.6						120.8	30.6	236.9	37.1	
Level of Service	F	D						F	C	F	D	
Approach Delay (s)		170.7			0.0			79.7			89.6	
Approach LOS		F			A			E			F	

Intersection Summary			
HCM 2000 Control Delay	90.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.42		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	566	79	1117	1784
v/c Ratio	0.57	0.58	1.03	0.33	0.53	1.07
Control Delay	36.7	36.8	83.9	38.9	13.0	60.6
Queue Delay	0.4	0.4	0.0	0.0	2.3	11.5
Total Delay	37.1	37.2	83.9	38.9	15.3	72.1
Queue Length 50th (ft)	221	222	~451	29	268	~785
Queue Length 95th (ft)	329	331	#696	m24	m206	#931
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	587	587	552	253	2152	1661
Starvation Cap Reductn	0	0	0	0	863	37
Spillback Cap Reductn	47	47	0	0	0	317
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.63	1.03	0.31	0.87	1.33

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	521	73	1028	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	131	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	566	79	1117	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	566	79	1117	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				38.9	38.9	38.9	63.1	69.1			54.0	
Effective Green, g (s)				41.9	41.9	41.9	69.1	72.1			57.0	
Actuated g/C Ratio				0.35	0.35	0.35	0.58	0.60			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				586	586	552	240	2126			1654	
v/s Ratio Prot							0.03	c0.32			c0.51	
v/s Ratio Perm				0.20	0.20	c0.36	0.16					
v/c Ratio				0.58	0.58	1.03	0.33	0.53			1.07	
Uniform Delay, d1				31.8	31.8	39.0	46.8	14.0			31.5	
Progression Factor				1.00	1.00	1.00	1.38	0.92			0.55	
Incremental Delay, d2				1.4	1.4	44.9	0.1	0.0			41.3	
Delay (s)				33.2	33.2	84.0	64.7	12.8			58.7	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			56.3			16.2			58.7	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	46.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	91	37	53	8	227	1455	104	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.03	0.75	0.62	0.38	0.81
Control Delay	57.7	2.8	54.9	57.6	0.1	49.8	4.7	8.6	16.3
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	2.2
Total Delay	57.7	2.9	54.9	57.6	0.1	49.8	4.8	8.6	18.4
Queue Length 50th (ft)	43	0	28	41	0	117	156	9	627
Queue Length 95th (ft)	87	0	66	86	0	m173	m171	m20	237
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	289	154	156	265	334	2347	277	2153
Starvation Cap Reductn	0	0	0	0	0	0	162	0	35
Spillback Cap Reductn	0	11	0	0	0	0	25	0	262
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.03	0.68	0.67	0.38	0.93

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	10	84	69	14	7	209	1073	266	96	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583	1681	1708	1583	1770	3434		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.13	1.00	
Satd. Flow (perm)		1790	1583	1681	1708	1583	101	3434		247	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	11	91	75	15	8	227	1166	289	104	1617	134
RTOR Reduction (vph)	0	0	83	0	0	8	0	18	0	0	5	0
Lane Group Flow (vph)	0	58	8	37	53	0	227	1437	0	104	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	77.2		75.9	69.5	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	80.2		79.9	72.5	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.67		0.67	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	299	2295		271	2113	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.42		0.03	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.23		
v/c Ratio		0.35	0.06	0.28	0.40	0.01	0.76	0.63		0.38	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	52.8	36.6	11.4		9.4	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.29	0.34		1.04	0.68	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.0	7.7	0.9		0.7	3.0	
Delay (s)		52.5	49.9	53.3	54.6	52.9	55.0	4.8		10.4	15.8	
Level of Service		D	D	D	D	D	D	A		B	B	
Approach Delay (s)		50.9			54.0			11.6			15.5	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	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)	11.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1543
v/c Ratio	0.38	0.78	0.78	0.67	0.03	0.71	0.84	0.63
Control Delay	56.1	73.0	73.8	10.7	6.7	14.2	44.5	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	56.1	73.0	73.8	10.7	6.7	14.2	44.5	13.7
Queue Length 50th (ft)	12	127	123	0	2	384	204	361
Queue Length 95th (ft)	42	#232	#228	92	m3	483	#350	551
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	229	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	1	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	193
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.03	0.72	0.77	0.68

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1412	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3536	
Flt Permitted		0.35		0.74	0.72	1.00	0.13	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	248	3406		178	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1535	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1543	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	159	1612		437	2286	
v/s Ratio Prot							0.00	0.35		c0.17	0.44	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.02			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.67	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.2	25.6		32.1	13.3	
Progression Factor		1.00		1.00	1.00	1.00	0.68	0.46		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.5		14.2	1.6	
Delay (s)		61.3		65.0	65.3	44.5	11.1	14.2		46.3	14.9	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.3			53.9			14.1			21.0	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	123	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	134	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1541	1586	382	1578	1593	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1543	1590	332	1582	1598	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			88			0	57	89	100	100	63
cM capacity (veh/h)	1119			1121			43	71	679	38	70	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	134	396	46	67	105	241
Volume Left	248	0	134	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	43	195	654
Volume to Capacity	0.22	0.26	0.12	0.23	0.03	1.57	0.54	0.37
Queue Length 95th (ft)	21	0	10	0	0	170	71	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	494.1	43.5	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		2.0			219.2		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	26.7		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	411	104	14	0	21	138	7	104
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	447	113	15	0	23	150	8	113
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	560			329			998	1051	326	1002	998	503
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	560			329			998	1051	326	1002	998	503
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			91	100	97	25	97	80
cM capacity (veh/h)	1011			1230			163	209	716	201	224	568

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	560	38	271
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	113
cSH	1011	1700	1230	1700	408	312
Volume to Capacity	0.07	0.19	0.01	0.33	0.09	0.87
Queue Length 95th (ft)	6	0	0	0	8	195
Control Delay (s)	8.8	0.0	7.9	0.0	17.8	60.2
Lane LOS	A		A		C	F
Approach Delay (s)	1.6		0.1		17.8	60.2
Approach LOS					C	F

Intersection Summary			
Average Delay	13.8		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Melanie Earnest opened 2/10/2015 3:33:51 PM 0 Melanie Earnest closed 2/10/2015 3:38:58 PM 307

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

2/11/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1248	1524
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.24	1.13
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	122.6	82.4
Queue Delay	0.8	0.8	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.5	247.2	0.8	54.0	82.4	77.6	122.6	83.4
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1500	~759
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#90	m266
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1345
Starvation Cap Reductn	0	0	0	0	0	0	0	282
Spillback Cap Reductn	17	17	0	0	0	282	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.44	1.50	0.14	0.20	0.89	1.17	1.24	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1141	1402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1551	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1240	1524
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1248	1223
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.80	0.77
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.20	1.15
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			91.4	70.3
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			95.0	129.7
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			114.1	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	158.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	547	2691
v/c Ratio	1.43	0.64	0.97	0.74	1.30	1.23
Control Delay	287.2	24.1	32.1	11.3	176.1	129.9
Queue Delay	0.0	27.2	41.7	50.7	0.8	0.5
Total Delay	287.2	51.3	73.8	62.0	176.9	130.4
Queue Length 50th (ft)	~210	6	952	298	~644	~1724
Queue Length 95th (ft)	#368	83	m785	m196	m#468	m#1264
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1180	1099	421	2182
Starvation Cap Reductn	0	0	330	374	32	345
Spillback Cap Reductn	0	79	0	0	0	300
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.96	1.35	1.12	1.41	1.46

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	503	2476	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	107	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	547	2691	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	97	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	718	547	2691	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						97.0	95.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						96.5	100.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.64	0.67	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1138	1002	421	2182	
v/s Ratio Prot								c0.65		c0.27	0.76	
v/s Ratio Perm	c0.09	0.01							0.48	c0.60		
v/c Ratio	1.43	0.15						1.01	0.72	1.30	1.23	
Uniform Delay, d1	70.2	66.4						26.8	16.0	51.4	28.8	
Progression Factor	1.00	1.00						1.18	1.07	1.04	0.81	
Incremental Delay, d2	240.8	0.7						10.5	0.2	136.3	105.4	
Delay (s)	311.0	67.1						42.1	17.2	189.9	128.7	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			31.8			139.0	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	103.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2013
v/c Ratio	1.20	1.20	1.10	0.43	0.61	1.18
Control Delay	143.8	144.4	111.9	35.4	7.3	110.7
Queue Delay	3.8	3.8	0.2	0.0	4.3	0.6
Total Delay	147.6	148.2	112.1	35.4	11.6	111.2
Queue Length 50th (ft)	~937	~940	~729	36	262	~1223
Queue Length 95th (ft)	#1202	#1204	#972	m37	m236	#1365
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	627	627	591	208	2111	1706
Starvation Cap Reductn	0	0	0	0	736	104
Spillback Cap Reductn	230	230	16	0	462	269
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.89	1.89	1.13	0.41	0.93	1.40

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1598	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3466	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	101	3539			3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1737	276
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2004	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				53.1	53.1	53.1	80.4	85.9			70.5	
Effective Green, g (s)				56.1	56.1	56.1	86.4	88.9			73.5	
Actuated g/C Ratio				0.37	0.37	0.37	0.58	0.59			0.49	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				628	628	592	201	2097			1698	
v/s Ratio Prot							0.04	c0.36			c0.58	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.19	1.20	1.10	0.43	0.61			1.18	
Uniform Delay, d1				47.0	47.0	47.0	61.3	19.5			38.2	
Progression Factor				1.00	1.00	1.00	0.79	0.37			0.67	
Incremental Delay, d2				102.5	103.1	67.8	0.4	0.0			85.0	
Delay (s)				149.4	150.0	114.8	48.8	7.2			110.5	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			139.1			9.8			110.5	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	96.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	171.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	233	262	207	99	1836	15	1558
v/c Ratio	0.35	0.87	0.79	0.88	0.51	0.58	0.85	0.11	0.79
Control Delay	64.1	67.3	78.2	89.0	16.4	32.7	24.5	6.9	27.4
Queue Delay	0.0	7.6	65.4	61.5	0.3	0.0	47.0	0.0	3.2
Total Delay	64.1	74.9	143.6	150.5	16.7	32.7	71.5	6.9	30.6
Queue Length 50th (ft)	72	149	231	265	26	31	769	4	758
Queue Length 95th (ft)	128	#297	209	233	15	m70	m845	m6	m843
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	239	293	302	304	410	171	2155	138	1982
Starvation Cap Reductn	0	0	0	0	0	0	72	0	188
Spillback Cap Reductn	0	26	158	160	26	0	520	0	319
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.92	1.62	1.82	0.54	0.58	1.12	0.11	0.94

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	280	17	124	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1694	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.06	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1694	1583	111	3507		89	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	467	28	207	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	83	0	0	147	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	163	233	262	60	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		16.0	16.0	23.4	23.4	23.4	93.1	86.4		83.9	81.7	
Effective Green, g (s)		19.0	19.0	26.4	26.4	24.4	95.1	89.4		87.9	84.7	
Actuated g/C Ratio		0.13	0.13	0.18	0.18	0.16	0.63	0.60		0.59	0.56	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		227	200	295	298	257	168	2090		99	1980	
v/s Ratio Prot		0.04		0.14	c0.15		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.04	0.34			0.08		
v/c Ratio		0.35	0.82	0.79	0.88	0.23	0.59	0.88		0.15	0.79	
Uniform Delay, d1		59.9	63.8	59.1	60.2	54.6	25.4	25.7		26.8	25.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.29	0.86		0.54	0.95	
Incremental Delay, d2		0.9	21.9	13.1	24.1	0.5	3.2	3.5		0.5	2.4	
Delay (s)		60.8	85.7	72.3	84.4	55.1	35.9	25.6		15.0	26.7	
Level of Service		E	F	E	F	E	D	C		B	C	
Approach Delay (s)		79.6			71.7			26.2			26.6	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1899	353	1130
v/c Ratio	1.25	0.89	1.00	1.15	0.06	1.27	1.26	0.58
Control Delay	242.4	92.7	117.1	110.7	15.1	152.3	181.3	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Total Delay	242.4	92.7	117.1	110.7	15.1	152.3	181.3	26.0
Queue Length 50th (ft)	~85	221	251	~486	3	~1216	~380	345
Queue Length 95th (ft)	#201	#384	#445	#734	m7	#1343	#588	476
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	246	241	587	237	1499	280	1961
Starvation Cap Reductn	0	0	0	0	0	15	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	648
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.89	1.00	1.15	0.06	1.28	1.26	0.86

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1353	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3420		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	353	3420		112	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1471	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	276	0	18	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	398	15	1881	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		27.5	27.5	27.5	64.0	62.0		84.0	77.5	
Effective Green, g (s)		23.5		29.5	29.5	29.5	68.0	65.0		86.0	80.5	
Actuated g/C Ratio		0.16		0.20	0.20	0.20	0.45	0.43		0.57	0.54	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		246	241	311	197	1482		279	1897	
v/s Ratio Prot							0.00	0.55		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	0.20	c0.25	0.03			c0.56		
v/c Ratio		1.28		0.89	1.00	1.28	0.08	1.27		1.27	0.60	
Uniform Delay, d1		63.2		58.6	60.2	60.2	23.5	42.5		51.7	23.7	
Progression Factor		1.00		1.00	1.00	1.00	1.06	0.73		1.00	1.00	
Incremental Delay, d2		215.1		29.3	58.0	147.9	0.1	124.4		144.7	1.4	
Delay (s)		278.3		87.9	118.2	208.1	24.9	155.5		196.5	25.0	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			165.9			154.4			65.9	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	130.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	105.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	28	165	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	30	179	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2077	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			474			1973	2007	420	2133	2027	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	13	69	100	100	30
cM capacity (veh/h)	833			992			9	35	577	4	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	210	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	179	287
cSH	833	1700	992	1700	1700	9	177	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.87	1.18	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	279	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	178.8	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			3132.0		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	420.0		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	448	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	487	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			502			1594	1755	495	1628	1635	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			502			1594	1755	495	1628	1635	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			57	89	99	0	90	53
cM capacity (veh/h)	737			1062			36	67	575	62	79	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	502	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1062	1700	61	108
Volume to Capacity	0.19	0.30	0.02	0.55	0.50	3.34
Queue Length 95th (ft)	18	0	2	0	49	Err
Control Delay (s)	11.1	0.0	8.5	0.0	110.5	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.5		0.2		110.5	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1817.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	659	105	24	38	1016	1090	646
v/c Ratio	1.50	1.51	0.20	0.15	0.23	0.96	1.34	0.63
Control Delay	269.0	276.2	1.1	40.5	13.7	44.0	171.2	1.9
Queue Delay	0.6	0.6	0.0	0.0	0.0	43.2	0.0	2.2
Total Delay	269.5	276.7	1.1	40.5	13.7	87.3	171.2	4.1
Queue Length 50th (ft)	~734	~748	0	12	12	707	~1117	0
Queue Length 95th (ft)	#975	#989	2	39	27	#1034	m#1218	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	160	167	1063	813	1025
Starvation Cap Reductn	0	0	0	0	0	0	0	240
Spillback Cap Reductn	25	25	0	0	0	203	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.59	1.61	0.20	0.15	0.23	1.18	1.34	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1197	7	97	7	7	7	35	935	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.82	1.00
Satd. Flow (perm)	1681	1686	1583		1750		120	1863			1531	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	8	105	8	8	8	38	1016	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	178
Lane Group Flow (vph)	650	659	27	0	17	0	38	1016	0	0	1090	468
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		8.5		67.5	67.5			62.5	62.5
Effective Green, g (s)	31.0	31.0	31.0		10.5		67.0	71.5			65.5	65.5
Actuated g/C Ratio	0.26	0.26	0.26		0.09		0.56	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		153		135	1110			835	864
v/s Ratio Prot	0.39	c0.39			c0.01		0.01	c0.55				
v/s Ratio Perm			0.02				0.14				c0.71	0.30
v/c Ratio	1.50	1.51	0.07		0.11		0.28	0.92			1.31	0.54
Uniform Delay, d1	44.5	44.5	33.6		50.4		26.3	21.6			27.2	17.6
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.23	0.11
Incremental Delay, d2	235.8	243.3	0.1		0.2		1.1	11.5			140.6	0.2
Delay (s)	280.3	287.8	33.7		50.7		27.4	33.1			146.9	2.2
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		265.5			50.7			32.9			93.1	
Approach LOS		F			D			C			F	

Intersection Summary			
HCM 2000 Control Delay	135.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	204	161	1265	1060	597	1674
v/c Ratio	1.39	0.53	1.15	0.96	1.46	0.95
Control Delay	251.3	12.6	93.9	21.2	231.4	32.7
Queue Delay	0.0	14.0	1.2	43.0	0.0	28.5
Total Delay	251.3	26.6	95.1	64.2	231.4	61.1
Queue Length 50th (ft)	~221	0	~1167	481	~567	~736
Queue Length 95th (ft)	#384	55	m525	m181	m#499	m#619
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	147	303	1098	1103	409	1763
Starvation Cap Reductn	0	0	244	262	0	69
Spillback Cap Reductn	0	119	12	0	0	188
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.39	0.88	1.48	1.26	1.46	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.

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	0	56	0	0	0	0	821	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1619						1691	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1619						1691	1504	182	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	0	61	0	0	0	0	892	1433	597	1674	0
RTOR Reduction (vph)	0	147	0	0	0	0	0	14	138	0	0	0
Lane Group Flow (vph)	204	14	0	0	0	0	0	1251	922	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	8.5	8.5						74.0	71.5	62.5	55.0	
Effective Green, g (s)	10.5	10.5						73.5	77.0	64.5	58.0	
Actuated g/C Ratio	0.09	0.09						0.61	0.64	0.54	0.48	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	147	141						1035	965	408	1710	
v/s Ratio Prot								c0.74		c0.29	0.47	
v/s Ratio Perm	c0.12	0.01							c0.61	c0.50		
v/c Ratio	1.39	0.10						1.21	0.96	1.46	0.98	
Uniform Delay, d1	54.8	50.4						23.2	19.9	37.7	30.4	
Progression Factor	1.00	1.00						1.11	1.39	0.64	0.85	
Incremental Delay, d2	210.8	0.2						95.0	2.9	209.7	10.6	
Delay (s)	265.5	50.6						120.8	30.6	233.7	36.5	
Level of Service	F	D						F	C	F	D	
Approach Delay (s)		170.7			0.0			79.7			88.3	
Approach LOS		F			A			E			F	

Intersection Summary			
HCM 2000 Control Delay	90.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.42		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	566	79	1117	1784
v/c Ratio	0.57	0.58	1.03	0.33	0.53	1.07
Control Delay	36.7	36.8	83.9	41.8	14.8	60.3
Queue Delay	0.1	0.1	0.0	0.0	2.8	11.7
Total Delay	36.8	36.8	83.9	41.8	17.6	72.0
Queue Length 50th (ft)	221	222	~451	32	290	~790
Queue Length 95th (ft)	329	331	#696	m26	m223	#931
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	587	587	552	253	2152	1661
Starvation Cap Reductn	0	0	0	0	890	37
Spillback Cap Reductn	7	7	0	0	0	370
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.58	1.03	0.31	0.89	1.38

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	521	73	1028	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	131	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	566	79	1117	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	566	79	1117	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				38.9	38.9	38.9	63.1	69.1			54.0	
Effective Green, g (s)				41.9	41.9	41.9	69.1	72.1			57.0	
Actuated g/C Ratio				0.35	0.35	0.35	0.58	0.60			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				586	586	552	240	2126			1654	
v/s Ratio Prot							0.03	c0.32			c0.51	
v/s Ratio Perm				0.20	0.20	c0.36	0.16					
v/c Ratio				0.58	0.58	1.03	0.33	0.53			1.07	
Uniform Delay, d1				31.8	31.8	39.0	46.8	14.0			31.5	
Progression Factor				1.00	1.00	1.00	1.49	1.04			0.54	
Incremental Delay, d2				1.4	1.4	44.9	0.1	0.0			41.3	
Delay (s)				33.2	33.2	84.0	69.6	14.6			58.4	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			56.3			18.2			58.4	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	120.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	91	37	53	75	228	1455	104	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.28	0.75	0.62	0.38	0.81
Control Delay	57.7	2.8	54.9	57.6	2.7	50.5	4.4	8.4	16.8
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	2.3
Total Delay	57.7	2.9	54.9	57.6	2.7	50.5	4.5	8.4	19.1
Queue Length 50th (ft)	43	0	28	41	0	118	148	8	628
Queue Length 95th (ft)	87	0	66	86	0	m174	m162	m14	215
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	289	154	156	265	334	2347	277	2151
Starvation Cap Reductn	0	0	0	0	0	0	162	0	35
Spillback Cap Reductn	0	12	0	0	2	0	58	0	267
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.29	0.68	0.67	0.38	0.93

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	10	84	69	14	69	210	1073	266	96	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583	1681	1708	1583	1770	3434		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.13	1.00	
Satd. Flow (perm)		1790	1583	1681	1708	1583	101	3434		247	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	11	91	75	15	75	228	1166	289	104	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	18	0	0	5	0
Lane Group Flow (vph)	0	58	8	37	53	5	228	1437	0	104	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	77.2		75.8	69.4	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	80.2		79.8	72.4	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.67		0.66	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	301	2295		270	2111	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.42		0.03	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.23		
v/c Ratio		0.35	0.06	0.28	0.40	0.05	0.76	0.63		0.39	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	53.0	36.6	11.4		9.4	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.31	0.31		1.00	0.71	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.2	7.6	0.9		0.7	3.0	
Delay (s)		52.5	49.9	53.3	54.6	53.2	55.5	4.5		10.0	16.3	
Level of Service		D	D	D	D	D	E	A		B	B	
Approach Delay (s)		50.9			53.7			11.4			16.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	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)	11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1543
v/c Ratio	0.38	0.79	0.79	0.61	0.03	0.75	0.86	0.62
Control Delay	55.8	69.4	70.2	10.6	5.7	14.7	50.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.4	70.2	10.6	5.7	14.7	50.9	13.4
Queue Length 50th (ft)	12	128	123	33	2	460	216	354
Queue Length 95th (ft)	42	#240	#234	109	m3	#543	#368	543
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	232	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	5	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	206
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.03	0.75	0.79	0.68

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1412	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3536	
Flt Permitted		0.36		0.74	0.72	1.00	0.13	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	251	3413		149	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1535	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1543	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	161	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.44	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.67	
Uniform Delay, d1		54.2		48.7	48.6	44.0	15.9	26.0		34.8	13.0	
Progression Factor		1.00		0.90	0.90	1.06	0.59	0.44		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.5	0.4	0.1	3.0		17.6	1.6	
Delay (s)		61.4		62.0	62.3	47.1	9.5	14.4		52.5	14.6	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.4			54.7			14.4			21.9	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	123	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	134	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1541	1586	382	1488	1593	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			389			1543	1590	334	1488	1598	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			88			100	100	84	100	100	63
cM capacity (veh/h)	1119			1121			43	71	679	63	70	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	134	396	46	105	241
Volume Left	248	0	134	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1119	1700	1121	1700	1700	679	654
Volume to Capacity	0.22	0.26	0.12	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	10	0	0	14	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		2.0			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	560	15	23	158	113
v/c Ratio	0.18	0.24	0.01	0.46	0.11	0.02	0.73	0.09
Control Delay	2.1	3.5	4.7	11.8	41.5	1.0	66.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	3.5	4.7	11.8	41.5	1.0	66.0	1.6
Queue Length 50th (ft)	4	14	1	182	10	0	118	0
Queue Length 95th (ft)	m11	m144	6	331	29	4	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	596	1386	791	1215	222	1074	349	1211
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	0.18	0.24	0.01	0.46	0.07	0.02	0.45	0.09

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	411	104	14	0	21	138	7	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1806			1770	1583		1778	1583
Flt Permitted	0.36	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	677	1856		1046	1806			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	447	113	15	0	23	150	8	113
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	32
Lane Group Flow (vph)	105	329	0	8	554	0	0	15	15	0	158	81
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	583	1337		718	1210			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.31							
v/s Ratio Perm	0.13			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.46			0.11	0.01		0.73	0.07
Uniform Delay, d1	4.9	5.7		6.2	9.4			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.3			0.3	0.0		11.5	0.1
Delay (s)	1.9	3.4		6.2	10.7			43.4	6.6		59.4	5.1
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.6			21.1			36.7	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1248	1524
v/c Ratio	1.36	1.41	0.14	0.20	0.89	0.92	1.24	1.13
Control Delay	227.7	246.4	0.8	54.0	82.4	31.6	122.6	82.4
Queue Delay	0.8	0.8	0.0	0.0	0.0	45.9	0.0	1.0
Total Delay	228.5	247.2	0.8	54.0	82.4	77.6	122.6	83.4
Queue Length 50th (ft)	~512	~543	0	15	64	913	~1500	~759
Queue Length 95th (ft)	#732	#767	0	47	#191	#1385	m#90	m266
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	280	281	378	118	136	1309	1003	1345
Starvation Cap Reductn	0	0	0	0	0	0	0	282
Spillback Cap Reductn	17	17	0	0	0	282	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.44	1.50	0.14	0.20	0.89	1.17	1.24	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1141	1402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.83	1.00
Satd. Flow (perm)	1681	1688	1583		1750		79	1861			1551	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1240	1524
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1248	1223
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	23.0	23.0	23.0		7.5		103.5	103.5			97.5	97.5
Effective Green, g (s)	25.0	25.0	25.0		9.5		101.0	105.5			100.5	100.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.67	0.67
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	280	281	263		110		132	1308			1039	1060
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.80	0.77
v/c Ratio	1.36	1.41	0.03		0.15		0.92	0.92			1.20	1.15
Uniform Delay, d1	62.5	62.5	52.4		66.4		48.8	18.7			24.8	24.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.40
Incremental Delay, d2	182.3	202.6	0.1		0.6		53.1	10.7			91.4	70.3
Delay (s)	244.8	265.1	52.4		67.1		102.0	29.5			95.0	129.7
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		242.4			67.1			36.1			114.1	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	114.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	158.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	547	2691
v/c Ratio	1.43	0.64	0.97	0.74	1.30	1.23
Control Delay	287.2	24.1	32.1	11.3	173.9	129.6
Queue Delay	0.0	27.2	41.7	50.7	0.9	0.4
Total Delay	287.2	51.3	73.8	62.0	174.8	130.0
Queue Length 50th (ft)	~210	6	952	298	~645	~1725
Queue Length 95th (ft)	#368	83	m785	m196	m#468	m#1264
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1180	1099	421	2182
Starvation Cap Reductn	0	0	330	374	36	304
Spillback Cap Reductn	0	79	20	0	0	300
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.96	1.35	1.12	1.42	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	503	2476	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	107	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	547	2691	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	97	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	718	547	2691	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						97.0	95.0	99.0	89.5	
Effective Green, g (s)	9.5	9.5						96.5	100.0	101.0	92.5	
Actuated g/C Ratio	0.06	0.06						0.64	0.67	0.67	0.62	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1138	1002	421	2182	
v/s Ratio Prot								c0.65		c0.27	0.76	
v/s Ratio Perm	c0.09	0.01							0.48	c0.60		
v/c Ratio	1.43	0.15						1.01	0.72	1.30	1.23	
Uniform Delay, d1	70.2	66.4						26.8	16.0	51.4	28.8	
Progression Factor	1.00	1.00						1.18	1.07	0.96	0.79	
Incremental Delay, d2	240.8	0.7						10.5	0.2	136.3	105.4	
Delay (s)	311.0	67.1						42.1	17.2	185.8	128.2	
Level of Service	F	E						D	B	F	F	
Approach Delay (s)		190.7			0.0			31.8			137.9	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	102.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2013
v/c Ratio	1.20	1.20	1.10	0.43	0.61	1.18
Control Delay	143.8	144.4	111.9	40.3	9.9	111.2
Queue Delay	2.6	2.6	0.1	0.0	8.0	0.6
Total Delay	146.4	147.0	112.0	40.3	17.9	111.8
Queue Length 50th (ft)	~937	~940	~729	37	320	~1224
Queue Length 95th (ft)	#1202	#1204	#972	m37	m290	#1365
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	627	627	591	208	2111	1706
Starvation Cap Reductn	0	0	0	0	790	104
Spillback Cap Reductn	174	174	10	0	463	274
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.66	1.66	1.12	0.41	0.97	1.41

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1598	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3466	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	101	3539			3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1737	276
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2004	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				53.1	53.1	53.1	80.4	85.9			70.5	
Effective Green, g (s)				56.1	56.1	56.1	86.4	88.9			73.5	
Actuated g/C Ratio				0.37	0.37	0.37	0.58	0.59			0.49	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				628	628	592	201	2097			1698	
v/s Ratio Prot							0.04	c0.36			c0.58	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.19	1.20	1.10	0.43	0.61			1.18	
Uniform Delay, d1				47.0	47.0	47.0	61.3	19.5			38.2	
Progression Factor				1.00	1.00	1.00	0.91	0.50			0.69	
Incremental Delay, d2				102.5	103.1	67.8	0.4	0.0			85.0	
Delay (s)				149.4	150.0	114.8	55.9	9.7			111.2	
Level of Service				F	F	F	E	A			F	
Approach Delay (s)		0.0			139.1			12.6			111.2	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	97.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	171.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	247	233	262	345	99	1836	15	1558
v/c Ratio	0.36	0.89	0.77	0.86	0.85	0.59	0.85	0.11	0.79
Control Delay	65.3	71.6	75.7	84.7	50.1	34.3	25.0	6.2	25.9
Queue Delay	0.0	11.7	68.0	65.1	3.2	0.0	47.0	0.0	2.5
Total Delay	65.3	83.3	143.7	149.8	53.3	34.3	72.0	6.2	28.4
Queue Length 50th (ft)	73	152	229	263	176	30	795	4	735
Queue Length 95th (ft)	129	#311	207	231	120	m70	m873	m7	m780
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	227	283	313	316	414	169	2154	138	1983
Starvation Cap Reductn	0	0	0	0	0	0	72	0	100
Spillback Cap Reductn	0	26	181	183	25	0	547	0	295
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.96	1.77	1.97	0.89	0.59	1.14	0.11	0.92

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	227	280	17	207	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1694	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.06	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1694	1583	111	3507		89	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	247	467	28	345	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	83	0	0	141	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	164	233	262	204	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		15.4	15.4	24.1	24.1	24.1	93.0	86.3		83.9	81.7	
Effective Green, g (s)		18.4	18.4	27.1	27.1	25.1	95.0	89.3		87.9	84.7	
Actuated g/C Ratio		0.12	0.12	0.18	0.18	0.17	0.63	0.60		0.59	0.56	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		220	194	303	306	264	167	2087		99	1980	
v/s Ratio Prot		0.04		0.14	c0.15		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.13	0.34			0.08		
v/c Ratio		0.36	0.84	0.77	0.86	0.77	0.59	0.88		0.15	0.79	
Uniform Delay, d1		60.4	64.4	58.5	59.6	59.7	25.4	25.7		26.9	25.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.36	0.88		0.49	0.90	
Incremental Delay, d2		1.0	26.9	11.1	20.3	13.2	3.4	3.6		0.5	2.3	
Delay (s)		61.4	91.3	69.6	79.8	72.9	37.9	26.2		13.6	25.3	
Level of Service		E	F	E	E	E	D	C		B	C	
Approach Delay (s)		84.0			74.2			26.8			25.2	
Approach LOS		F			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	1989	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.25	1.26	0.55
Control Delay	242.4	120.1	158.1	80.1	12.4	142.6	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0
Total Delay	242.4	120.1	158.1	80.1	12.4	142.6	181.6	22.1
Queue Length 50th (ft)	~85	~237	~295	~350	3	~1270	~380	321
Queue Length 95th (ft)	#201	m#406	m#469	#587	m6	#1390	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1592	280	2055
Starvation Cap Reductn	0	0	0	0	0	30	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	607
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.27	1.26	0.78

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1436	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3425		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3425		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1561	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	275	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	309	15	1972	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1575		279	1991	
v/s Ratio Prot							0.00	0.58		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.25		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.85	0.98	0.70		1.00	1.00	
Incremental Delay, d2		215.1		64.1	108.2	98.4	0.1	116.5		144.7	1.2	
Delay (s)		278.3		121.9	166.1	151.2	20.8	144.8		197.2	22.2	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			148.5			143.8			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	121.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	193	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	210	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.75	0.75	0.92	0.75	0.75	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	499			481			1829	1870	428	1765	1894	457
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	64	100	100	33
cM capacity (veh/h)	760			993			10	34	576	22	32	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	210	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	210	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.36	0.67
Queue Length 95th (ft)	36	0	7	0	0	41	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	14.8	28.5
Lane LOS	B		A			B	D
Approach Delay (s)	3.7		0.9			14.8	28.5
Approach LOS						B	D

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	174	502	23	928	23	8	181	180
v/c Ratio	0.50	0.36	0.04	0.75	0.10	0.03	0.83	0.54
Control Delay	5.1	3.7	4.9	21.0	52.0	0.1	90.2	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	3.7	4.9	21.0	52.0	0.1	90.2	34.0
Queue Length 50th (ft)	13	71	5	543	19	0	172	80
Queue Length 95th (ft)	m14	m84	12	854	47	0	#259	158
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	391	1378	655	1236	278	364	258	377
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.36	0.04	0.75	0.08	0.02	0.70	0.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	448	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1854		1770	1786			1804	1583		1778	1583
Flt Permitted	0.18	1.00		0.46	1.00			0.77	1.00		0.72	1.00
Satd. Flow (perm)	327	1854		859	1786			1441	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	487	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	7	0	0	0	7	0	0	75
Lane Group Flow (vph)	174	501	0	23	921	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.6	109.8		106.0	103.2			24.4	24.4		24.4	24.4
Effective Green, g (s)	116.6	109.8		106.0	103.2			24.4	24.4		24.4	24.4
Actuated g/C Ratio	0.78	0.73		0.71	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	344	1357		624	1228			234	257		217	257
v/s Ratio Prot	c0.03	0.27		0.00	c0.52							
v/s Ratio Perm	0.36			0.03				0.02	0.00		c0.14	0.07
v/c Ratio	0.51	0.37		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.3	7.4		6.6	15.1			53.4	52.6		60.8	56.3
Progression Factor	0.60	0.42		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.4		0.0	4.2			0.2	0.0		23.2	1.1
Delay (s)	9.8	3.5		6.6	19.3			53.6	52.6		84.0	57.4
Level of Service	A	A		A	B			D	D		F	E
Approach Delay (s)		5.1			19.0			53.4			70.7	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	650	659	105	24	38	1016	1090	646
v/c Ratio	1.29	1.30	0.18	0.15	0.17	0.54	0.66	0.58
Control Delay	180.4	186.5	0.9	40.5	14.3	20.0	1.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5	1.6	5.0
Total Delay	180.4	186.5	0.9	40.5	14.3	20.5	3.0	7.1
Queue Length 50th (ft)	~674	~689	0	12	13	263	14	0
Queue Length 95th (ft)	#915	#930	2	39	30	324	m16	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	504	505	596	160	229	1872	1640	1105
Starvation Cap Reductn	0	0	0	0	0	0	352	383
Spillback Cap Reductn	0	0	0	0	0	391	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.29	1.30	0.18	0.15	0.17	0.69	0.85	0.89

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1197	7	97	7	7	7	35	935	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.14	1.00			0.95	1.00
Satd. Flow (perm)	1681	1686	1583		1750		258	3539			3348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	8	105	8	8	8	38	1016	0	8	1082	646
RTOR Reduction (vph)	0	0	74	0	7	0	0	0	0	0	0	320
Lane Group Flow (vph)	650	659	32	0	17	0	38	1016	0	0	1090	326
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	34.0	34.0	34.0		8.5		62.5	62.5			57.5	57.5
Effective Green, g (s)	36.0	36.0	36.0		10.5		62.0	66.5			60.5	60.5
Actuated g/C Ratio	0.30	0.30	0.30		0.09		0.52	0.55			0.50	0.50
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	504	505	474		153		196	1961			1687	798
v/s Ratio Prot	0.39	c0.39			c0.01		0.01	c0.29				
v/s Ratio Perm			0.02				0.09				c0.33	0.21
v/c Ratio	1.29	1.30	0.07		0.11		0.19	0.52			0.65	0.41
Uniform Delay, d1	42.0	42.0	30.0		50.4		17.6	16.7			21.9	18.6
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	1.15
Incremental Delay, d2	144.7	151.1	0.1		0.2		0.5	0.2			0.1	0.0
Delay (s)	186.7	193.1	30.1		50.7		18.1	16.9			1.1	21.4
Level of Service	F	F	C		D		B	B			A	C
Approach Delay (s)		178.0			50.7			16.9			8.7	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	67.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	204	161	1265	1060	597	1674
v/c Ratio	1.39	0.53	0.66	1.09	1.14	1.04
Control Delay	251.3	12.6	11.4	65.9	94.5	54.5
Queue Delay	0.0	0.0	30.3	4.9	1.0	13.3
Total Delay	251.3	12.6	41.7	70.7	95.4	67.8
Queue Length 50th (ft)	~221	0	225	~863	~507	~781
Queue Length 95th (ft)	#384	55	m203	m#451	m#488	m#774
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	147	303	1906	973	522	1616
Starvation Cap Reductn	0	0	705	98	58	52
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.39	0.53	1.05	1.21	1.29	1.07

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	0	56	0	0	0	0	821	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.94						0.96	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1619						3240	1441	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.14	1.00	
Satd. Flow (perm)	1681	1619						3240	1441	263	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	0	61	0	0	0	0	892	1433	597	1674	0
RTOR Reduction (vph)	0	147	0	0	0	0	0	37	141	0	0	0
Lane Group Flow (vph)	204	14	0	0	0	0	0	1228	919	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	8.5	8.5						66.3	63.8	57.5	50.0	
Effective Green, g (s)	10.5	10.5						65.8	69.3	59.5	53.0	
Actuated g/C Ratio	0.09	0.09						0.55	0.58	0.50	0.44	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	147	141						1776	832	522	1563	
v/s Ratio Prot								0.38		c0.30	0.47	
v/s Ratio Perm	c0.12	0.01							c0.64	c0.27		
v/c Ratio	1.39	0.10						0.69	1.10	1.14	1.07	
Uniform Delay, d1	54.8	50.4						19.7	25.4	35.1	33.5	
Progression Factor	1.00	1.00						0.67	1.05	0.79	0.85	
Incremental Delay, d2	210.8	0.2						0.3	53.2	67.0	38.6	
Delay (s)	265.5	50.6						13.4	79.9	94.9	67.2	
Level of Service	F	D						B	E	F	E	
Approach Delay (s)		170.7			0.0			43.8			74.5	
Approach LOS		F			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	67.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	566	79	1117	1784
v/c Ratio	0.57	0.58	1.03	0.33	0.53	1.07
Control Delay	36.7	36.8	83.9	38.9	12.0	60.3
Queue Delay	0.3	0.3	0.0	0.0	1.8	11.8
Total Delay	37.0	37.1	83.9	38.9	13.7	72.2
Queue Length 50th (ft)	221	222	~451	29	221	~790
Queue Length 95th (ft)	329	331	#696	m56	m239	#931
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	587	587	552	253	2152	1661
Starvation Cap Reductn	0	0	0	0	818	37
Spillback Cap Reductn	37	37	0	0	0	416
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.61	1.03	0.31	0.84	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	521	73	1028	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	131	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	566	79	1117	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	337	338	566	79	1117	0	0	1777	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				38.9	38.9	38.9	63.1	69.1			54.0	
Effective Green, g (s)				41.9	41.9	41.9	69.1	72.1			57.0	
Actuated g/C Ratio				0.35	0.35	0.35	0.58	0.60			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				586	586	552	240	2126			1654	
v/s Ratio Prot							0.03	c0.32			c0.51	
v/s Ratio Perm				0.20	0.20	c0.36	0.16					
v/c Ratio				0.58	0.58	1.03	0.33	0.53			1.07	
Uniform Delay, d1				31.8	31.8	39.0	46.8	14.0			31.5	
Progression Factor				1.00	1.00	1.00	1.30	0.81			0.54	
Incremental Delay, d2				1.4	1.4	44.9	0.6	0.1			41.3	
Delay (s)				33.2	33.2	84.0	61.2	11.5			58.4	
Level of Service				C	C	F	E	B			E	
Approach Delay (s)		0.0			56.3			14.7			58.4	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	45.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	91	37	53	75	228	1455	104	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.28	0.75	0.62	0.38	0.81
Control Delay	57.7	2.8	54.9	57.6	2.7	49.8	4.5	8.7	16.4
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	2.3
Total Delay	57.7	2.9	54.9	57.6	2.7	49.8	4.6	8.7	18.7
Queue Length 50th (ft)	43	0	28	41	0	118	150	9	628
Queue Length 95th (ft)	87	0	66	86	0	m174	m163	m19	234
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	164	289	154	156	265	334	2347	277	2151
Starvation Cap Reductn	0	0	0	0	0	0	162	0	35
Spillback Cap Reductn	0	12	0	0	2	0	59	0	267
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.29	0.68	0.67	0.38	0.93

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	10	84	69	14	69	210	1073	266	96	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1790	1583	1681	1708	1583	1770	3434		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.13	1.00	
Satd. Flow (perm)		1790	1583	1681	1708	1583	101	3434		247	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	11	91	75	15	75	228	1166	289	104	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	18	0	0	5	0
Lane Group Flow (vph)	0	58	8	37	53	5	228	1437	0	104	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	77.2		75.8	69.4	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	80.2		79.8	72.4	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.67		0.66	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		164	145	131	133	97	301	2295		270	2111	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.42		0.03	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.23		
v/c Ratio		0.35	0.06	0.28	0.40	0.05	0.76	0.63		0.39	0.83	
Uniform Delay, d1		51.2	49.8	52.1	52.6	53.0	36.6	11.4		9.4	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.28	0.32		1.04	0.68	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.2	7.6	0.9		0.7	3.0	
Delay (s)		52.5	49.9	53.3	54.6	53.2	54.6	4.6		10.5	15.9	
Level of Service		D	D	D	D	D	D	A		B	B	
Approach Delay (s)		50.9			53.7			11.4			15.6	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	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)	11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1543
v/c Ratio	0.38	0.79	0.79	0.61	0.03	0.75	0.86	0.62
Control Delay	55.8	69.4	70.2	10.6	6.7	16.1	50.9	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.4	70.2	10.6	6.7	16.1	50.9	13.4
Queue Length 50th (ft)	12	128	123	33	2	452	216	354
Queue Length 95th (ft)	42	#240	#234	109	m3	#539	#368	543
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	232	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	5	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	195
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.03	0.75	0.79	0.68

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1412	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3536	
Flt Permitted		0.36		0.74	0.72	1.00	0.13	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	251	3413		149	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1535	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1543	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	161	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.44	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.67	
Uniform Delay, d1		54.2		48.7	48.6	44.0	15.9	26.0		34.8	13.0	
Progression Factor		1.00		0.90	0.90	1.06	0.69	0.49		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.5	0.4	0.1	3.0		17.6	1.6	
Delay (s)		61.4		62.0	62.3	47.1	11.2	15.8		52.5	14.6	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.4			54.7			15.8			21.9	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.5	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	123	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	134	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1541	1586	382	1488	1593	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			389			1543	1590	334	1488	1598	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			88			100	100	84	100	100	63
cM capacity (veh/h)	1119			1121			43	71	679	63	70	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	134	396	46	105	241
Volume Left	248	0	134	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1119	1700	1121	1700	1700	679	654
Volume to Capacity	0.22	0.26	0.12	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	10	0	0	14	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		2.0			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	560	15	23	158	113
v/c Ratio	0.18	0.24	0.01	0.46	0.11	0.02	0.73	0.09
Control Delay	2.1	3.5	4.7	11.8	41.5	1.0	66.0	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	3.5	4.7	11.8	41.5	1.0	66.0	1.6
Queue Length 50th (ft)	4	14	1	182	10	0	118	0
Queue Length 95th (ft)	m11	m144	6	331	29	4	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	596	1386	791	1215	222	1074	349	1211
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	0.18	0.24	0.01	0.46	0.07	0.02	0.45	0.09

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	411	104	14	0	21	138	7	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1806			1770	1583		1778	1583
Flt Permitted	0.36	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	677	1856		1046	1806			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	447	113	15	0	23	150	8	113
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	32
Lane Group Flow (vph)	105	329	0	8	554	0	0	15	15	0	158	81
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	583	1337		718	1210			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.31							
v/s Ratio Perm	0.13			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.46			0.11	0.01		0.73	0.07
Uniform Delay, d1	4.9	5.7		6.2	9.4			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.3			0.3	0.0		11.5	0.1
Delay (s)	1.9	3.4		6.2	10.7			43.4	6.6		59.4	5.1
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.6			21.1			36.7	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/26/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1248	1524
v/c Ratio	1.31	1.35	0.13	0.20	0.44	0.49	0.58	1.12
Control Delay	207.2	224.9	0.7	54.0	11.9	11.3	0.5	77.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	18.0	1.1
Total Delay	207.2	224.9	0.7	54.0	11.9	11.5	18.5	79.0
Queue Length 50th (ft)	~500	~531	0	15	34	263	8	~757
Queue Length 95th (ft)	#720	#755	0	47	55	310	m10	m264
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	291	292	388	118	275	2463	2138	1359
Starvation Cap Reductn	0	0	0	0	0	0	910	306
Spillback Cap Reductn	0	0	0	0	0	547	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.31	1.35	0.13	0.20	0.44	0.63	1.02	1.45

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1141	1402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			0.94	1.00
Satd. Flow (perm)	1681	1688	1583		1750		291	3536			3343	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1240	1524
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	324
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1248	1200
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	24.0	24.0	24.0		7.5		102.5	102.5			96.5	96.5
Effective Green, g (s)	26.0	26.0	26.0		9.5		100.0	104.5			99.5	99.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	291	292	274		110		263	2463			2217	1050
v/s Ratio Prot	0.23	c0.23			c0.01		0.02	c0.34				
v/s Ratio Perm			0.01				0.29				0.37	c0.76
v/c Ratio	1.31	1.35	0.03		0.15		0.46	0.49			0.56	1.14
Uniform Delay, d1	62.0	62.0	51.5		66.4		12.6	10.5			13.6	25.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.77
Incremental Delay, d2	160.3	179.6	0.1		0.6		1.3	0.2			0.0	65.4
Delay (s)	222.3	241.6	51.6		67.1		13.9	10.6			0.4	135.4
Level of Service	F	F	D		E		B	B			A	F
Approach Delay (s)		220.8			67.1			10.9			74.6	
Approach LOS		F			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	81.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	131.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	547	2691
v/c Ratio	1.43	0.64	0.56	0.82	1.01	1.25
Control Delay	287.2	24.1	16.8	25.1	60.2	135.7
Queue Delay	0.0	0.9	3.0	2.7	32.4	0.3
Total Delay	287.2	25.0	19.8	27.8	92.5	136.0
Queue Length 50th (ft)	~210	6	311	443	~557	~1737
Queue Length 95th (ft)	#368	83	m300	m445	m464	m#1277
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	2070	990	540	2158
Starvation Cap Reductn	0	0	785	91	143	258
Spillback Cap Reductn	0	12	91	0	0	203
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.67	0.89	0.91	1.38	1.42

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	503	2476	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						3390	1441	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.09	1.00	
Satd. Flow (perm)	1681	1590						3390	1441	176	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	547	2691	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	110	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	705	547	2691	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						88.6	86.6	98.0	88.5	
Effective Green, g (s)	9.5	9.5						88.1	91.6	100.0	91.5	
Actuated g/C Ratio	0.06	0.06						0.59	0.61	0.67	0.61	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1991	879	541	2158	
v/s Ratio Prot								0.34		c0.27	c0.76	
v/s Ratio Perm	c0.09	0.01							c0.49	0.41		
v/c Ratio	1.43	0.15						0.58	0.80	1.01	1.25	
Uniform Delay, d1	70.2	66.4						19.3	22.3	44.4	29.2	
Progression Factor	1.00	1.00						0.93	1.38	1.11	0.78	
Incremental Delay, d2	240.8	0.7						0.2	3.2	14.4	111.5	
Delay (s)	311.0	67.1						18.2	33.8	63.9	134.3	
Level of Service	F	E						B	C	E	F	
Approach Delay (s)		190.7			0.0			24.7			122.4	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	91.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	2013
v/c Ratio	1.20	1.20	1.10	0.43	0.61	1.18
Control Delay	143.8	144.4	111.9	47.7	14.2	111.2
Queue Delay	1.7	1.7	0.1	0.0	1.0	0.8
Total Delay	145.5	146.1	112.0	47.7	15.2	112.0
Queue Length 50th (ft)	~937	~940	~729	44	371	~1225
Queue Length 95th (ft)	#1202	#1204	#972	102	m387	#1365
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	627	627	591	208	2111	1706
Starvation Cap Reductn	0	0	0	0	524	104
Spillback Cap Reductn	125	125	10	0	434	362
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.49	1.50	1.12	0.41	0.81	1.50

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1598	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3466	
Flt Permitted				0.95	0.95	1.00	0.05	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	101	3539			3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1737	276
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	2004	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				53.1	53.1	53.1	80.4	85.9			70.5	
Effective Green, g (s)				56.1	56.1	56.1	86.4	88.9			73.5	
Actuated g/C Ratio				0.37	0.37	0.37	0.58	0.59			0.49	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				628	628	592	201	2097			1698	
v/s Ratio Prot							0.04	c0.36			c0.58	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.19	1.20	1.10	0.43	0.61			1.18	
Uniform Delay, d1				47.0	47.0	47.0	61.3	19.5			38.2	
Progression Factor				1.00	1.00	1.00	1.00	0.67			0.68	
Incremental Delay, d2				102.5	103.1	67.8	1.2	0.4			85.0	
Delay (s)				149.4	150.0	114.8	62.3	13.5			111.2	
Level of Service				F	F	F	E	B			F	
Approach Delay (s)		0.0			139.1			16.5			111.2	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	98.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	137.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	247	233	262	345	99	1836	15	1558
v/c Ratio	0.36	0.89	0.77	0.86	0.85	0.59	0.85	0.11	0.79
Control Delay	65.3	71.6	75.7	84.7	50.1	34.0	23.1	5.9	25.1
Queue Delay	0.0	11.7	64.9	61.9	3.2	0.0	47.0	0.0	4.1
Total Delay	65.3	83.3	140.6	146.7	53.3	34.0	70.1	5.9	29.1
Queue Length 50th (ft)	73	152	229	263	176	31	727	4	730
Queue Length 95th (ft)	129	#311	207	231	120	m70	m910	m6	m774
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	227	283	313	316	414	169	2154	138	1983
Starvation Cap Reductn	0	0	0	0	0	0	72	0	77
Spillback Cap Reductn	0	26	158	159	25	0	544	0	342
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.96	1.50	1.67	0.89	0.59	1.14	0.11	0.95

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	227	280	17	207	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1694	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.06	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1694	1583	111	3507		89	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	247	467	28	345	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	83	0	0	141	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	164	233	262	204	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		15.4	15.4	24.1	24.1	24.1	93.0	86.3		83.9	81.7	
Effective Green, g (s)		18.4	18.4	27.1	27.1	25.1	95.0	89.3		87.9	84.7	
Actuated g/C Ratio		0.12	0.12	0.18	0.18	0.17	0.63	0.60		0.59	0.56	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		220	194	303	306	264	167	2087		99	1980	
v/s Ratio Prot		0.04		0.14	c0.15		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.13	0.34			0.08		
v/c Ratio		0.36	0.84	0.77	0.86	0.77	0.59	0.88		0.15	0.79	
Uniform Delay, d1		60.4	64.4	58.5	59.6	59.7	25.4	25.7		26.9	25.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.34	0.80		0.45	0.87	
Incremental Delay, d2		1.0	26.9	11.1	20.3	13.2	3.4	3.6		0.5	2.3	
Delay (s)		61.4	91.3	69.6	79.8	72.9	37.5	24.2		12.7	24.5	
Level of Service		E	F	E	E	E	D	C		B	C	
Approach Delay (s)		84.0			74.2			24.9			24.3	
Approach LOS		F			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	1989	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.25	1.26	0.55
Control Delay	242.4	120.1	158.1	80.2	12.1	142.3	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.9
Total Delay	242.4	120.1	158.1	80.2	12.1	142.4	181.6	22.0
Queue Length 50th (ft)	~85	~237	~295	~350	3	~1268	~380	321
Queue Length 95th (ft)	#201	m#406	m#468	#586	m6	#1389	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1592	280	2055
Starvation Cap Reductn	0	0	0	0	0	30	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	584
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.27	1.26	0.77

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1436	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3425		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3425		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1561	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	275	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	309	15	1972	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1575		279	1991	
v/s Ratio Prot							0.00	0.58		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.25		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.85	0.95	0.69		1.00	1.00	
Incremental Delay, d2		215.1		64.1	108.2	98.4	0.1	116.5		144.7	1.2	
Delay (s)		278.3		122.0	166.1	151.6	20.2	144.4		197.2	22.2	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			148.8			143.5			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	121.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	193	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	210	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.75	0.75	0.92	0.75	0.75	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	497			481			1830	1870	428	1765	1895	455
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	64	100	100	33
cM capacity (veh/h)	760			993			10	34	576	22	32	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	210	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	210	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.36	0.67
Queue Length 95th (ft)	36	0	7	0	0	41	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	14.8	28.4
Lane LOS	B		A			B	D
Approach Delay (s)	3.7		0.9			14.8	28.4
Approach LOS						B	D

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	174	502	23	928	23	8	181	180
v/c Ratio	0.50	0.36	0.04	0.75	0.10	0.03	0.83	0.54
Control Delay	5.3	3.7	4.9	21.2	52.0	0.1	90.2	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	3.7	4.9	21.2	52.0	0.1	90.2	34.0
Queue Length 50th (ft)	13	56	5	543	19	0	172	80
Queue Length 95th (ft)	m14	m81	12	866	47	0	#259	158
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	399	1376	657	1234	278	364	258	377
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	0.44	0.36	0.04	0.75	0.08	0.02	0.70	0.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	448	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1854		1770	1786			1804	1583		1778	1583
Flt Permitted	0.17	1.00		0.46	1.00			0.77	1.00		0.72	1.00
Satd. Flow (perm)	325	1854		858	1786			1441	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	487	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	8	0	0	0	7	0	0	75
Lane Group Flow (vph)	174	501	0	23	920	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.6	109.6		106.0	103.0			24.4	24.4		24.4	24.4
Effective Green, g (s)	116.6	109.6		106.0	103.0			24.4	24.4		24.4	24.4
Actuated g/C Ratio	0.78	0.73		0.71	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	345	1354		624	1226			234	257		217	257
v/s Ratio Prot	c0.03	0.27		0.00	c0.52							
v/s Ratio Perm	0.36			0.03				0.02	0.00		c0.14	0.07
v/c Ratio	0.50	0.37		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.4	7.5		6.6	15.2			53.4	52.6		60.8	56.3
Progression Factor	0.65	0.41		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.4		0.0	4.3			0.2	0.0		23.2	1.1
Delay (s)	10.5	3.4		6.6	19.5			53.6	52.6		84.0	57.4
Level of Service	B	A		A	B			D	D		F	E
Approach Delay (s)		5.3			19.2			53.4			70.7	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	872	437	105	24	38	1016	1090	646
v/c Ratio	1.08	1.08	0.20	0.13	0.15	0.51	0.62	0.57
Control Delay	99.4	112.2	1.1	38.5	12.3	17.2	1.6	1.6
Queue Delay	6.8	6.1	0.0	0.0	0.0	0.5	1.0	2.8
Total Delay	106.2	118.2	1.1	38.5	12.3	17.7	2.6	4.4
Queue Length 50th (ft)	~415	~416	0	11	12	242	13	0
Queue Length 95th (ft)	#550	#639	2	39	28	298	m16	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	805	403	525	189	253	1990	1752	1136
Starvation Cap Reductn	0	0	0	0	0	0	387	365
Spillback Cap Reductn	16	8	0	0	0	503	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	1.11	0.20	0.13	0.15	0.68	0.80	0.84

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1197	7	97	7	7	7	35	935	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1616	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.15	1.00			0.95	1.00
Satd. Flow (perm)	3221	1616	1583		1750		288	3539			3348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	8	105	8	8	8	38	1016	0	8	1082	646
RTOR Reduction (vph)	0	0	79	0	7	0	0	0	0	0	0	299
Lane Group Flow (vph)	872	437	26	0	17	0	38	1016	0	0	1090	347
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	28.0	28.0	28.0		10.5		66.5	66.5			61.5	61.5
Effective Green, g (s)	30.0	30.0	30.0		12.5		66.0	70.5			64.5	64.5
Actuated g/C Ratio	0.25	0.25	0.25		0.10		0.55	0.59			0.54	0.54
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	805	404	395		182		220	2079			1799	850
v/s Ratio Prot	c0.27	0.27			c0.01		0.01	c0.29				
v/s Ratio Perm			0.02				0.09				c0.33	0.22
v/c Ratio	1.08	1.08	0.07		0.09		0.17	0.49			0.61	0.41
Uniform Delay, d1	45.0	45.0	34.3		48.6		15.2	14.3			19.0	16.4
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	0.62
Incremental Delay, d2	56.7	68.4	0.1		0.2		0.4	0.1			0.2	0.1
Delay (s)	101.7	113.4	34.4		48.8		15.6	14.5			1.1	10.3
Level of Service	F	F	C		D		B	B			A	B
Approach Delay (s)		100.3			48.8			14.5			4.5	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	509	266	52	24	121	1205	1248	1524
v/c Ratio	1.19	1.24	0.16	0.20	0.40	0.46	0.55	1.11
Control Delay	159.0	191.4	1.0	54.0	9.0	8.6	0.4	68.7
Queue Delay	0.1	0.1	0.0	0.0	0.0	0.2	7.3	0.9
Total Delay	159.1	191.5	1.0	54.0	9.0	8.8	7.7	69.6
Queue Length 50th (ft)	~328	~352	0	15	28	223	7	~670
Queue Length 95th (ft)	#453	#554	0	47	46	263	m10	m279
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	429	215	330	118	302	2605	2274	1378
Starvation Cap Reductn	0	0	0	0	0	0	979	263
Spillback Cap Reductn	5	2	0	0	0	575	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.25	0.16	0.20	0.40	0.59	0.96	1.37

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1141	1402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1619	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.17	1.00			0.94	1.00
Satd. Flow (perm)	3221	1619	1583		1750		313	3536			3343	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1240	1524
RTOR Reduction (vph)	0	0	45	0	7	0	0	0	0	0	0	280
Lane Group Flow (vph)	509	266	7	0	17	0	121	1205	0	0	1248	1244
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	18.0	18.0	18.0		7.5		108.5	108.5			102.5	102.5
Effective Green, g (s)	20.0	20.0	20.0		9.5		106.0	110.5			105.5	105.5
Actuated g/C Ratio	0.13	0.13	0.13		0.06		0.71	0.74			0.70	0.70
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	429	215	211		110		289	2604			2351	1113
v/s Ratio Prot	0.16	c0.16			c0.01		0.02	c0.34				
v/s Ratio Perm			0.00				0.28				0.37	c0.79
v/c Ratio	1.19	1.24	0.03		0.15		0.42	0.46			0.53	1.12
Uniform Delay, d1	65.0	65.0	56.6		66.4		9.8	7.9			10.5	22.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.51
Incremental Delay, d2	105.2	140.0	0.1		0.6		1.0	0.1			0.0	54.3
Delay (s)	170.2	205.0	56.7		67.1		10.7	8.0			0.3	110.0
Level of Service	F	F	E		E		B	A			A	F
Approach Delay (s)		174.3			67.1			8.3			60.6	
Approach LOS		F			E			A			E	

Intersection Summary			
HCM 2000 Control Delay	65.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	131.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	641	649	105	24	38	1000	1090	646
v/c Ratio	1.48	1.49	0.20	0.17	0.23	0.93	1.22	0.62
Control Delay	260.3	266.5	1.1	41.6	13.3	38.7	118.7	1.7
Queue Delay	0.5	0.5	0.0	0.0	0.0	45.5	0.0	2.0
Total Delay	260.8	267.0	1.1	41.6	13.3	84.2	118.7	3.7
Queue Length 50th (ft)	~718	~731	0	12	12	668	~1056	0
Queue Length 95th (ft)	#957	#972	2	40	26	#995	m#1188	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	145	166	1078	890	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	241
Spillback Cap Reductn	21	22	0	0	0	211	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.55	1.57	0.20	0.17	0.23	1.15	1.22	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1179	7	97	7	7	7	35	920	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.89	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1650	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	8	105	8	8	8	38	1000	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	641	649	27	0	17	0	38	1000	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		7.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	31.0	31.0	31.0		9.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.26	0.26	0.26		0.08		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		138		135	1125			914	877
v/s Ratio Prot	0.38	c0.38			c0.01		0.01	c0.54				
v/s Ratio Perm			0.02				0.15				c0.66	0.30
v/c Ratio	1.48	1.49	0.07		0.12		0.28	0.89			1.19	0.53
Uniform Delay, d1	44.5	44.5	33.6		51.4		26.3	20.3			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.22	0.09
Incremental Delay, d2	226.8	233.3	0.1		0.3		1.1	8.8			91.1	0.2
Delay (s)	271.3	277.8	33.7		51.7		27.5	29.1			96.9	1.8
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		256.4			51.7			29.0			61.5	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	118.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	184	152	1230	1060	597	1674
v/c Ratio	1.38	0.52	1.14	0.99	1.36	0.93
Control Delay	253.2	11.6	86.8	25.2	189.6	31.1
Queue Delay	0.0	11.6	1.3	39.3	0.0	11.8
Total Delay	253.2	23.2	88.0	64.5	189.6	42.9
Queue Length 50th (ft)	~198	0	~1118	507	~569	500
Queue Length 95th (ft)	#353	47	m524	m244	m#516	m#587
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	133	290	1083	1076	438	1793
Starvation Cap Reductn	0	0	241	244	0	69
Spillback Cap Reductn	0	110	0	0	0	141
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.38	0.84	1.46	1.27	1.36	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	0	56	0	0	0	0	788	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1615						1689	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1615						1689	1504	186	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	0	61	0	0	0	0	857	1433	597	1674	0
RTOR Reduction (vph)	0	140	0	0	0	0	0	14	124	0	0	0
Lane Group Flow (vph)	184	12	0	0	0	0	0	1216	936	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						73.0	70.5	63.5	56.0	
Effective Green, g (s)	9.5	9.5						72.5	76.0	65.5	59.0	
Actuated g/C Ratio	0.08	0.08						0.60	0.63	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	133	127						1020	952	438	1740	
v/s Ratio Prot								c0.72		c0.29	0.47	
v/s Ratio Perm	c0.11	0.01							c0.62	c0.45		
v/c Ratio	1.38	0.09						1.19	0.98	1.36	0.96	
Uniform Delay, d1	55.2	51.3						23.8	21.4	37.4	29.4	
Progression Factor	1.00	1.00						1.10	1.33	0.70	0.87	
Incremental Delay, d2	212.3	0.2						87.3	5.5	164.7	8.3	
Delay (s)	267.5	51.5						113.4	34.0	190.9	33.9	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		169.8			0.0			76.6			75.1	
Approach LOS		F			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	82.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	545	79	1052	1784
v/c Ratio	0.59	0.59	1.01	0.33	0.49	1.05
Control Delay	37.8	37.9	81.2	38.8	12.3	55.9
Queue Delay	0.2	0.2	0.0	0.0	1.8	19.2
Total Delay	38.0	38.1	81.2	38.8	14.1	75.1
Queue Length 50th (ft)	224	225	~420	28	245	~800
Queue Length 95th (ft)	334	336	#671	m24	m194	#921
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	573	573	540	254	2182	1691
Starvation Cap Reductn	0	0	0	0	915	47
Spillback Cap Reductn	19	19	0	0	0	333
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.61	1.01	0.31	0.83	1.31

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	501	73	968	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	128	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	545	79	1052	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	337	338	545	79	1052	0	0	1776	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				37.9	37.9	37.9	64.1	70.1			55.0	
Effective Green, g (s)				40.9	40.9	40.9	70.1	73.1			58.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.58	0.61			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				572	572	539	240	2155			1683	
v/s Ratio Prot							0.03	c0.30			c0.51	
v/s Ratio Perm				0.20	0.20	c0.34	0.16					
v/c Ratio				0.59	0.59	1.01	0.33	0.49			1.06	
Uniform Delay, d1				32.6	32.6	39.5	46.8	13.0			31.0	
Progression Factor				1.00	1.00	1.00	1.40	0.93			0.63	
Incremental Delay, d2				1.6	1.6	41.6	0.1	0.0			35.0	
Delay (s)				34.2	34.3	81.1	65.6	12.2			54.6	
Level of Service				C	C	F	E	B			D	
Approach Delay (s)		0.0			55.2			15.9			54.6	
Approach LOS		A			E			B			D	

Intersection Summary			
HCM 2000 Control Delay	44.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	91	75	23	227	1369	71	1751
v/c Ratio	0.35	0.33	0.51	0.11	0.66	0.51	0.21	0.74
Control Delay	54.9	10.1	62.0	36.1	38.6	2.7	3.3	10.2
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.1	0.0	1.3
Total Delay	54.9	10.2	62.0	36.1	38.6	2.8	3.3	11.4
Queue Length 50th (ft)	41	0	55	10	92	105	5	172
Queue Length 95th (ft)	85	38	106	36	m141	m113	m10	188
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	176	289	161	227	409	2682	343	2366
Starvation Cap Reductn	0	0	0	0	0	264	0	35
Spillback Cap Reductn	0	10	0	0	0	0	0	374
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.33	0.47	0.10	0.56	0.57	0.21	0.88

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	9	84	69	14	7	209	1073	187	65	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1789	1583	1770	1766		1770	3460		1770	3499	
Flt Permitted		0.76	1.00	0.70	1.00		0.07	1.00		0.18	1.00	
Satd. Flow (perm)		1408	1583	1295	1766		126	3460		343	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	10	91	75	15	8	227	1166	203	71	1617	134
RTOR Reduction (vph)	0	0	81	0	7	0	0	11	0	0	5	0
Lane Group Flow (vph)	0	57	10	75	16	0	227	1358	0	71	1746	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		10.8	10.8	10.8	10.8		97.7	88.7		82.5	78.0	
Effective Green, g (s)		13.8	13.8	13.8	13.8		99.7	91.7		86.5	81.0	
Actuated g/C Ratio		0.12	0.12	0.12	0.12		0.83	0.76		0.72	0.68	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		161	182	148	203		340	2644		324	2361	
v/s Ratio Prot					0.01		c0.10	0.39		0.01	c0.50	
v/s Ratio Perm		0.04	0.01	c0.06			0.46			0.15		
v/c Ratio		0.35	0.06	0.51	0.08		0.67	0.51		0.22	0.74	
Uniform Delay, d1		49.0	47.3	49.9	47.4		30.3	5.5		5.0	12.7	
Progression Factor		1.00	1.00	1.00	1.00		1.42	0.39		0.73	0.61	
Incremental Delay, d2		1.3	0.1	2.7	0.2		3.7	0.5		0.3	1.7	
Delay (s)		50.3	47.4	52.6	47.6		46.7	2.7		3.9	9.4	
Level of Service		D	D	D	D		D	A		A	A	
Approach Delay (s)		48.6			51.4			8.9			9.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	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)	8.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1509
v/c Ratio	0.38	0.78	0.78	0.67	0.03	0.71	0.84	0.61
Control Delay	56.1	73.0	73.8	10.7	5.7	15.4	44.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	73.0	73.8	10.7	5.7	15.4	44.5	13.3
Queue Length 50th (ft)	12	127	123	0	2	406	204	347
Queue Length 95th (ft)	42	#232	#228	92	m3	470	#350	530
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	238	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	1	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.03	0.72	0.77	0.61

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1381	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3536	
Flt Permitted		0.35		0.74	0.72	1.00	0.14	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	265	3406		178	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1501	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1509	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	167	1612		437	2286	
v/s Ratio Prot							0.00	0.35		c0.17	0.43	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.02			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.66	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.1	25.6		32.1	13.1	
Progression Factor		1.00		1.00	1.00	1.00	0.58	0.49		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.7		14.2	1.5	
Delay (s)		61.3		65.0	65.3	44.5	9.4	15.3		46.3	14.6	
Level of Service		E		E	E	D	A	B		D	B	
Approach Delay (s)		61.3			53.9			15.3			20.8	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	107	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	116	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1506	1552	382	1543	1559	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1506	1554	332	1545	1561	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			90			0	60	89	100	100	63
cM capacity (veh/h)	1119			1121			46	76	679	43	75	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	116	396	46	67	105	241
Volume Left	248	0	116	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	46	205	654
Volume to Capacity	0.22	0.26	0.10	0.23	0.03	1.47	0.51	0.37
Queue Length 95th (ft)	21	0	9	0	0	164	65	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	438.4	39.7	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		1.8			195.1		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	24.4		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	398	104	14	0	21	138	7	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	433	113	15	0	23	150	8	110
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	546			329			982	1036	326	988	984	489
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	546			329			982	1036	326	988	984	489
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			91	100	97	27	97	81
cM capacity (veh/h)	1024			1230			169	213	716	206	229	579

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	546	38	267
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	110
cSH	1024	1700	1230	1700	424	316
Volume to Capacity	0.07	0.19	0.01	0.32	0.09	0.85
Queue Length 95th (ft)	6	0	0	0	7	186
Control Delay (s)	8.8	0.0	7.9	0.0	17.5	56.2
Lane LOS	A		A		C	F
Approach Delay (s)	1.6		0.1		17.5	56.2
Approach LOS					C	F

Intersection Summary			
Average Delay	13.0		
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1224	1490
v/c Ratio	1.31	1.35	0.13	0.20	0.90	0.93	1.27	1.12
Control Delay	207.2	224.9	0.7	54.0	84.1	33.5	137.1	75.1
Queue Delay	0.2	0.2	0.0	0.0	0.0	45.5	0.0	1.0
Total Delay	207.4	225.1	0.7	54.0	84.1	79.0	137.1	76.1
Queue Length 50th (ft)	~500	~531	0	15	64	937	~1497	~708
Queue Length 95th (ft)	#720	#755	0	47	#192	#1398	m#1069	m259
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	291	292	388	118	135	1296	960	1334
Starvation Cap Reductn	0	0	0	0	0	0	0	281
Spillback Cap Reductn	4	4	0	0	0	281	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	1.37	0.13	0.20	0.90	1.19	1.27	1.42

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1119	1371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.80	1.00
Satd. Flow (perm)	1681	1688	1583		1750		80	1861			1499	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1216	1490
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1224	1189
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	24.0	24.0	24.0		7.5		102.5	102.5			96.5	96.5
Effective Green, g (s)	26.0	26.0	26.0		9.5		100.0	104.5			99.5	99.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	291	292	274		110		132	1296			994	1050
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.82	0.75
v/c Ratio	1.31	1.35	0.03		0.15		0.92	0.93			1.23	1.13
Uniform Delay, d1	62.0	62.0	51.5		66.4		48.4	19.6			25.2	25.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.30
Incremental Delay, d2	160.3	179.6	0.1		0.6		53.1	11.7			105.0	61.0
Delay (s)	222.3	241.6	51.6		67.1		101.6	31.3			108.6	119.2
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		220.8			67.1			37.7			114.4	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	111.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	157.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	524	2634
v/c Ratio	1.43	0.64	1.01	0.76	1.13	1.22
Control Delay	287.2	24.1	39.9	11.8	105.4	124.2
Queue Delay	0.0	28.6	33.8	50.6	1.4	0.4
Total Delay	287.2	52.7	73.7	62.4	106.8	124.7
Queue Length 50th (ft)	~210	6	~990	306	~552	~1674
Queue Length 95th (ft)	#368	83	m837	m208	m457	m#1278
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1136	1068	465	2158
Starvation Cap Reductn	0	0	308	353	65	322
Spillback Cap Reductn	0	80	1	0	0	286
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.39	1.14	1.31	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	482	2423	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	115	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	524	2634	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	103	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	712	524	2634	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						93.3	91.3	98.0	88.5	
Effective Green, g (s)	9.5	9.5						92.8	96.3	100.0	91.5	
Actuated g/C Ratio	0.06	0.06						0.62	0.64	0.67	0.61	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1095	965	465	2158	
v/s Ratio Prot								c0.65		c0.26	c0.74	
v/s Ratio Perm	c0.09	0.01							0.47	0.49		
v/c Ratio	1.43	0.15						1.05	0.74	1.13	1.22	
Uniform Delay, d1	70.2	66.4						28.6	18.3	50.0	29.2	
Progression Factor	1.00	1.00						1.08	0.96	1.08	0.80	
Incremental Delay, d2	240.8	0.7						25.0	0.3	60.0	99.7	
Delay (s)	311.0	67.1						55.9	17.8	114.2	123.0	
Level of Service	F	E						E	B	F	F	
Approach Delay (s)		190.7			0.0			40.1			121.6	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	95.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	115.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	1928
v/c Ratio	1.17	1.18	1.08	0.43	0.62	1.15
Control Delay	135.0	135.5	104.8	33.7	6.6	98.7
Queue Delay	3.5	3.5	6.8	0.0	5.2	0.5
Total Delay	138.4	139.0	111.6	33.7	11.8	99.2
Queue Length 50th (ft)	~925	~927	~718	37	245	~1141
Queue Length 95th (ft)	#1190	#1192	#961	m31	m217	#1283
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	639	639	602	208	2088	1683
Starvation Cap Reductn	0	0	0	0	731	86
Spillback Cap Reductn	223	223	14	0	408	242
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.80	1.81	1.11	0.41	0.95	1.34

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1524	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3465	
Flt Permitted				0.95	0.95	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	103	3539			3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1657	271
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	1919	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				54.1	54.1	54.1	79.4	84.9			69.5	
Effective Green, g (s)				57.1	57.1	57.1	85.4	87.9			72.5	
Actuated g/C Ratio				0.38	0.38	0.38	0.57	0.59			0.48	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				639	639	602	202	2073			1674	
v/s Ratio Prot							0.04	c0.36			c0.55	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.17	1.18	1.08	0.43	0.62			1.15	
Uniform Delay, d1				46.4	46.4	46.4	61.3	20.2			38.8	
Progression Factor				1.00	1.00	1.00	0.76	0.32			0.73	
Incremental Delay, d2				94.0	94.6	61.2	0.3	0.1			71.1	
Delay (s)				140.4	141.1	107.6	46.7	6.5			99.3	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			130.7			9.0			99.3	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	89.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	169.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	335	182	99	1836	15	1558
v/c Ratio	0.21	0.45	0.89	0.33	0.52	0.82	0.11	0.77
Control Delay	39.3	26.8	74.6	21.2	26.5	20.6	6.2	13.7
Queue Delay	0.0	1.0	50.9	0.0	0.0	47.7	0.0	2.3
Total Delay	39.3	27.8	125.5	21.3	26.5	68.3	6.2	16.0
Queue Length 50th (ft)	57	112	303	66	27	717	2	718
Queue Length 95th (ft)	101	193	249	61	m65	m848	m3	m357
Internal Link Dist (ft)	268			247		361		109
Turn Bay Length (ft)		250			200		180	
Base Capacity (vph)	420	583	411	589	202	2233	140	2030
Starvation Cap Reductn	0	0	0	0	0	73	0	18
Spillback Cap Reductn	0	151	104	19	0	793	0	330
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.57	1.09	0.32	0.49	1.27	0.11	0.92

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	201	16	93	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0		2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1770	1625		1770	3507		1770	3507	
Flt Permitted		0.69	1.00	0.68	1.00		0.07	1.00		0.05	1.00	
Satd. Flow (perm)		1288	1583	1259	1625		122	3507		87	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	335	27	155	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	69	0	62	0	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	177	335	120	0	99	1833	0	15	1555	0
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Actuated Green, G (s)		42.1	42.1	42.1	42.1		96.4	89.7		85.9	83.7	
Effective Green, g (s)		45.1	45.1	45.1	45.1		98.4	92.7		89.9	86.7	
Actuated g/C Ratio		0.30	0.30	0.30	0.30		0.66	0.62		0.60	0.58	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		387	475	378	488		192	2167		99	2027	
v/s Ratio Prot					0.07		c0.04	c0.52		0.00	0.44	
v/s Ratio Perm		0.06	0.11	c0.27			0.30			0.09		
v/c Ratio		0.21	0.37	0.89	0.25		0.52	0.85		0.15	0.77	
Uniform Delay, d1		39.1	41.3	50.0	39.6		23.3	22.9		24.0	24.0	
Progression Factor		1.00	1.00	1.00	1.00		1.36	0.79		0.50	0.46	
Incremental Delay, d2		0.3	0.5	21.2	0.3		1.4	2.7		0.5	2.2	
Delay (s)		39.4	41.8	71.2	39.9		33.1	20.9		12.5	13.1	
Level of Service		D	D	E	D		C	C		B	B	
Approach Delay (s)		41.2			60.2			21.5			13.1	
Approach LOS		D			E			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1865	353	1130
v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.26	1.26	0.58
Control Delay	242.4	87.2	107.8	101.8	6.5	148.8	179.5	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Total Delay	242.4	87.2	107.8	101.8	6.5	148.9	179.5	24.7
Queue Length 50th (ft)	~85	218	248	~473	2	~1194	~380	352
Queue Length 95th (ft)	#201	#374	#436	#722	m2	#1321	#588	483
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	254	249	599	232	1477	281	1937
Starvation Cap Reductn	0	0	0	0	0	23	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	134
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.28	1.26	0.63

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1322	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3417		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	348	3417		114	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1437	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	277	0	18	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	397	15	1847	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		28.5	28.5	28.5	63.0	61.0		83.0	76.5	
Effective Green, g (s)		23.5		30.5	30.5	30.5	67.0	64.0		85.0	79.5	
Actuated g/C Ratio		0.16		0.20	0.20	0.20	0.45	0.43		0.57	0.53	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		254	249	321	193	1457		279	1873	
v/s Ratio Prot							0.00	0.54		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	0.20	c0.25	0.03			c0.55		
v/c Ratio		1.28		0.86	0.97	1.24	0.08	1.27		1.27	0.60	
Uniform Delay, d1		63.2		57.7	59.3	59.8	24.1	43.0		51.6	24.4	
Progression Factor		1.00		1.00	1.00	1.00	0.42	0.65		1.00	1.00	
Incremental Delay, d2		215.1		23.8	47.5	130.2	0.1	124.0		144.7	1.4	
Delay (s)		278.3		81.4	106.8	189.9	10.3	151.8		196.3	25.8	
Level of Service		F		F	F	F	B	F		F	C	
Approach Delay (s)		278.3			151.4			150.7			66.4	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	125.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	25	152	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	27	165	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2061	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			472			1974	2007	418	2117	2028	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	22	71	100	100	30
cM capacity (veh/h)	833			992			9	35	578	6	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	192	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	165	287
cSH	833	1700	992	1700	1700	9	180	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.90	1.07	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	233	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	139.7	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			3287.1		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	418.5		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	435	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	473	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			488			1580	1741	480	1614	1621	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			488			1580	1741	480	1614	1621	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			58	89	99	0	91	53
cM capacity (veh/h)	737			1075			37	68	586	63	81	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	488	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1075	1700	63	110
Volume to Capacity	0.19	0.29	0.02	0.55	0.48	3.27
Queue Length 95th (ft)	18	0	2	0	48	Err
Control Delay (s)	11.1	0.0	8.4	0.0	106.9	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.5		0.2		106.9	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1830.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

2/11/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	641	649	105	24	38	1000	1090	646
v/c Ratio	1.48	1.49	0.20	0.17	0.23	0.93	1.22	0.62
Control Delay	260.3	266.5	1.1	41.6	13.3	38.7	118.7	1.7
Queue Delay	0.5	0.5	0.0	0.0	0.0	45.5	0.0	2.0
Total Delay	260.8	267.0	1.1	41.6	13.3	84.2	118.7	3.7
Queue Length 50th (ft)	~718	~731	0	12	12	668	~1056	0
Queue Length 95th (ft)	#957	#972	2	40	26	#995	m#1188	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	145	166	1078	890	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	241
Spillback Cap Reductn	21	22	0	0	0	211	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.55	1.57	0.20	0.17	0.23	1.15	1.22	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1179	7	97	7	7	7	35	920	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.89	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1650	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	8	105	8	8	8	38	1000	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	641	649	27	0	17	0	38	1000	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		7.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	31.0	31.0	31.0		9.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.26	0.26	0.26		0.08		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		138		135	1125			914	877
v/s Ratio Prot	0.38	c0.38			c0.01		0.01	c0.54				
v/s Ratio Perm			0.02				0.15				c0.66	0.30
v/c Ratio	1.48	1.49	0.07		0.12		0.28	0.89			1.19	0.53
Uniform Delay, d1	44.5	44.5	33.6		51.4		26.3	20.3			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.22	0.09
Incremental Delay, d2	226.8	233.3	0.1		0.3		1.1	8.8			91.1	0.2
Delay (s)	271.3	277.8	33.7		51.7		27.5	29.1			96.9	1.8
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		256.4			51.7			29.0			61.5	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	118.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	184	152	1230	1060	597	1674
v/c Ratio	1.38	0.52	1.14	0.99	1.36	0.93
Control Delay	253.2	11.6	86.8	25.2	189.6	31.1
Queue Delay	0.0	11.6	1.3	39.3	0.0	11.8
Total Delay	253.2	23.2	88.0	64.5	189.6	42.9
Queue Length 50th (ft)	~198	0	~1118	507	~569	500
Queue Length 95th (ft)	#353	47	m524	m244	m#516	m#587
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	133	290	1083	1076	438	1793
Starvation Cap Reductn	0	0	241	244	0	69
Spillback Cap Reductn	0	110	0	0	0	141
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.38	0.84	1.46	1.27	1.36	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	0	56	0	0	0	0	788	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1615						1689	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1615						1689	1504	186	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	0	61	0	0	0	0	857	1433	597	1674	0
RTOR Reduction (vph)	0	140	0	0	0	0	0	14	124	0	0	0
Lane Group Flow (vph)	184	12	0	0	0	0	0	1216	936	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						73.0	70.5	63.5	56.0	
Effective Green, g (s)	9.5	9.5						72.5	76.0	65.5	59.0	
Actuated g/C Ratio	0.08	0.08						0.60	0.63	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	133	127						1020	952	438	1740	
v/s Ratio Prot								c0.72		c0.29	0.47	
v/s Ratio Perm	c0.11	0.01							c0.62	c0.45		
v/c Ratio	1.38	0.09						1.19	0.98	1.36	0.96	
Uniform Delay, d1	55.2	51.3						23.8	21.4	37.4	29.4	
Progression Factor	1.00	1.00						1.10	1.33	0.70	0.87	
Incremental Delay, d2	212.3	0.2						87.3	5.5	164.7	8.3	
Delay (s)	267.5	51.5						113.4	34.0	190.8	33.8	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		169.8			0.0			76.6			75.1	
Approach LOS		F			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	82.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	545	79	1052	1784
v/c Ratio	0.59	0.59	1.01	0.33	0.49	1.05
Control Delay	37.8	37.9	81.2	38.8	12.3	52.5
Queue Delay	0.2	0.2	0.0	0.0	1.8	19.2
Total Delay	38.0	38.1	81.2	38.8	14.1	71.6
Queue Length 50th (ft)	224	225	~420	28	245	~777
Queue Length 95th (ft)	334	336	#671	m24	m194	#918
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	573	573	540	254	2182	1691
Starvation Cap Reductn	0	0	0	0	915	39
Spillback Cap Reductn	19	19	0	0	0	333
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.61	1.01	0.31	0.83	1.31

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	501	73	968	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	128	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	545	79	1052	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	337	338	545	79	1052	0	0	1776	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				37.9	37.9	37.9	64.1	70.1			55.0	
Effective Green, g (s)				40.9	40.9	40.9	70.1	73.1			58.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.58	0.61			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				572	572	539	240	2155			1683	
v/s Ratio Prot							0.03	c0.30			c0.51	
v/s Ratio Perm				0.20	0.20	c0.34	0.16					
v/c Ratio				0.59	0.59	1.01	0.33	0.49			1.06	
Uniform Delay, d1				32.6	32.6	39.5	46.8	13.0			31.0	
Progression Factor				1.00	1.00	1.00	1.40	0.93			0.53	
Incremental Delay, d2				1.6	1.6	41.6	0.1	0.0			34.2	
Delay (s)				34.2	34.3	81.1	65.6	12.2			50.7	
Level of Service				C	C	F	E	B			D	
Approach Delay (s)		0.0			55.2			15.9			50.7	
Approach LOS		A			E			B			D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	91	37	53	8	227	1369	71	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.03	0.75	0.56	0.24	0.81
Control Delay	57.6	2.8	54.9	57.6	0.1	50.5	3.9	5.0	16.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.7
Total Delay	57.6	2.9	54.9	57.6	0.1	50.5	4.1	5.0	18.3
Queue Length 50th (ft)	42	0	28	41	0	116	137	6	628
Queue Length 95th (ft)	86	0	66	86	0	m172	m151	m9	226
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	163	289	154	156	265	334	2441	296	2154
Starvation Cap Reductn	0	0	0	0	0	0	220	0	24
Spillback Cap Reductn	0	10	0	0	0	0	0	0	240
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.03	0.68	0.62	0.24	0.91

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	9	84	69	14	7	209	1073	187	65	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1789	1583	1681	1708	1583	1770	3460		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.16	1.00	
Satd. Flow (perm)		1789	1583	1681	1708	1583	101	3460		302	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	10	91	75	15	8	227	1166	203	71	1617	134
RTOR Reduction (vph)	0	0	83	0	0	8	0	11	0	0	5	0
Lane Group Flow (vph)	0	57	8	37	53	0	227	1358	0	71	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	79.2		73.9	69.5	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	82.2		77.9	72.5	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.69		0.65	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		163	145	131	133	97	299	2370		274	2113	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.39		0.01	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.15		
v/c Ratio		0.35	0.06	0.28	0.40	0.01	0.76	0.57		0.26	0.83	
Uniform Delay, d1		51.1	49.8	52.1	52.6	52.8	36.6	9.8		8.6	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.30	0.33		0.70	0.69	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.0	8.0	0.8		0.4	3.0	
Delay (s)		52.4	49.9	53.3	54.6	52.9	55.5	4.0		6.4	16.0	
Level of Service		D	D	D	D	D	E	A		A	B	
Approach Delay (s)		50.9			54.0			11.3			15.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.2	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)	11.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	384	8	1213	371	1509
v/c Ratio	0.38	0.78	0.78	0.67	0.03	0.71	0.84	0.61
Control Delay	56.1	73.0	73.8	10.7	6.6	14.5	44.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	56.1	73.0	73.8	10.7	6.6	14.5	44.5	13.4
Queue Length 50th (ft)	12	127	123	0	2	406	204	347
Queue Length 95th (ft)	42	#232	#228	92	m3	482	#350	530
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	225	218	589	238	1697	479	2458
Starvation Cap Reductn	0	0	0	0	0	1	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	201
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.72	0.72	0.65	0.03	0.72	0.77	0.67

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	353	7	836	280	341	1381	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3406		1770	3536	
Flt Permitted		0.35		0.74	0.72	1.00	0.14	1.00		0.10	1.00	
Satd. Flow (perm)		616		1312	1273	1583	265	3406		178	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	384	8	909	304	371	1501	8
RTOR Reduction (vph)	0	7	0	0	0	323	0	24	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	61	8	1189	0	371	1509	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.7		17.2	17.2	17.2	54.8	53.8		80.1	74.6	
Effective Green, g (s)		7.7		19.2	19.2	19.2	58.8	56.8		82.1	77.6	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.47		0.68	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		209	203	253	167	1612		437	2286	
v/s Ratio Prot							0.00	0.35		c0.17	0.43	
v/s Ratio Perm		c0.03		c0.12	0.12	0.04	0.02			c0.41		
v/c Ratio		0.42		0.78	0.78	0.24	0.05	0.74		0.85	0.66	
Uniform Delay, d1		54.0		48.4	48.4	44.0	16.1	25.6		32.1	13.1	
Progression Factor		1.00		1.00	1.00	1.00	0.68	0.46		1.00	1.00	
Incremental Delay, d2		7.3		16.7	17.0	0.5	0.1	2.6		14.2	1.5	
Delay (s)		61.3		65.0	65.3	44.5	11.0	14.5		46.3	14.6	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.3			53.9			14.4			20.8	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	107	364	42	62	28	69	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	116	396	46	67	30	75	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	441			435			1506	1552	382	1543	1559	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			387			1506	1554	332	1545	1561	396
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			90			0	60	89	100	100	63
cM capacity (veh/h)	1119			1121			46	76	679	43	75	654

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	435	116	396	46	67	105	241
Volume Left	248	0	116	0	0	67	0	0
Volume Right	0	105	0	0	46	0	75	241
cSH	1119	1700	1121	1700	1700	46	205	654
Volume to Capacity	0.22	0.26	0.10	0.23	0.03	1.47	0.51	0.37
Queue Length 95th (ft)	21	0	9	0	0	164	65	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	438.4	39.7	13.7
Lane LOS	A		A			F	E	B
Approach Delay (s)	3.3		1.8			195.1		13.7
Approach LOS						F		B

Intersection Summary			
Average Delay	24.4		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	296	7	7	398	104	14	0	21	138	7	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	322	8	8	433	113	15	0	23	150	8	110
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	546			329			982	1036	326	988	984	489
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	546			329			982	1036	326	988	984	489
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			99			91	100	97	27	97	81
cM capacity (veh/h)	1024			1230			169	213	716	206	229	579

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	75	329	8	546	38	267
Volume Left	75	0	8	0	15	150
Volume Right	0	8	0	113	23	110
cSH	1024	1700	1230	1700	424	316
Volume to Capacity	0.07	0.19	0.01	0.32	0.09	0.85
Queue Length 95th (ft)	6	0	0	0	7	186
Control Delay (s)	8.8	0.0	7.9	0.0	17.5	56.2
Lane LOS	A		A		C	F
Approach Delay (s)	1.6		0.1		17.5	56.2
Approach LOS					C	F

Intersection Summary			
Average Delay	13.0		
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

2/11/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1224	1490
v/c Ratio	1.31	1.35	0.13	0.20	0.90	0.93	1.27	1.12
Control Delay	207.2	224.9	0.7	54.0	84.1	33.5	137.1	75.1
Queue Delay	0.2	0.2	0.0	0.0	0.0	45.5	0.0	1.0
Total Delay	207.4	225.1	0.7	54.0	84.1	79.0	137.1	76.1
Queue Length 50th (ft)	~500	~531	0	15	64	937	~1497	~709
Queue Length 95th (ft)	#720	#755	0	47	#192	#1398	m#1069	m259
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	291	292	388	118	135	1296	960	1334
Starvation Cap Reductn	0	0	0	0	0	0	0	281
Spillback Cap Reductn	4	4	0	0	0	281	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	1.37	0.13	0.20	0.90	1.19	1.27	1.42

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1119	1371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.80	1.00
Satd. Flow (perm)	1681	1688	1583		1750		80	1861			1499	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1216	1490
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1224	1189
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	24.0	24.0	24.0		7.5		102.5	102.5			96.5	96.5
Effective Green, g (s)	26.0	26.0	26.0		9.5		100.0	104.5			99.5	99.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	291	292	274		110		132	1296			994	1050
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.82	0.75
v/c Ratio	1.31	1.35	0.03		0.15		0.92	0.93			1.23	1.13
Uniform Delay, d1	62.0	62.0	51.5		66.4		48.4	19.6			25.2	25.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.30
Incremental Delay, d2	160.3	179.6	0.1		0.6		53.1	11.7			105.0	61.0
Delay (s)	222.3	241.6	51.6		67.1		101.6	31.3			108.6	119.1
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		220.8			67.1			37.7			114.4	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	111.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	157.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	524	2634
v/c Ratio	1.43	0.64	1.01	0.76	1.13	1.22
Control Delay	287.2	24.1	39.9	11.8	105.4	124.2
Queue Delay	0.0	28.6	33.8	50.6	1.4	0.4
Total Delay	287.2	52.7	73.7	62.4	106.8	124.7
Queue Length 50th (ft)	~210	6	~990	306	~551	~1674
Queue Length 95th (ft)	#368	83	m837	m208	m457	m#1278
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1136	1068	465	2158
Starvation Cap Reductn	0	0	308	353	65	322
Spillback Cap Reductn	0	80	1	0	0	286
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.39	1.14	1.31	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	482	2423	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	115	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	524	2634	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	103	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	712	524	2634	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						93.3	91.3	98.0	88.5	
Effective Green, g (s)	9.5	9.5						92.8	96.3	100.0	91.5	
Actuated g/C Ratio	0.06	0.06						0.62	0.64	0.67	0.61	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1095	965	465	2158	
v/s Ratio Prot								c0.65		c0.26	c0.74	
v/s Ratio Perm	c0.09	0.01							0.47	0.49		
v/c Ratio	1.43	0.15						1.05	0.74	1.13	1.22	
Uniform Delay, d1	70.2	66.4						28.6	18.3	50.0	29.2	
Progression Factor	1.00	1.00						1.08	0.96	1.09	0.80	
Incremental Delay, d2	240.8	0.7						25.0	0.3	60.0	99.7	
Delay (s)	311.0	67.1						55.9	17.8	114.3	123.0	
Level of Service	F	E						E	B	F	F	
Approach Delay (s)		190.7			0.0			40.1			121.6	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	95.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	115.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	1928
v/c Ratio	1.17	1.18	1.08	0.43	0.62	1.15
Control Delay	135.0	135.5	104.8	33.7	6.6	96.0
Queue Delay	3.5	3.5	6.9	0.0	5.2	0.5
Total Delay	138.4	139.0	111.7	33.7	11.8	96.5
Queue Length 50th (ft)	~925	~927	~718	37	245	~1142
Queue Length 95th (ft)	#1190	#1192	#961	m31	m217	#1284
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	639	639	602	208	2088	1683
Starvation Cap Reductn	0	0	0	0	731	75
Spillback Cap Reductn	223	223	22	0	330	242
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.80	1.81	1.12	0.41	0.95	1.34

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1524	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3465	
Flt Permitted				0.95	0.95	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	103	3539			3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1657	271
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	1919	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				54.1	54.1	54.1	79.4	84.9			69.5	
Effective Green, g (s)				57.1	57.1	57.1	85.4	87.9			72.5	
Actuated g/C Ratio				0.38	0.38	0.38	0.57	0.59			0.48	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				639	639	602	202	2073			1674	
v/s Ratio Prot							0.04	c0.36			c0.55	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.17	1.18	1.08	0.43	0.62			1.15	
Uniform Delay, d1				46.4	46.4	46.4	61.3	20.2			38.8	
Progression Factor				1.00	1.00	1.00	0.76	0.32			0.64	
Incremental Delay, d2				94.0	94.6	61.2	0.3	0.1			71.0	
Delay (s)				140.4	141.1	107.6	46.7	6.5			95.8	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			130.7			9.0			95.8	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	87.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	169.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	167	195	155	99	1836	15	1558
v/c Ratio	0.37	0.81	0.69	0.80	0.46	0.48	0.80	0.11	0.75
Control Delay	64.6	51.1	76.8	85.9	12.7	21.5	18.7	6.4	25.5
Queue Delay	0.0	1.8	9.3	24.5	0.3	0.0	35.0	0.0	2.1
Total Delay	64.6	52.9	86.1	110.4	13.0	21.5	53.7	6.4	27.6
Queue Length 50th (ft)	72	114	165	196	0	25	697	4	759
Queue Length 95th (ft)	127	#224	161	185	0	m55	m824	m6	m863
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	251	330	248	251	347	226	2290	140	2076
Starvation Cap Reductn	0	0	0	0	0	0	77	0	244
Spillback Cap Reductn	0	21	53	53	25	0	575	0	358
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.80	0.86	0.98	0.48	0.44	1.07	0.11	0.91

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	201	16	93	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1697	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.07	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1697	1583	131	3507		87	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	335	27	155	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	112	0	0	135	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	134	167	195	20	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		15.1	15.1	18.5	18.5	18.5	98.9	92.2		87.9	85.7	
Effective Green, g (s)		18.1	18.1	21.5	21.5	19.5	100.9	95.2		91.9	88.7	
Actuated g/C Ratio		0.12	0.12	0.14	0.14	0.13	0.67	0.63		0.61	0.59	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		217	191	240	243	205	205	2225		100	2073	
v/s Ratio Prot		0.04		0.10	c0.11		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.08			0.01	0.29			0.09		
v/c Ratio		0.37	0.70	0.70	0.80	0.10	0.48	0.82		0.15	0.75	
Uniform Delay, d1		60.7	63.4	61.1	62.2	57.5	21.5	21.0		21.9	22.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.35	0.79		0.58	0.99	
Incremental Delay, d2		1.1	11.1	8.5	17.2	0.2	1.1	2.2		0.5	1.9	
Delay (s)		61.8	74.5	69.6	79.3	57.7	30.0	18.9		13.1	24.2	
Level of Service		E	E	E	E	E	C	B		B	C	
Approach Delay (s)		71.4			69.7			19.5			24.1	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	674	15	1865	353	1130
v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.26	1.26	0.58
Control Delay	242.4	87.2	107.8	101.8	15.7	152.0	179.5	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Total Delay	242.4	87.2	107.8	101.8	15.7	152.1	179.5	26.9
Queue Length 50th (ft)	~85	218	248	~473	4	~1203	~380	352
Queue Length 95th (ft)	#201	#374	#436	#722	m8	#1323	#588	483
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	254	249	599	232	1477	281	1937
Starvation Cap Reductn	0	0	0	0	0	15	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	640
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.86	0.97	1.13	0.06	1.28	1.26	0.87

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	620	14	1322	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3417		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.19	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	348	3417		114	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	674	15	1437	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	277	0	18	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	397	15	1847	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		28.5	28.5	28.5	63.0	61.0		83.0	76.5	
Effective Green, g (s)		23.5		30.5	30.5	30.5	67.0	64.0		85.0	79.5	
Actuated g/C Ratio		0.16		0.20	0.20	0.20	0.45	0.43		0.57	0.53	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		254	249	321	193	1457		279	1873	
v/s Ratio Prot							0.00	0.54		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	0.20	c0.25	0.03			c0.55		
v/c Ratio		1.28		0.86	0.97	1.24	0.08	1.27		1.27	0.60	
Uniform Delay, d1		63.2		57.7	59.3	59.8	24.1	43.0		51.6	24.4	
Progression Factor		1.00		1.00	1.00	1.00	1.06	0.77		1.00	1.00	
Incremental Delay, d2		215.1		23.8	47.5	130.2	0.1	124.0		144.7	1.4	
Delay (s)		278.3		81.4	106.8	189.9	25.7	157.1		196.3	25.8	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			151.4			156.0			66.4	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	127.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	104.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	83	25	152	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	90	27	165	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	786			564			1932	1962	515	2061	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	786			472			1974	2007	418	2117	2028	755
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	70			92			0	22	71	100	100	30
cM capacity (veh/h)	833			992			9	35	578	6	34	408

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1
Volume Total	248	564	83	755	30	90	192	287
Volume Left	248	0	83	0	0	90	0	0
Volume Right	0	98	0	0	30	0	165	287
cSH	833	1700	992	1700	1700	9	180	408
Volume to Capacity	0.30	0.33	0.08	0.44	0.02	9.90	1.07	0.70
Queue Length 95th (ft)	31	0	7	0	0	Err	233	132
Control Delay (s)	11.1	0.0	9.0	0.0	0.0	Err	139.7	32.1
Lane LOS	B		A			F	F	D
Approach Delay (s)	3.4		0.9			3287.1		32.1
Approach LOS						F		D

Intersection Summary			
Average Delay	418.5		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	132	435	14	21	619	235	14	7	7	159	7	166
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	473	15	23	673	255	15	8	8	173	8	180
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		782										
pX, platoon unblocked												
vC, conflicting volume	928			488			1580	1741	480	1614	1621	801
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			488			1580	1741	480	1614	1621	801
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	81			98			58	89	99	0	91	53
cM capacity (veh/h)	737			1075			37	68	586	63	81	385

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	143	488	23	928	30	361
Volume Left	143	0	23	0	15	173
Volume Right	0	15	0	255	8	180
cSH	737	1700	1075	1700	63	110
Volume to Capacity	0.19	0.29	0.02	0.55	0.48	3.27
Queue Length 95th (ft)	18	0	2	0	48	Err
Control Delay (s)	11.1	0.0	8.4	0.0	106.9	Err
Lane LOS	B		A		F	F
Approach Delay (s)	2.5		0.2		106.9	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	1830.6		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	641	649	105	24	38	1000	1090	646
v/c Ratio	1.48	1.49	0.20	0.17	0.23	0.93	1.22	0.62
Control Delay	260.3	266.5	1.1	41.6	13.3	38.7	118.7	1.7
Queue Delay	0.5	0.5	0.0	0.0	0.0	45.5	0.0	2.0
Total Delay	260.8	267.0	1.1	41.6	13.3	84.2	118.7	3.7
Queue Length 50th (ft)	~718	~731	0	12	12	668	~1056	0
Queue Length 95th (ft)	#957	#972	2	40	26	#995	m#1188	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	434	435	537	145	166	1078	890	1038
Starvation Cap Reductn	0	0	0	0	0	0	0	241
Spillback Cap Reductn	21	22	0	0	0	211	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.55	1.57	0.20	0.17	0.23	1.15	1.22	0.81

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1179	7	97	7	7	7	35	920	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	1863			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.06	1.00			0.89	1.00
Satd. Flow (perm)	1681	1686	1583		1750		118	1863			1650	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	8	105	8	8	8	38	1000	0	8	1082	646
RTOR Reduction (vph)	0	0	78	0	7	0	0	0	0	0	0	177
Lane Group Flow (vph)	641	649	27	0	17	0	38	1000	0	0	1090	469
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	29.0	29.0	29.0		7.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	31.0	31.0	31.0		9.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.26	0.26	0.26		0.08		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	434	435	408		138		135	1125			914	877
v/s Ratio Prot	0.38	c0.38			c0.01		0.01	c0.54				
v/s Ratio Perm			0.02				0.15				c0.66	0.30
v/c Ratio	1.48	1.49	0.07		0.12		0.28	0.89			1.19	0.53
Uniform Delay, d1	44.5	44.5	33.6		51.4		26.3	20.3			26.8	16.9
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.22	0.09
Incremental Delay, d2	226.8	233.3	0.1		0.3		1.1	8.8			91.1	0.2
Delay (s)	271.3	277.8	33.7		51.7		27.5	29.1			96.9	1.8
Level of Service	F	F	C		D		C	C			F	A
Approach Delay (s)		256.4			51.7			29.0			61.5	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	118.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	184	152	1230	1060	597	1674
v/c Ratio	1.38	0.52	1.14	0.99	1.36	0.93
Control Delay	253.2	11.6	86.8	25.2	189.6	31.1
Queue Delay	0.0	11.6	1.3	39.3	0.0	11.8
Total Delay	253.2	23.2	88.0	64.5	189.6	42.9
Queue Length 50th (ft)	~198	0	~1118	507	~569	500
Queue Length 95th (ft)	#353	47	m524	m244	m#516	m#587
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	133	290	1083	1076	438	1793
Starvation Cap Reductn	0	0	241	244	0	69
Spillback Cap Reductn	0	110	0	0	0	141
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.38	0.84	1.46	1.27	1.36	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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	0	56	0	0	0	0	788	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.94						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1615						1689	1504	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1615						1689	1504	186	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	0	61	0	0	0	0	857	1433	597	1674	0
RTOR Reduction (vph)	0	140	0	0	0	0	0	14	124	0	0	0
Lane Group Flow (vph)	184	12	0	0	0	0	0	1216	936	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						73.0	70.5	63.5	56.0	
Effective Green, g (s)	9.5	9.5						72.5	76.0	65.5	59.0	
Actuated g/C Ratio	0.08	0.08						0.60	0.63	0.55	0.49	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	133	127						1020	952	438	1740	
v/s Ratio Prot								c0.72		c0.29	0.47	
v/s Ratio Perm	c0.11	0.01							c0.62	c0.45		
v/c Ratio	1.38	0.09						1.19	0.98	1.36	0.96	
Uniform Delay, d1	55.2	51.3						23.8	21.4	37.4	29.4	
Progression Factor	1.00	1.00						1.10	1.33	0.70	0.87	
Incremental Delay, d2	212.3	0.2						87.3	5.5	164.7	8.3	
Delay (s)	267.5	51.5						113.4	34.0	190.8	33.8	
Level of Service	F	D						F	C	F	C	
Approach Delay (s)		169.8			0.0			76.6			75.1	
Approach LOS		F			A			E			E	

Intersection Summary			
HCM 2000 Control Delay	82.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	545	79	1052	1784
v/c Ratio	0.59	0.59	1.01	0.33	0.49	1.05
Control Delay	37.8	37.9	81.2	38.8	12.3	52.5
Queue Delay	0.2	0.2	0.0	0.0	1.8	19.2
Total Delay	38.0	38.1	81.2	38.8	14.1	71.7
Queue Length 50th (ft)	224	225	~420	28	245	~777
Queue Length 95th (ft)	334	336	#671	m24	m194	#918
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	573	573	540	254	2182	1691
Starvation Cap Reductn	0	0	0	0	915	39
Spillback Cap Reductn	19	19	0	0	0	333
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.61	1.01	0.31	0.83	1.31

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	501	73	968	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	128	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	545	79	1052	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	337	338	545	79	1052	0	0	1776	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				37.9	37.9	37.9	64.1	70.1			55.0	
Effective Green, g (s)				40.9	40.9	40.9	70.1	73.1			58.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.58	0.61			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				572	572	539	240	2155			1683	
v/s Ratio Prot							0.03	c0.30			c0.51	
v/s Ratio Perm				0.20	0.20	c0.34	0.16					
v/c Ratio				0.59	0.59	1.01	0.33	0.49			1.06	
Uniform Delay, d1				32.6	32.6	39.5	46.8	13.0			31.0	
Progression Factor				1.00	1.00	1.00	1.40	0.93			0.54	
Incremental Delay, d2				1.6	1.6	41.6	0.1	0.0			34.2	
Delay (s)				34.2	34.3	81.1	65.6	12.2			50.8	
Level of Service				C	C	F	E	B			D	
Approach Delay (s)		0.0			55.2			15.9			50.8	
Approach LOS		A			E			B			D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	117.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	91	37	53	75	227	1369	71	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.28	0.75	0.56	0.24	0.81
Control Delay	57.6	2.8	54.9	57.6	2.7	50.5	3.9	4.9	16.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.7
Total Delay	57.6	2.9	54.9	57.6	2.7	50.5	4.1	4.9	18.6
Queue Length 50th (ft)	42	0	28	41	0	116	137	6	628
Queue Length 95th (ft)	86	0	66	86	0	m172	m151	m9	223
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	163	289	154	156	265	334	2441	296	2154
Starvation Cap Reductn	0	0	0	0	0	0	220	0	24
Spillback Cap Reductn	0	10	0	0	2	0	56	0	240
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.29	0.68	0.62	0.24	0.91

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	9	84	69	14	69	209	1073	187	65	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1789	1583	1681	1708	1583	1770	3460		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.16	1.00	
Satd. Flow (perm)		1789	1583	1681	1708	1583	101	3460		302	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	10	91	75	15	75	227	1166	203	71	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	11	0	0	5	0
Lane Group Flow (vph)	0	57	8	37	53	5	227	1358	0	71	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	79.2		73.9	69.5	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	82.2		77.9	72.5	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.69		0.65	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		163	145	131	133	97	299	2370		274	2113	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.39		0.01	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.15		
v/c Ratio		0.35	0.06	0.28	0.40	0.05	0.76	0.57		0.26	0.83	
Uniform Delay, d1		51.1	49.8	52.1	52.6	53.0	36.6	9.8		8.6	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.30	0.33		0.68	0.71	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.2	8.0	0.8		0.4	3.0	
Delay (s)		52.4	49.9	53.3	54.6	53.2	55.5	4.0		6.2	16.4	
Level of Service		D	D	D	D	D	E	A		A	B	
Approach Delay (s)		50.9			53.7			11.3			16.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	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)	11.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1509
v/c Ratio	0.38	0.79	0.79	0.61	0.03	0.75	0.86	0.61
Control Delay	55.8	69.6	70.3	10.7	6.6	16.4	50.9	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.6	70.3	10.7	6.6	16.4	50.9	13.1
Queue Length 50th (ft)	12	128	124	33	2	460	216	340
Queue Length 95th (ft)	42	#238	#233	109	m1	#547	#368	522
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	240	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	3	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	209
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.03	0.75	0.79	0.67

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1381	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3536	
Flt Permitted		0.36		0.74	0.72	1.00	0.14	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	268	3413		149	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1501	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1509	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	169	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.43	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.66	
Uniform Delay, d1		54.2		48.7	48.6	44.0	15.8	26.0		34.8	12.8	
Progression Factor		1.00		0.90	0.90	1.08	0.69	0.50		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.6	0.4	0.1	3.1		17.6	1.5	
Delay (s)		61.4		62.2	62.5	47.7	11.0	16.1		52.5	14.2	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.4			55.1			16.1			21.8	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.6	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	107	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	116	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	1.00			0.96			0.96	0.96	0.96	0.96	0.96	1.00
vC, conflicting volume	441			435			1506	1552	382	1453	1559	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436			389			1495	1542	334	1440	1550	390
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			90			100	100	84	100	100	63
cM capacity (veh/h)	1118			1121			47	77	679	69	76	655

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	116	396	46	105	241
Volume Left	248	0	116	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1118	1700	1121	1700	1700	679	655
Volume to Capacity	0.22	0.26	0.10	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	9	0	0	14	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		1.8			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	546	15	23	158	110
v/c Ratio	0.17	0.24	0.01	0.45	0.11	0.02	0.73	0.09
Control Delay	2.0	3.5	4.7	11.6	41.5	1.0	65.9	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	3.5	4.7	11.6	41.5	1.0	65.9	1.6
Queue Length 50th (ft)	4	14	1	176	10	0	118	0
Queue Length 95th (ft)	m11	m144	6	319	29	4	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	608	1386	791	1214	229	1074	360	1210
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	0.17	0.24	0.01	0.45	0.07	0.02	0.44	0.09

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	398	104	14	0	21	138	7	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1805			1770	1583		1778	1583
Flt Permitted	0.37	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	692	1856		1046	1805			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	433	113	15	0	23	150	8	110
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	31
Lane Group Flow (vph)	105	329	0	8	540	0	0	15	15	0	158	79
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	594	1337		718	1209			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.30							
v/s Ratio Perm	0.12			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.45			0.11	0.01		0.73	0.07
Uniform Delay, d1	4.8	5.7		6.2	9.3			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.2			0.3	0.0		11.5	0.1
Delay (s)	1.9	3.4		6.2	10.5			43.4	6.6		59.4	5.0
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.5			21.1			37.1	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1224	1490
v/c Ratio	1.31	1.35	0.13	0.20	0.90	0.93	1.27	1.12
Control Delay	207.2	224.9	0.7	54.0	84.1	33.5	137.1	75.1
Queue Delay	0.2	0.2	0.0	0.0	0.0	45.5	0.0	1.0
Total Delay	207.4	225.1	0.7	54.0	84.1	79.0	137.1	76.1
Queue Length 50th (ft)	~500	~531	0	15	64	937	~1497	~709
Queue Length 95th (ft)	#720	#755	0	47	#192	#1398	m#1069	m259
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	291	292	388	118	135	1296	960	1334
Starvation Cap Reductn	0	0	0	0	0	0	0	281
Spillback Cap Reductn	4	4	0	0	0	281	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	1.37	0.13	0.20	0.90	1.19	1.27	1.42

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1119	1371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	1861			1862	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.04	1.00			0.80	1.00
Satd. Flow (perm)	1681	1688	1583		1750		80	1861			1499	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1216	1490
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	301
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1224	1189
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	24.0	24.0	24.0		7.5		102.5	102.5			96.5	96.5
Effective Green, g (s)	26.0	26.0	26.0		9.5		100.0	104.5			99.5	99.5
Actuated g/C Ratio	0.17	0.17	0.17		0.06		0.67	0.70			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	291	292	274		110		132	1296			994	1050
v/s Ratio Prot	0.23	c0.23			c0.01		0.04	c0.65				
v/s Ratio Perm			0.01				0.57				c0.82	0.75
v/c Ratio	1.31	1.35	0.03		0.15		0.92	0.93			1.23	1.13
Uniform Delay, d1	62.0	62.0	51.5		66.4		48.4	19.6			25.2	25.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.14	2.30
Incremental Delay, d2	160.3	179.6	0.1		0.6		53.1	11.7			105.0	61.0
Delay (s)	222.3	241.6	51.6		67.1		101.6	31.3			108.6	119.2
Level of Service	F	F	D		E		F	C			F	F
Approach Delay (s)		220.8			67.1			37.7			114.4	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	111.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	157.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	524	2634
v/c Ratio	1.43	0.64	1.01	0.76	1.13	1.22
Control Delay	287.2	24.1	39.9	11.8	105.4	124.2
Queue Delay	0.0	28.6	33.8	50.6	1.4	0.4
Total Delay	287.2	52.7	73.7	62.4	106.8	124.7
Queue Length 50th (ft)	~210	6	~990	306	~551	~1674
Queue Length 95th (ft)	#368	83	m837	m208	m457	m#1278
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	1136	1068	465	2158
Starvation Cap Reductn	0	0	308	353	65	322
Spillback Cap Reductn	0	80	1	0	0	285
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.97	1.39	1.14	1.31	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	482	2423	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.95	0.95	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						1770	1504	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.06	1.00	
Satd. Flow (perm)	1681	1590						1770	1504	115	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	524	2634	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	103	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	712	524	2634	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						93.3	91.3	98.0	88.5	
Effective Green, g (s)	9.5	9.5						92.8	96.3	100.0	91.5	
Actuated g/C Ratio	0.06	0.06						0.62	0.64	0.67	0.61	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						1095	965	465	2158	
v/s Ratio Prot								c0.65		c0.26	c0.74	
v/s Ratio Perm	c0.09	0.01							0.47	0.49		
v/c Ratio	1.43	0.15						1.05	0.74	1.13	1.22	
Uniform Delay, d1	70.2	66.4						28.6	18.3	50.0	29.2	
Progression Factor	1.00	1.00						1.08	0.96	1.08	0.80	
Incremental Delay, d2	240.8	0.7						25.0	0.3	60.0	99.7	
Delay (s)	311.0	67.1						55.9	17.8	114.2	123.0	
Level of Service	F	E						E	B	F	F	
Approach Delay (s)		190.7			0.0			40.1			121.6	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	95.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	115.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	1928
v/c Ratio	1.17	1.18	1.08	0.43	0.62	1.15
Control Delay	135.0	135.5	104.8	33.7	6.6	95.8
Queue Delay	3.5	3.5	6.9	0.0	5.2	0.5
Total Delay	138.4	139.0	111.7	33.7	11.8	96.3
Queue Length 50th (ft)	~925	~927	~718	37	245	~1141
Queue Length 95th (ft)	#1190	#1192	#961	m31	m217	#1284
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	639	639	602	208	2088	1683
Starvation Cap Reductn	0	0	0	0	731	83
Spillback Cap Reductn	223	223	25	0	392	242
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.80	1.81	1.13	0.41	0.95	1.34

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1524	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3465	
Flt Permitted				0.95	0.95	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	103	3539			3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1657	271
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	1919	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				54.1	54.1	54.1	79.4	84.9			69.5	
Effective Green, g (s)				57.1	57.1	57.1	85.4	87.9			72.5	
Actuated g/C Ratio				0.38	0.38	0.38	0.57	0.59			0.48	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				639	639	602	202	2073			1674	
v/s Ratio Prot							0.04	c0.36			c0.55	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.17	1.18	1.08	0.43	0.62			1.15	
Uniform Delay, d1				46.4	46.4	46.4	61.3	20.2			38.8	
Progression Factor				1.00	1.00	1.00	0.76	0.32			0.64	
Incremental Delay, d2				94.0	94.6	61.2	0.3	0.1			70.9	
Delay (s)				140.4	141.1	107.6	46.7	6.5			95.6	
Level of Service				F	F	F	D	A			F	
Approach Delay (s)		0.0			130.7			9.0			95.6	
Approach LOS		A			F			A			F	

Intersection Summary			
HCM 2000 Control Delay	87.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	169.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	167	195	293	99	1836	15	1558
v/c Ratio	0.33	0.84	0.67	0.77	0.77	0.55	0.83	0.11	0.76
Control Delay	62.1	61.9	73.4	80.9	35.9	26.7	21.4	7.9	28.7
Queue Delay	0.0	1.8	5.6	13.6	1.6	0.0	37.2	0.0	3.1
Total Delay	62.1	63.7	79.0	94.5	37.5	26.7	58.6	7.9	31.9
Queue Length 50th (ft)	71	147	162	193	97	28	734	4	765
Queue Length 95th (ft)	126	#278	158	182	61	m62	m863	m7	m811
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	263	313	268	271	394	183	2221	138	2044
Starvation Cap Reductn	0	0	0	0	0	0	73	0	231
Spillback Cap Reductn	0	15	57	58	27	0	515	0	374
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.83	0.79	0.92	0.80	0.54	1.08	0.11	0.93

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	201	16	176	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1697	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.07	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1697	1583	125	3507		86	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	335	27	293	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	82	0	0	164	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	164	167	195	129	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		17.1	17.1	19.5	19.5	19.5	95.9	89.2		86.5	84.3	
Effective Green, g (s)		20.1	20.1	22.5	22.5	20.5	97.9	92.2		90.5	87.3	
Actuated g/C Ratio		0.13	0.13	0.15	0.15	0.14	0.65	0.61		0.60	0.58	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		241	212	252	254	216	181	2155		99	2041	
v/s Ratio Prot		0.04		0.10	c0.11		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.08	0.32			0.09		
v/c Ratio		0.33	0.77	0.66	0.77	0.60	0.55	0.85		0.15	0.76	
Uniform Delay, d1		58.9	62.7	60.2	61.2	60.9	23.2	23.3		24.4	23.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.31	0.82		0.67	1.09	
Incremental Delay, d2		0.8	15.9	6.4	13.0	4.4	2.1	2.8		0.5	2.0	
Delay (s)		59.7	78.6	66.6	74.2	65.3	32.5	21.8		16.9	27.6	
Level of Service		E	E	E	E	E	C	C		B	C	
Approach Delay (s)		74.0			68.3			22.4			27.5	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	1955	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.23	1.26	0.55
Control Delay	242.4	120.1	158.1	80.0	13.9	135.6	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Total Delay	242.4	120.1	158.1	80.0	13.9	135.7	181.6	23.0
Queue Length 50th (ft)	~85	~237	~295	~350	3	~1227	~380	321
Queue Length 95th (ft)	#201	m#406	m#469	#587	m7	#1354	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1591	280	2055
Starvation Cap Reductn	0	0	0	0	0	23	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	721
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.25	1.26	0.85

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1405	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3423		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3423		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1527	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	275	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	309	15	1938	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1574		279	1991	
v/s Ratio Prot							0.00	0.57		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.23		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.84	1.10	0.76		1.00	1.00	
Incremental Delay, d2		215.1		64.1	108.2	98.4	0.1	107.5		144.7	1.2	
Delay (s)		278.3		121.9	166.1	151.0	23.4	138.4		197.2	22.2	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			148.4			137.5			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	118.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	177	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	192	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.76	0.76	0.92	0.76	0.76	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	500			481			1829	1869	428	1764	1894	458
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	67	100	100	33
cM capacity (veh/h)	760			993			10	34	576	23	33	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	192	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	192	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.33	0.67
Queue Length 95th (ft)	36	0	7	0	0	37	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	14.4	28.5
Lane LOS	B		A			B	D
Approach Delay (s)	3.7		0.9			14.4	28.5
Approach LOS						B	D

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	171	488	23	928	23	8	181	180
v/c Ratio	0.49	0.35	0.03	0.75	0.10	0.03	0.83	0.54
Control Delay	4.6	3.6	4.9	20.9	52.0	0.1	90.2	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	3.6	4.9	20.9	52.0	0.1	90.2	34.0
Queue Length 50th (ft)	12	76	5	542	19	0	172	80
Queue Length 95th (ft)	m13	m86	12	847	47	0	#259	158
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	391	1377	667	1237	278	364	258	377
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	0.44	0.35	0.03	0.75	0.08	0.02	0.70	0.48

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	435	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1854		1770	1786			1804	1583		1778	1583
Flt Permitted	0.18	1.00		0.47	1.00			0.77	1.00		0.72	1.00
Satd. Flow (perm)	328	1854		874	1786			1441	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	473	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	7	0	0	0	7	0	0	75
Lane Group Flow (vph)	171	487	0	23	921	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.6	109.8		106.1	103.3			24.4	24.4		24.4	24.4
Effective Green, g (s)	116.6	109.8		106.1	103.3			24.4	24.4		24.4	24.4
Actuated g/C Ratio	0.78	0.73		0.71	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	344	1357		634	1229			234	257		217	257
v/s Ratio Prot	c0.03	0.26		0.00	c0.52							
v/s Ratio Perm	0.36			0.02				0.02	0.00		c0.14	0.07
v/c Ratio	0.50	0.36		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.2	7.3		6.5	15.0			53.4	52.6		60.8	56.3
Progression Factor	0.54	0.42		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	0.3		0.0	4.2			0.2	0.0		23.2	1.1
Delay (s)	8.7	3.4		6.6	19.2			53.6	52.6		84.0	57.4
Level of Service	A	A		A	B			D	D		F	E
Approach Delay (s)		4.8			18.9			53.4			70.7	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	641	649	105	24	38	1000	1090	646
v/c Ratio	1.24	1.25	0.17	0.17	0.17	0.53	0.66	0.58
Control Delay	159.1	164.1	0.8	41.6	14.3	19.9	1.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.3	1.6	5.0
Total Delay	159.1	164.1	0.8	41.6	14.3	20.2	2.9	7.1
Queue Length 50th (ft)	~648	~660	0	12	13	257	14	0
Queue Length 95th (ft)	#887	#901	2	40	30	317	m16	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	518	519	607	145	229	1872	1640	1105
Starvation Cap Reductn	0	0	0	0	0	0	351	383
Spillback Cap Reductn	0	0	0	0	0	322	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.24	1.25	0.17	0.17	0.17	0.65	0.85	0.89

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1179	7	97	7	7	7	35	920	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1686	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.14	1.00			0.95	1.00
Satd. Flow (perm)	1681	1686	1583		1750		258	3539			3348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	8	105	8	8	8	38	1000	0	8	1082	646
RTOR Reduction (vph)	0	0	73	0	7	0	0	0	0	0	0	320
Lane Group Flow (vph)	641	649	32	0	17	0	38	1000	0	0	1090	326
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	35.0	35.0	35.0		7.5		62.5	62.5			57.5	57.5
Effective Green, g (s)	37.0	37.0	37.0		9.5		62.0	66.5			60.5	60.5
Actuated g/C Ratio	0.31	0.31	0.31		0.08		0.52	0.55			0.50	0.50
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	518	519	488		138		196	1961			1687	798
v/s Ratio Prot	0.38	c0.38			c0.01		0.01	c0.28				
v/s Ratio Perm			0.02				0.09				c0.33	0.21
v/c Ratio	1.24	1.25	0.07		0.12		0.19	0.51			0.65	0.41
Uniform Delay, d1	41.5	41.5	29.3		51.4		17.6	16.6			21.9	18.6
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	1.16
Incremental Delay, d2	122.6	128.0	0.1		0.3		0.5	0.2			0.1	0.0
Delay (s)	164.1	169.5	29.4		51.7		18.1	16.8			1.1	21.6
Level of Service	F	F	C		D		B	B			A	C
Approach Delay (s)		156.5			51.7			16.8			8.8	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	60.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	184	152	1230	1060	597	1674
v/c Ratio	1.38	0.52	0.63	1.08	1.17	1.04
Control Delay	253.2	11.6	10.7	63.9	104.5	54.9
Queue Delay	0.0	0.0	16.3	7.5	1.0	13.3
Total Delay	253.2	11.6	27.1	71.4	105.5	68.2
Queue Length 50th (ft)	~198	0	212	~871	~515	~767
Queue Length 95th (ft)	#353	47	m197	m#482	m#513	m#787
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	133	290	1952	979	511	1616
Starvation Cap Reductn	0	0	735	92	56	52
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.38	0.52	1.01	1.20	1.31	1.07

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	0	56	0	0	0	0	788	1318	549	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.94						0.95	0.85	1.00	1.00	
Flt Protected	0.95	0.97						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1615						3236	1441	1770	3539	
Flt Permitted	0.95	0.97						1.00	1.00	0.14	1.00	
Satd. Flow (perm)	1681	1615						3236	1441	257	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	0	61	0	0	0	0	857	1433	597	1674	0
RTOR Reduction (vph)	0	140	0	0	0	0	0	39	127	0	0	0
Lane Group Flow (vph)	184	12	0	0	0	0	0	1191	933	597	1674	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						68.0	65.5	57.5	50.0	
Effective Green, g (s)	9.5	9.5						67.5	71.0	59.5	53.0	
Actuated g/C Ratio	0.08	0.08						0.56	0.59	0.50	0.44	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	2.5	2.5								2.5	5.0	
Lane Grp Cap (vph)	133	127						1820	852	511	1563	
v/s Ratio Prot								0.37		c0.30	0.47	
v/s Ratio Perm	c0.11	0.01							c0.65	c0.28		
v/c Ratio	1.38	0.09						0.65	1.09	1.17	1.07	
Uniform Delay, d1	55.2	51.3						18.2	24.5	35.3	33.5	
Progression Factor	1.00	1.00						0.69	1.03	0.76	0.86	
Incremental Delay, d2	212.3	0.2						0.3	50.2	77.9	38.7	
Delay (s)	267.5	51.5						12.8	75.5	104.8	67.6	
Level of Service	F	D						B	E	F	E	
Approach Delay (s)		169.8			0.0			41.8			77.4	
Approach LOS		F			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	67.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	337	338	545	79	1052	1784
v/c Ratio	0.59	0.59	1.01	0.33	0.49	1.05
Control Delay	37.8	37.9	81.2	39.6	11.9	52.5
Queue Delay	0.2	0.2	0.0	0.0	1.3	19.5
Total Delay	38.0	38.1	81.2	39.6	13.3	72.0
Queue Length 50th (ft)	224	225	~420	29	200	~777
Queue Length 95th (ft)	334	336	#671	m61	m220	#918
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	573	573	540	254	2182	1691
Starvation Cap Reductn	0	0	0	0	857	39
Spillback Cap Reductn	20	20	0	0	0	441
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.61	1.01	0.31	0.79	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	621	0	501	73	968	0	0	1468	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0	3.0	3.0	3.0			3.0	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3483	
Flt Permitted				0.95	0.95	1.00	0.07	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	128	3539			3483	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	675	0	545	79	1052	0	0	1596	188
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	337	338	545	79	1052	0	0	1776	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				37.9	37.9	37.9	64.1	70.1			55.0	
Effective Green, g (s)				40.9	40.9	40.9	70.1	73.1			58.0	
Actuated g/C Ratio				0.34	0.34	0.34	0.58	0.61			0.48	
Clearance Time (s)				6.0	6.0	6.0	6.0				6.0	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				572	572	539	240	2155			1683	
v/s Ratio Prot							0.03	c0.30			c0.51	
v/s Ratio Perm				0.20	0.20	c0.34	0.16					
v/c Ratio				0.59	0.59	1.01	0.33	0.49			1.06	
Uniform Delay, d1				32.6	32.6	39.5	46.8	13.0			31.0	
Progression Factor				1.00	1.00	1.00	1.34	0.87			0.54	
Incremental Delay, d2				1.6	1.6	41.6	0.6	0.1			34.2	
Delay (s)				34.2	34.3	81.1	63.4	11.5			50.8	
Level of Service				C	C	F	E	B			D	
Approach Delay (s)		0.0			55.2			15.1			50.8	
Approach LOS		A			E			B			D	

Intersection Summary			
HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	57	91	37	53	75	227	1369	71	1751
v/c Ratio	0.35	0.31	0.24	0.34	0.28	0.75	0.56	0.24	0.81
Control Delay	57.6	2.8	54.9	57.6	2.7	50.2	4.0	4.9	16.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.7
Total Delay	57.6	2.9	54.9	57.6	2.7	50.2	4.2	4.9	18.6
Queue Length 50th (ft)	42	0	28	41	0	116	140	6	628
Queue Length 95th (ft)	86	0	66	86	0	m172	m153	m9	223
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	163	289	154	156	265	334	2441	296	2154
Starvation Cap Reductn	0	0	0	0	0	0	220	0	24
Spillback Cap Reductn	0	10	0	0	2	0	55	0	240
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.33	0.24	0.34	0.29	0.68	0.62	0.24	0.91

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	9	84	69	14	69	209	1073	187	65	1488	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.96	1.00	0.95	0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1789	1583	1681	1708	1583	1770	3460		1770	3499	
Flt Permitted		0.96	1.00	0.95	0.97	1.00	0.05	1.00		0.16	1.00	
Satd. Flow (perm)		1789	1583	1681	1708	1583	101	3460		302	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	10	91	75	15	75	227	1166	203	71	1617	134
RTOR Reduction (vph)	0	0	83	0	0	70	0	11	0	0	5	0
Lane Group Flow (vph)	0	57	8	37	53	5	227	1358	0	71	1746	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		8.0	8.0	6.4	6.4	6.4	88.1	79.2		73.9	69.5	
Effective Green, g (s)		11.0	11.0	9.4	9.4	7.4	90.1	82.2		77.9	72.5	
Actuated g/C Ratio		0.09	0.09	0.08	0.08	0.06	0.75	0.69		0.65	0.60	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		163	145	131	133	97	299	2370		274	2113	
v/s Ratio Prot		c0.03		0.02	c0.03		c0.10	0.39		0.01	c0.50	
v/s Ratio Perm			0.01			0.00	0.47			0.15		
v/c Ratio		0.35	0.06	0.28	0.40	0.05	0.76	0.57		0.26	0.83	
Uniform Delay, d1		51.1	49.8	52.1	52.6	53.0	36.6	9.8		8.6	18.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.29	0.34		0.68	0.71	
Incremental Delay, d2		1.3	0.2	1.2	2.0	0.2	8.0	0.8		0.4	3.0	
Delay (s)		52.4	49.9	53.3	54.6	53.2	55.2	4.1		6.2	16.4	
Level of Service		D	D	D	D	D	E	A		A	B	
Approach Delay (s)		50.9			53.7			11.4			16.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	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)	11.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	163	158	316	8	1280	371	1509
v/c Ratio	0.38	0.79	0.79	0.61	0.03	0.75	0.86	0.61
Control Delay	55.8	69.6	70.3	10.7	6.6	16.4	50.9	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	55.8	69.6	70.3	10.7	6.6	16.4	50.9	13.1
Queue Length 50th (ft)	12	128	124	33	2	452	216	340
Queue Length 95th (ft)	42	#238	#233	109	m1	#544	#368	522
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	66	221	214	529	240	1708	467	2470
Starvation Cap Reductn	0	0	0	0	0	3	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	209
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.74	0.74	0.60	0.03	0.75	0.79	0.67

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	7	7	288	7	291	7	898	280	341	1381	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected		0.98		0.95	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750		1681	1689	1583	1770	3413		1770	3536	
Flt Permitted		0.36		0.74	0.72	1.00	0.14	1.00		0.08	1.00	
Satd. Flow (perm)		633		1312	1273	1583	268	3413		149	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	8	8	313	8	316	8	976	304	371	1501	8
RTOR Reduction (vph)	0	8	0	0	0	266	0	22	0	0	0	0
Lane Group Flow (vph)	0	17	0	163	158	50	8	1258	0	371	1509	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		5.5		16.9	16.9	16.9	55.2	54.2		80.6	75.1	
Effective Green, g (s)		7.5		18.9	18.9	18.9	59.2	57.2		82.6	78.1	
Actuated g/C Ratio		0.06		0.16	0.16	0.16	0.49	0.48		0.69	0.65	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		39		206	200	249	169	1626		425	2301	
v/s Ratio Prot							0.00	0.37		c0.17	0.43	
v/s Ratio Perm		c0.03		c0.12	0.12	0.03	0.02			c0.43		
v/c Ratio		0.42		0.79	0.79	0.20	0.05	0.77		0.87	0.66	
Uniform Delay, d1		54.2		48.7	48.6	44.0	15.8	26.0		34.8	12.8	
Progression Factor		1.00		0.90	0.90	1.08	0.69	0.50		1.00	1.00	
Incremental Delay, d2		7.2		18.2	18.6	0.4	0.1	3.1		17.6	1.5	
Delay (s)		61.4		62.2	62.5	47.7	11.1	16.2		52.5	14.2	
Level of Service		E		E	E	D	B	B		D	B	
Approach Delay (s)		61.4			55.1			16.1			21.8	
Approach LOS		E			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	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)	12.5
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	303	97	107	364	42	0	0	97	0	0	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	329	105	116	396	46	0	0	105	0	0	241
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	1.00			0.96			0.96	0.96	0.96	0.96	0.96	1.00
vC, conflicting volume	441			435			1506	1552	382	1453	1559	396
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436			389			1495	1542	334	1440	1550	390
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	78			90			100	100	84	100	100	63
cM capacity (veh/h)	1118			1121			47	77	679	69	76	655

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	435	116	396	46	105	241
Volume Left	248	0	116	0	0	0	0
Volume Right	0	105	0	0	46	105	241
cSH	1118	1700	1121	1700	1700	679	655
Volume to Capacity	0.22	0.26	0.10	0.23	0.03	0.16	0.37
Queue Length 95th (ft)	21	0	9	0	0	14	42
Control Delay (s)	9.1	0.0	8.6	0.0	0.0	11.3	13.7
Lane LOS	A		A			B	B
Approach Delay (s)	3.3		1.8			11.3	13.7
Approach LOS						B	B

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	105	330	8	546	15	23	158	110
v/c Ratio	0.17	0.24	0.01	0.45	0.11	0.02	0.73	0.09
Control Delay	2.0	3.5	4.7	11.6	41.5	1.0	65.9	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.0	3.5	4.7	11.6	41.5	1.0	65.9	1.6
Queue Length 50th (ft)	4	14	1	176	10	0	118	0
Queue Length 95th (ft)	m11	m144	6	319	29	4	180	22
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	608	1386	791	1214	229	1074	360	1210
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	0.17	0.24	0.01	0.45	0.07	0.02	0.44	0.09

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	296	7	7	398	104	14	0	21	138	7	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1770	1856		1770	1805			1770	1583		1778	1583
Flt Permitted	0.37	1.00		0.56	1.00			0.46	1.00		0.73	1.00
Satd. Flow (perm)	692	1856		1046	1805			863	1583		1352	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	322	8	8	433	113	15	0	23	150	8	110
RTOR Reduction (vph)	0	1	0	0	6	0	0	0	8	0	0	31
Lane Group Flow (vph)	105	329	0	8	540	0	0	15	15	0	158	79
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	custom	Perm	NA	custom
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		2	8		6
Actuated Green, G (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Effective Green, g (s)	91.7	86.5		81.6	80.4			19.3	80.4		19.3	86.5
Actuated g/C Ratio	0.76	0.72		0.68	0.67			0.16	0.67		0.16	0.72
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	5.0		4.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	594	1337		718	1209			138	1060		217	1141
v/s Ratio Prot	c0.01	0.18		0.00	c0.30							
v/s Ratio Perm	0.12			0.01				0.02	0.01		c0.12	0.05
v/c Ratio	0.18	0.25		0.01	0.45			0.11	0.01		0.73	0.07
Uniform Delay, d1	4.8	5.7		6.2	9.3			43.0	6.6		47.9	4.9
Progression Factor	0.37	0.53		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.4		0.0	1.2			0.3	0.0		11.5	0.1
Delay (s)	1.9	3.4		6.2	10.5			43.4	6.6		59.4	5.0
Level of Service	A	A		A	B			D	A		E	A
Approach Delay (s)		3.0			10.5			21.1			37.1	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	380	395	52	24	121	1205	1224	1490
v/c Ratio	1.26	1.30	0.13	0.20	0.44	0.49	0.58	1.10
Control Delay	188.7	205.3	0.7	54.0	12.1	11.8	0.5	67.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	15.0	1.9
Total Delay	188.7	205.3	0.7	54.0	12.1	12.0	15.5	69.6
Queue Length 50th (ft)	~488	~518	0	15	35	270	7	~696
Queue Length 95th (ft)	#708	#743	0	47	57	318	m10	m258
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	302	303	398	118	278	2440	2115	1357
Starvation Cap Reductn	0	0	0	0	0	0	897	314
Spillback Cap Reductn	0	0	0	0	0	509	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.26	1.30	0.13	0.20	0.44	0.62	1.00	1.43

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1119	1371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.95	0.95	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1688	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			0.94	1.00
Satd. Flow (perm)	1681	1688	1583		1750		298	3536			3342	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1216	1490
RTOR Reduction (vph)	0	0	43	0	7	0	0	0	0	0	0	332
Lane Group Flow (vph)	380	395	9	0	17	0	121	1205	0	0	1224	1158
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	25.0	25.0	25.0		7.5		101.5	101.5			95.5	95.5
Effective Green, g (s)	27.0	27.0	27.0		9.5		99.0	103.5			98.5	98.5
Actuated g/C Ratio	0.18	0.18	0.18		0.06		0.66	0.69			0.66	0.66
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	302	303	284		110		265	2439			2194	1039
v/s Ratio Prot	0.23	c0.23			c0.01		0.02	c0.34				
v/s Ratio Perm			0.01				0.28				0.37	c0.73
v/c Ratio	1.26	1.30	0.03		0.15		0.46	0.49			0.56	1.11
Uniform Delay, d1	61.5	61.5	50.7		66.4		12.9	10.9			14.0	25.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.83
Incremental Delay, d2	140.3	158.6	0.1		0.6		1.2	0.2			0.0	53.0
Delay (s)	201.8	220.1	50.8		67.1		14.1	11.1			0.4	125.8
Level of Service	F	F	D		E		B	B			A	F
Approach Delay (s)		201.0			67.1			11.4			69.2	
Approach LOS		F			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	75.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	129.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	152	148	1149	815	524	2634
v/c Ratio	1.43	0.64	0.54	0.81	1.01	1.23
Control Delay	287.2	24.1	15.5	22.6	57.1	129.7
Queue Delay	0.0	0.9	2.3	2.1	33.9	0.3
Total Delay	287.2	25.0	17.9	24.7	91.0	130.0
Queue Length 50th (ft)	~210	6	305	418	~533	~1687
Queue Length 95th (ft)	#368	83	m299	m436	m462	m#1292
Internal Link Dist (ft)		306	194			417
Turn Bay Length (ft)	175				400	
Base Capacity (vph)	106	233	2122	1012	521	2135
Starvation Cap Reductn	0	0	801	93	126	227
Spillback Cap Reductn	0	12	116	0	0	193
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.43	0.67	0.87	0.89	1.33	1.38

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	202	0	74	0	0	0	0	1057	750	482	2423	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5	2.5						2.0	2.0	4.5	3.5	
Lane Util. Factor	0.95	0.95						0.91	0.91	1.00	0.95	
Frt	1.00	0.92						1.00	0.85	1.00	1.00	
Flt Protected	0.95	0.98						1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1681	1590						3390	1441	1770	3539	
Flt Permitted	0.95	0.98						1.00	1.00	0.10	1.00	
Satd. Flow (perm)	1681	1590						3390	1441	190	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	0	80	0	0	0	0	1149	815	524	2634	0
RTOR Reduction (vph)	0	133	0	0	0	0	0	0	110	0	0	0
Lane Group Flow (vph)	152	15	0	0	0	0	0	1149	705	524	2634	0
Turn Type	Perm	NA						NA	custom	pm+pt	NA	
Protected Phases		4						3 6		5	2	
Permitted Phases	4								3 6 9	2		
Actuated Green, G (s)	7.5	7.5						90.9	88.9	97.0	87.5	
Effective Green, g (s)	9.5	9.5						90.4	93.9	99.0	90.5	
Actuated g/C Ratio	0.06	0.06						0.60	0.63	0.66	0.60	
Clearance Time (s)	4.5	4.5								6.5	6.5	
Vehicle Extension (s)	3.0	3.0								3.0	5.0	
Lane Grp Cap (vph)	106	100						2043	902	521	2135	
v/s Ratio Prot								0.34		c0.25	c0.74	
v/s Ratio Perm	c0.09	0.01							c0.49	0.41		
v/c Ratio	1.43	0.15						0.56	0.78	1.01	1.23	
Uniform Delay, d1	70.2	66.4						17.9	20.5	43.8	29.8	
Progression Factor	1.00	1.00						0.93	1.38	1.10	0.76	
Incremental Delay, d2	240.8	0.7						0.2	2.8	13.2	105.6	
Delay (s)	311.0	67.1						16.9	31.0	61.3	128.2	
Level of Service	F	E						B	C	E	F	
Approach Delay (s)		190.7			0.0			22.8			117.1	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	87.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	750	751	652	86	1283	1928
v/c Ratio	1.17	1.18	1.08	0.43	0.62	1.15
Control Delay	135.0	135.5	104.8	51.2	16.6	96.5
Queue Delay	1.3	1.3	6.7	0.0	1.4	0.9
Total Delay	136.3	136.9	111.6	51.2	18.0	97.4
Queue Length 50th (ft)	~925	~927	~718	46	381	~1142
Queue Length 95th (ft)	#1190	#1192	#961	104	m398	#1283
Internal Link Dist (ft)		494			417	361
Turn Bay Length (ft)	430		350	400		
Base Capacity (vph)	639	639	602	208	2088	1683
Starvation Cap Reductn	0	0	0	0	557	83
Spillback Cap Reductn	106	106	10	0	386	386
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.41	1.41	1.10	0.41	0.84	1.49

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	1381	0	600	79	1180	0	0	1524	249
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				2.5	2.5	2.5	2.5	2.5			2.5	
Lane Util. Factor				0.95	0.95	1.00	1.00	0.95			0.95	
Frt				1.00	1.00	0.85	1.00	1.00			0.98	
Flt Protected				0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)				1681	1681	1583	1770	3539			3465	
Flt Permitted				0.95	0.95	1.00	0.06	1.00			1.00	
Satd. Flow (perm)				1681	1681	1583	103	3539			3465	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1501	0	652	86	1283	0	0	1657	271
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	0	0	750	751	652	86	1283	0	0	1919	0
Turn Type				Perm	NA	Perm	custom	NA			NA	
Protected Phases					4		1	1 6			2	
Permitted Phases				4		4	6					
Actuated Green, G (s)				54.1	54.1	54.1	79.4	84.9			69.5	
Effective Green, g (s)				57.1	57.1	57.1	85.4	87.9			72.5	
Actuated g/C Ratio				0.38	0.38	0.38	0.57	0.59			0.48	
Clearance Time (s)				5.5	5.5	5.5	5.5				5.5	
Vehicle Extension (s)				3.0	3.0	3.0	3.0				5.0	
Lane Grp Cap (vph)				639	639	602	202	2073			1674	
v/s Ratio Prot							0.04	c0.36			c0.55	
v/s Ratio Perm				0.45	0.45	0.41	0.21					
v/c Ratio				1.17	1.18	1.08	0.43	0.62			1.15	
Uniform Delay, d1				46.4	46.4	46.4	61.3	20.2			38.8	
Progression Factor				1.00	1.00	1.00	1.07	0.77			0.66	
Incremental Delay, d2				94.0	94.6	61.2	1.2	0.4			70.9	
Delay (s)				140.4	141.1	107.6	66.8	15.9			96.6	
Level of Service				F	F	F	E	B			F	
Approach Delay (s)		0.0			130.7			19.1			96.6	
Approach LOS		A			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	90.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	135.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	246	167	195	293	99	1836	15	1558
v/c Ratio	0.33	0.84	0.67	0.77	0.77	0.55	0.83	0.11	0.76
Control Delay	62.1	61.9	73.4	80.9	35.9	28.0	20.6	5.8	23.4
Queue Delay	0.0	2.0	6.8	17.0	1.6	0.0	33.3	0.0	3.0
Total Delay	62.1	63.9	80.1	97.9	37.4	28.0	53.9	5.8	26.4
Queue Length 50th (ft)	71	147	162	193	97	25	726	4	730
Queue Length 95th (ft)	126	#278	158	182	61	m63	m928	m6	m774
Internal Link Dist (ft)	268			247			361		109
Turn Bay Length (ft)		250				200		180	
Base Capacity (vph)	263	313	268	271	394	183	2221	138	2044
Starvation Cap Reductn	0	0	0	0	0	0	73	0	96
Spillback Cap Reductn	0	16	62	63	26	0	500	0	369
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.83	0.81	0.94	0.80	0.54	1.07	0.11	0.93

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	21	226	201	16	176	91	1585	104	14	1345	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	5.0	2.5	2.5		2.5	2.5	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1799	1583	1681	1697	1583	1770	3507		1770	3507	
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.07	1.00		0.05	1.00	
Satd. Flow (perm)		1799	1583	1681	1697	1583	125	3507		86	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.60	0.60	0.60	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	23	246	335	27	293	99	1723	113	15	1462	96
RTOR Reduction (vph)	0	0	82	0	0	164	0	3	0	0	3	0
Lane Group Flow (vph)	0	80	164	167	195	129	99	1833	0	15	1555	0
Turn Type	Split	NA	Perm	Split	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases			4			8	6			2		
Actuated Green, G (s)		17.1	17.1	19.5	19.5	19.5	95.9	89.2		86.5	84.3	
Effective Green, g (s)		20.1	20.1	22.5	22.5	20.5	97.9	92.2		90.5	87.3	
Actuated g/C Ratio		0.13	0.13	0.15	0.15	0.14	0.65	0.61		0.60	0.58	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.5	5.5		4.5	5.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		241	212	252	254	216	181	2155		99	2041	
v/s Ratio Prot		0.04		0.10	c0.11		c0.03	c0.52		0.00	0.44	
v/s Ratio Perm			c0.10			0.08	0.32			0.09		
v/c Ratio		0.33	0.77	0.66	0.77	0.60	0.55	0.85		0.15	0.76	
Uniform Delay, d1		58.9	62.7	60.2	61.2	60.9	23.2	23.3		24.4	23.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.40	0.78		0.46	0.87	
Incremental Delay, d2		0.8	15.9	6.4	13.0	4.4	2.1	2.8		0.5	2.0	
Delay (s)		59.7	78.6	66.6	74.2	65.3	34.5	20.9		11.8	22.5	
Level of Service		E	E	E	E	E	C	C		B	C	
Approach Delay (s)		74.0			68.3			21.6			22.4	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	75	218	241	584	15	1955	353	1130
v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.23	1.26	0.55
Control Delay	242.4	120.2	158.2	80.3	12.2	133.4	181.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Total Delay	242.4	120.2	158.2	80.3	12.2	133.4	181.6	22.0
Queue Length 50th (ft)	~85	~237	~294	~349	2	~1233	~380	321
Queue Length 95th (ft)	#201	m#406	m#470	#586	m6	#1354	#588	447
Internal Link Dist (ft)	240		252			239		1592
Turn Bay Length (ft)					200		200	
Base Capacity (vph)	60	213	208	543	255	1591	280	2055
Starvation Cap Reductn	0	0	0	0	0	23	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	583
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	1.02	1.16	1.08	0.06	1.25	1.26	0.77

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	28	14	401	21	537	14	1405	394	325	1032	7
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	2.5	3.0		2.5	3.0	
Lane Util. Factor		1.00		0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frt		0.97		1.00	1.00	0.85	1.00	0.97		1.00	1.00	
Flt Protected		0.98		0.95	0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1777		1681	1693	1583	1770	3423		1770	3535	
Flt Permitted		0.19		0.71	0.69	1.00	0.20	1.00		0.06	1.00	
Satd. Flow (perm)		346		1253	1226	1583	374	3423		106	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	30	15	436	23	584	15	1527	428	353	1122	8
RTOR Reduction (vph)	0	6	0	0	0	275	0	17	0	0	0	0
Lane Group Flow (vph)	0	69	0	218	241	309	15	1938	0	353	1130	0
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8		8	6			2		
Actuated Green, G (s)		21.5		23.5	23.5	23.5	68.0	66.0		88.0	81.5	
Effective Green, g (s)		23.5		25.5	25.5	25.5	72.0	69.0		90.0	84.5	
Actuated g/C Ratio		0.16		0.17	0.17	0.17	0.48	0.46		0.60	0.56	
Clearance Time (s)		5.5		5.5	5.5	5.5	4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	5.0		3.0	5.0	
Lane Grp Cap (vph)		54		213	208	269	216	1574		279	1991	
v/s Ratio Prot							0.00	0.57		c0.16	0.32	
v/s Ratio Perm		c0.20		0.17	c0.20	0.20	0.03			c0.59		
v/c Ratio		1.28		1.02	1.16	1.15	0.07	1.23		1.27	0.57	
Uniform Delay, d1		63.2		62.2	62.2	62.2	21.1	40.5		52.5	21.0	
Progression Factor		1.00		0.93	0.93	0.86	0.96	0.68		1.00	1.00	
Incremental Delay, d2		215.1		64.2	108.2	98.4	0.1	107.5		144.7	1.2	
Delay (s)		278.3		122.1	166.3	151.8	20.4	135.0		197.2	22.2	
Level of Service		F		F	F	F	C	F		F	C	
Approach Delay (s)		278.3			149.0			134.1			63.8	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	117.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	228	429	90	76	695	28	0	0	177	0	0	264
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	248	466	98	83	755	30	0	0	192	0	0	287
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		332			450							
pX, platoon unblocked	0.71			0.92			0.75	0.75	0.92	0.75	0.75	0.71
vC, conflicting volume	786			564			1932	1962	515	1883	1980	755
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496			481			1830	1871	428	1765	1895	454
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	67			92			100	100	67	100	100	33
cM capacity (veh/h)	760			993			10	34	576	23	32	431

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total	248	564	83	755	30	192	287
Volume Left	248	0	83	0	0	0	0
Volume Right	0	98	0	0	30	192	287
cSH	760	1700	993	1700	1700	576	431
Volume to Capacity	0.33	0.33	0.08	0.44	0.02	0.33	0.67
Queue Length 95th (ft)	36	0	7	0	0	37	118
Control Delay (s)	12.0	0.0	9.0	0.0	0.0	14.4	28.4
Lane LOS	B		A			B	D
Approach Delay (s)	3.7		0.9			14.4	28.4
Approach LOS						B	D

Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	171	488	23	928	23	8	181	180
v/c Ratio	0.50	0.36	0.03	0.75	0.10	0.03	0.83	0.54
Control Delay	4.8	3.7	5.0	21.5	51.7	0.1	89.5	33.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	3.7	5.0	21.5	51.7	0.1	89.5	33.4
Queue Length 50th (ft)	12	48	4	540	19	0	172	79
Queue Length 95th (ft)	m14	m86	13	892	46	0	256	156
Internal Link Dist (ft)		370		296	173		348	
Turn Bay Length (ft)	150		115			50		50
Base Capacity (vph)	398	1371	667	1233	289	375	267	388
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	0.43	0.36	0.03	0.75	0.08	0.02	0.68	0.46

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	435	14	21	619	235	14	7	7	159	7	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.95	1.00
Satd. Flow (prot)	1770	1854		1770	1786			1804	1583		1778	1583
Flt Permitted	0.17	1.00		0.47	1.00			0.78	1.00		0.72	1.00
Satd. Flow (perm)	324	1854		872	1786			1445	1583		1339	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	473	15	23	673	255	15	8	8	173	8	180
RTOR Reduction (vph)	0	1	0	0	8	0	0	0	7	0	0	75
Lane Group Flow (vph)	171	487	0	23	920	0	0	23	1	0	181	105
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4		4	8		8
Actuated Green, G (s)	116.5	109.3		106.1	102.9			24.5	24.5		24.5	24.5
Effective Green, g (s)	116.5	109.3		106.1	102.9			24.5	24.5		24.5	24.5
Actuated g/C Ratio	0.78	0.73		0.71	0.69			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	344	1350		635	1225			236	258		218	258
v/s Ratio Prot	c0.03	0.26		0.00	c0.52							
v/s Ratio Perm	0.35			0.02				0.02	0.00		c0.14	0.07
v/c Ratio	0.50	0.36		0.04	0.75			0.10	0.01		0.83	0.41
Uniform Delay, d1	15.4	7.5		6.6	15.3			53.4	52.5		60.7	56.2
Progression Factor	0.57	0.41		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	0.3		0.0	4.3			0.2	0.0		22.7	1.0
Delay (s)	9.3	3.4		6.6	19.5			53.5	52.6		83.4	57.3
Level of Service	A	A		A	B			D	D		F	E
Approach Delay (s)		4.9			19.2			53.3			70.4	
Approach LOS		A			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	859	431	105	24	38	1000	1090	646
v/c Ratio	1.10	1.11	0.20	0.14	0.14	0.49	0.60	0.56
Control Delay	107.1	119.7	1.2	39.5	11.3	15.8	1.5	1.3
Queue Delay	0.1	0.2	0.0	0.0	0.0	0.3	0.9	2.3
Total Delay	107.3	119.9	1.2	39.5	11.3	16.1	2.4	3.7
Queue Length 50th (ft)	~415	~417	0	12	12	226	12	0
Queue Length 95th (ft)	#550	#639	2	39	26	280	m16	m0
Internal Link Dist (ft)		2790		120		781	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	778	390	513	174	265	2049	1807	1152
Starvation Cap Reductn	0	0	0	0	0	0	405	360
Spillback Cap Reductn	18	9	0	0	0	438	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.13	1.13	0.20	0.14	0.14	0.62	0.78	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1179	7	97	7	7	7	35	920	0	7	995	594
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1616	1583		1750		1770	3539			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.16	1.00			0.95	1.00
Satd. Flow (perm)	3221	1616	1583		1750		302	3539			3349	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1282	8	105	8	8	8	38	1000	0	8	1082	646
RTOR Reduction (vph)	0	0	80	0	7	0	0	0	0	0	0	288
Lane Group Flow (vph)	859	431	25	0	17	0	38	1000	0	0	1090	358
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6 9			2 9	
Permitted Phases			3				5 6 9			2 5 9		2 9
Actuated Green, G (s)	27.0	27.0	27.0		9.5		68.5	68.5			63.5	63.5
Effective Green, g (s)	29.0	29.0	29.0		11.5		68.0	72.5			66.5	66.5
Actuated g/C Ratio	0.24	0.24	0.24		0.10		0.57	0.60			0.55	0.55
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.0	3.0	3.0		2.5		3.0					
Lane Grp Cap (vph)	778	390	382		167		232	2138			1855	877
v/s Ratio Prot	0.27	c0.27			c0.01		0.01	c0.28				
v/s Ratio Perm			0.02				0.09				c0.33	0.23
v/c Ratio	1.10	1.11	0.07		0.10		0.16	0.47			0.59	0.41
Uniform Delay, d1	45.5	45.5	35.1		49.5		14.1	13.1			17.7	15.4
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.05	0.43
Incremental Delay, d2	64.6	77.1	0.1		0.2		0.3	0.1			0.2	0.1
Delay (s)	110.1	122.6	35.1		49.7		14.5	13.2			1.0	6.7
Level of Service	F	F	D		D		B	B			A	A
Approach Delay (s)		108.3			49.7			13.3			3.2	
Approach LOS		F			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	40.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues
2: MD 108 & Ten Oaks. Rd./Gas Sta.

1/22/2015

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	509	266	52	24	121	1205	1224	1490
v/c Ratio	1.19	1.24	0.16	0.20	0.39	0.46	0.54	1.08
Control Delay	159.0	191.4	1.0	54.0	8.8	8.6	0.4	57.2
Queue Delay	0.1	0.1	0.0	0.0	0.0	0.2	5.5	8.9
Total Delay	159.1	191.5	1.0	54.0	8.8	8.7	6.0	66.1
Queue Length 50th (ft)	~328	~352	0	15	28	223	7	~596
Queue Length 95th (ft)	#453	#554	0	47	46	263	m10	m275
Internal Link Dist (ft)		2790		120		721	194	
Turn Bay Length (ft)	625		250		80			
Base Capacity (vph)	429	215	330	118	310	2605	2271	1379
Starvation Cap Reductn	0	0	0	0	0	0	976	264
Spillback Cap Reductn	5	2	0	0	0	534	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.20	1.25	0.16	0.20	0.39	0.58	0.95	1.34

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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	699	14	48	7	7	7	111	1101	7	7	1119	1371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0		2.5		2.5	4.5			3.5	3.5
Lane Util. Factor	0.91	0.91	1.00		1.00		1.00	0.95			0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	3221	1619	1583		1750		1770	3536			3538	1583
Flt Permitted	0.95	0.95	1.00		0.98		0.17	1.00			0.94	1.00
Satd. Flow (perm)	3221	1619	1583		1750		324	3536			3342	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	760	15	52	8	8	8	121	1197	8	8	1216	1490
RTOR Reduction (vph)	0	0	45	0	7	0	0	0	0	0	0	281
Lane Group Flow (vph)	509	266	7	0	17	0	121	1205	0	0	1224	1209
Turn Type	Split	NA	Perm	Split	NA		pm+pt	NA		custom	NA	Perm
Protected Phases	3	3		4	4		1	5 6			2 9	
Permitted Phases			3				5 6			2 5 9		2 9
Actuated Green, G (s)	18.0	18.0	18.0		7.5		108.5	108.5			102.5	102.5
Effective Green, g (s)	20.0	20.0	20.0		9.5		106.0	110.5			105.5	105.5
Actuated g/C Ratio	0.13	0.13	0.13		0.06		0.71	0.74			0.70	0.70
Clearance Time (s)	5.0	5.0	5.0		4.5		4.5					
Vehicle Extension (s)	3.5	3.5	3.5		3.0		3.0					
Lane Grp Cap (vph)	429	215	211		110		296	2604			2350	1113
v/s Ratio Prot	0.16	c0.16			c0.01		0.02	c0.34				
v/s Ratio Perm			0.00				0.27				0.37	c0.76
v/c Ratio	1.19	1.24	0.03		0.15		0.41	0.46			0.52	1.09
Uniform Delay, d1	65.0	65.0	56.6		66.4		9.6	7.9			10.4	22.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			0.03	2.51
Incremental Delay, d2	105.2	140.0	0.1		0.6		0.9	0.1			0.0	40.7
Delay (s)	170.2	205.0	56.7		67.1		10.5	8.0			0.3	96.6
Level of Service	F	F	E		E		B	A			A	F
Approach Delay (s)		174.3			67.1			8.2			53.2	
Approach LOS		F			E			A			D	

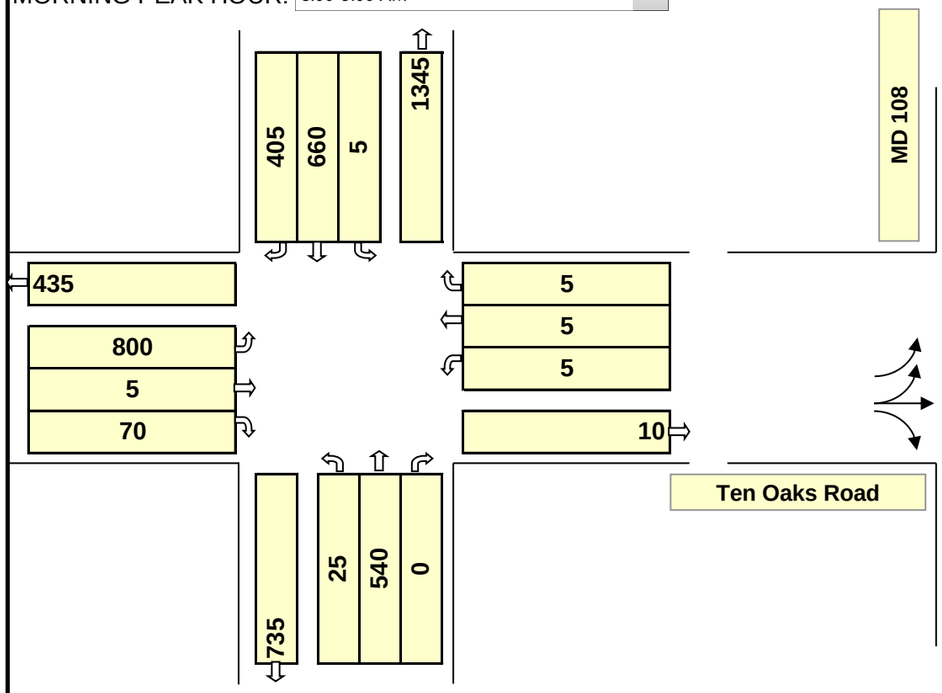
Intersection Summary			
HCM 2000 Control Delay	61.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	129.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D: Capacity Analyses – Critical Lane Volume (CLV)

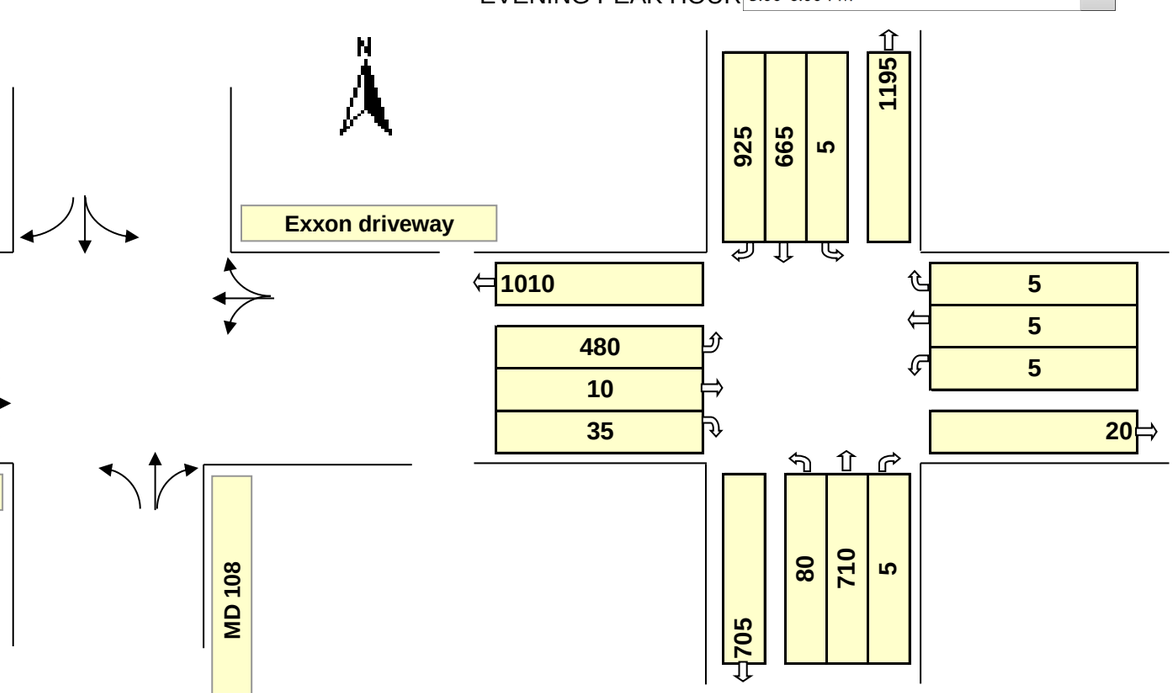
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	540	0.0	0	540	1.00	540	5	545	☐
	SBTL+NBL	0	660	2.0	5	670	1.00	670	25	695	☑
	EBTL	0	5	1.0	800	805	0.60	483	0	483	☑
	WBRTL	5	5	1.0	5	15	1.00	15	0	15	☑
											☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1193** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	5	710	0.0	0	715	1.00	715	5	720	☐
	SBTL+NBL	0	665	3.0	5	680	1.00	680	80	760	☑
	EBTL	0	10	1.0	480	490	0.60	294	0	294	☑
	WBRTL	5	5	1.0	5	15	1.00	15	0	15	☑
											☐
											☐

Remarks: SBR not critical because it gets 'covered' by EBL & SBTL

* Critical Volume — TOTAL: **1069** — Level of Service: **B** — V/C **0.67**

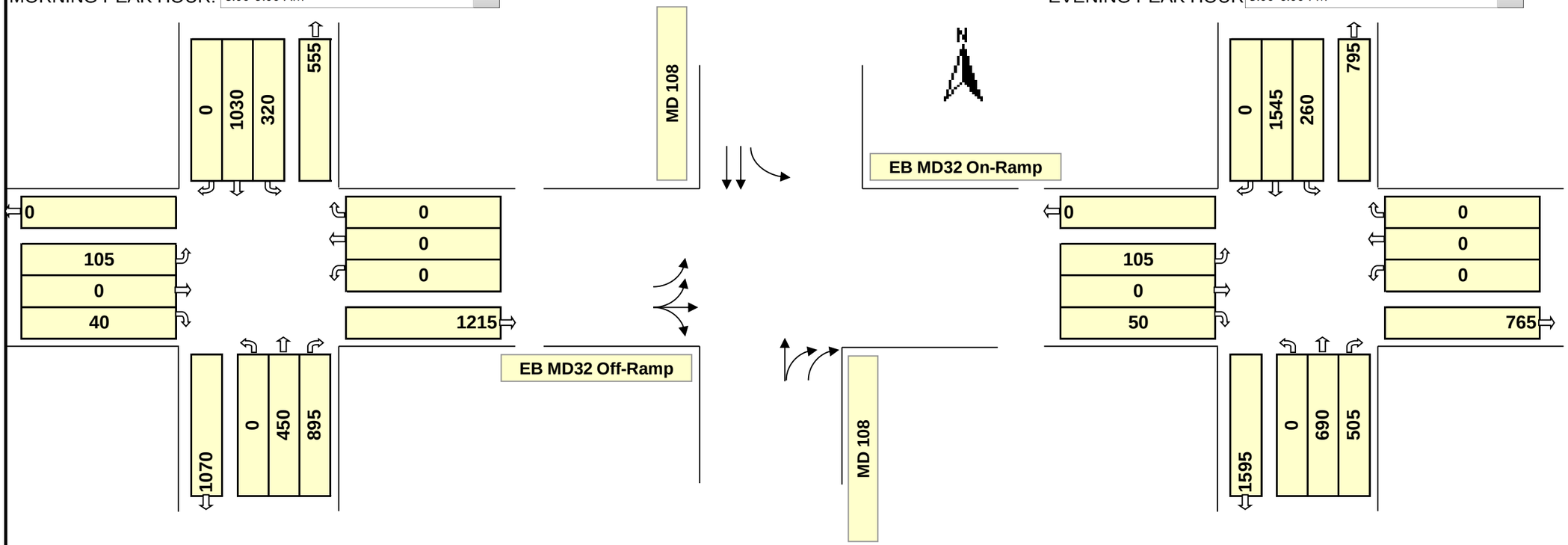
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	895	450	0.0	0	1345	0.55	740	320	1060	☑
	SBT	0	1030	0.0	0	1030	0.55	567	0	567	☐
	EBRTL	40	0	1.0	105	145	0.60	87	0	87	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1147** — Level of Service: **B** — V/C **0.72**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	505	690	0.0	0	1195	0.55	657	260	917	☑
	SBT	0	1545	0.0	0	1545	0.55	850	0	850	☐
	EBRTL	50	0	1.0	105	155	0.60	93	0	93	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1010** — Level of Service: **B** — V/C **0.63**

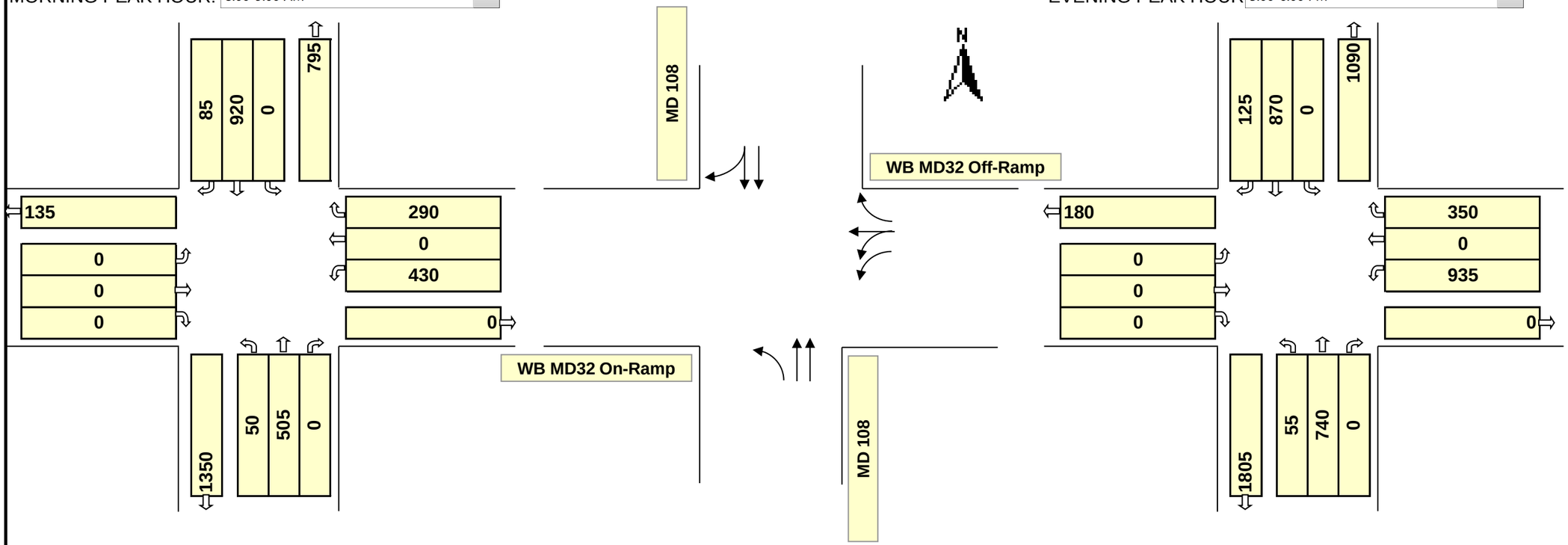
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at WB MD 32 Ramps** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	505	0.0	0	505	0.55	278	0	278	☐
	SBTR+NBL	85	920	0.0	0	1005	0.55	553	50	603	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	430	430	0.60	258	0	258	☐
	WBR-SBL	290	0	0.0	0	290	1	290	0	290	☑
											☐

Remarks:

* Critical Volume — TOTAL: **893** — Level of Service: **A** — V/C **0.56**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	740	0.0	0	740	0.55	407	0	407	☐
	SBTR+NBL	125	870	0.0	0	995	0.55	547	55	602	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	935	935	0.60	561	0	561	☑
	WBR-SBL	350	0	0.0	0	350	1.00	350	0	350	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1163** — Level of Service: **C** — V/C **0.73**

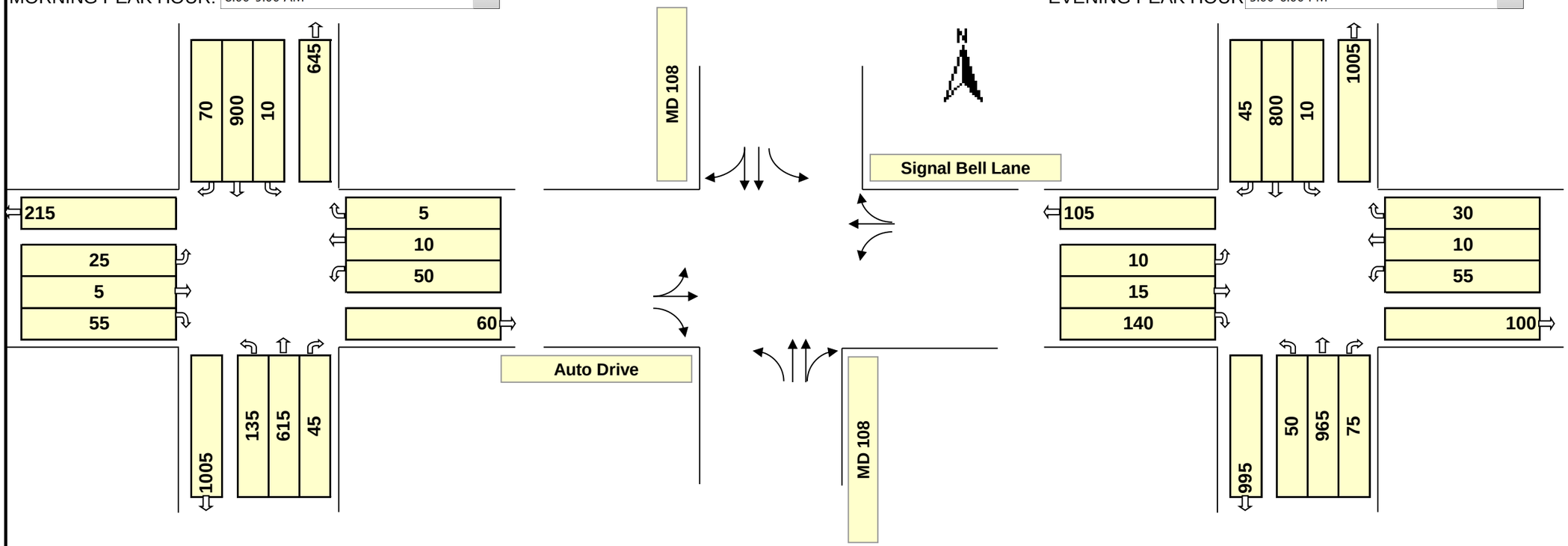
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Concurrent

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	45	615	0.0	0	660	0.55	363	10	373	☐
	SBTR+NBL	70	900	0.0	0	970	0.55	534	135	669	☑
	EBTL+WBL	0	5	1.1	25	33	1.00	33	50	83	☑
	WBTR+EBL	5	10	0.0	0	15	1.00	15	25	40	☐
	EBR-NBL	55	0	0.0	135	-80	1.00	-80	0	-80	☐
											☐

Remarks: WB right-turn volume not reduced by SB left-turn volume due to short turn lane which occasionally is blocked by WB left-turn queues

* Critical Volume — TOTAL: **751** — Level of Service: **A** — V/C **0.47**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	75	965	0.0	0	1040	0.55	572	10	582	☑
	SBTR+NBL	45	800	0.0	0	845	0.55	465	50	515	☐
	EBTL+WBL	0	15	1.1	10	26	1.00	26	55	81	☐
	WBTR+EBL	30	10	0.0	0	40	1.00	40	10	50	☐
	EBR-NBL	140	0	0.0	50	90	1.00	90	0	90	☑
											☐

Remarks: WB rights not reduced (see AM comment).

* Critical Volume — TOTAL: **672** — Level of Service: **A** — V/C **0.42**

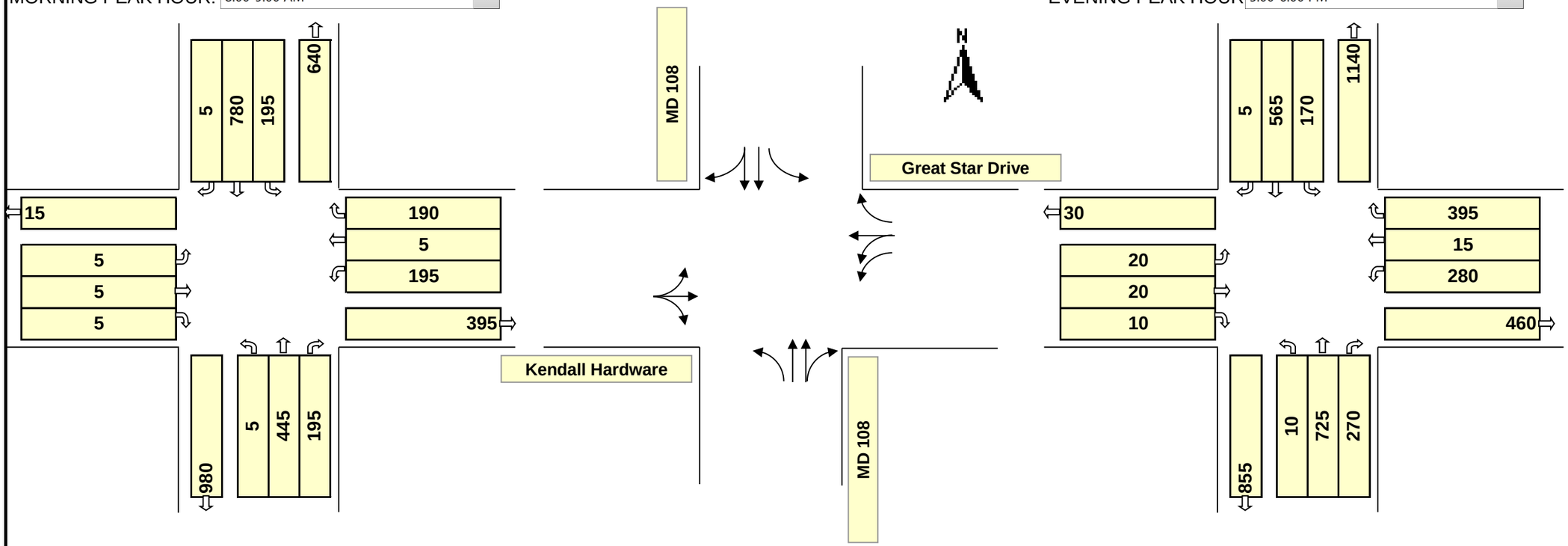
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	195	445	0.0	0	640	0.55	352	195	547	☑
	SBTR+NBL	5	780	0.0	0	785	0.55	432	5	437	☐
	EBRTL	5	5	1.0	5	15	1.00	15	0	15	☑
	WBTL	0	5	1.0	195	200	0.60	120	0	120	☑
	WBR-SBL	190	0	0.0	195	-5	1.00	-5	0	-5	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **682** — Level of Service: **A** — V/C **0.43**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	270	725	0.0	0	995	0.55	547	170	717	☑
	SBTR+NBL	5	565	0.0	0	570	0.55	314	10	324	☐
	EBRTL	10	20	1.0	20	50	1.00	50	0	50	☑
	WBTL	0	15	1.0	280	295	0.60	177	0	177	☐
	WBR-SBL	395	0	0.0	170	225	1.00	225	0	225	☑
											☐

Remarks: WBR critical volume gets reduced by SBL & WBL volume

* Critical Volume — TOTAL: **992** — Level of Service: **A** — V/C **0.62**

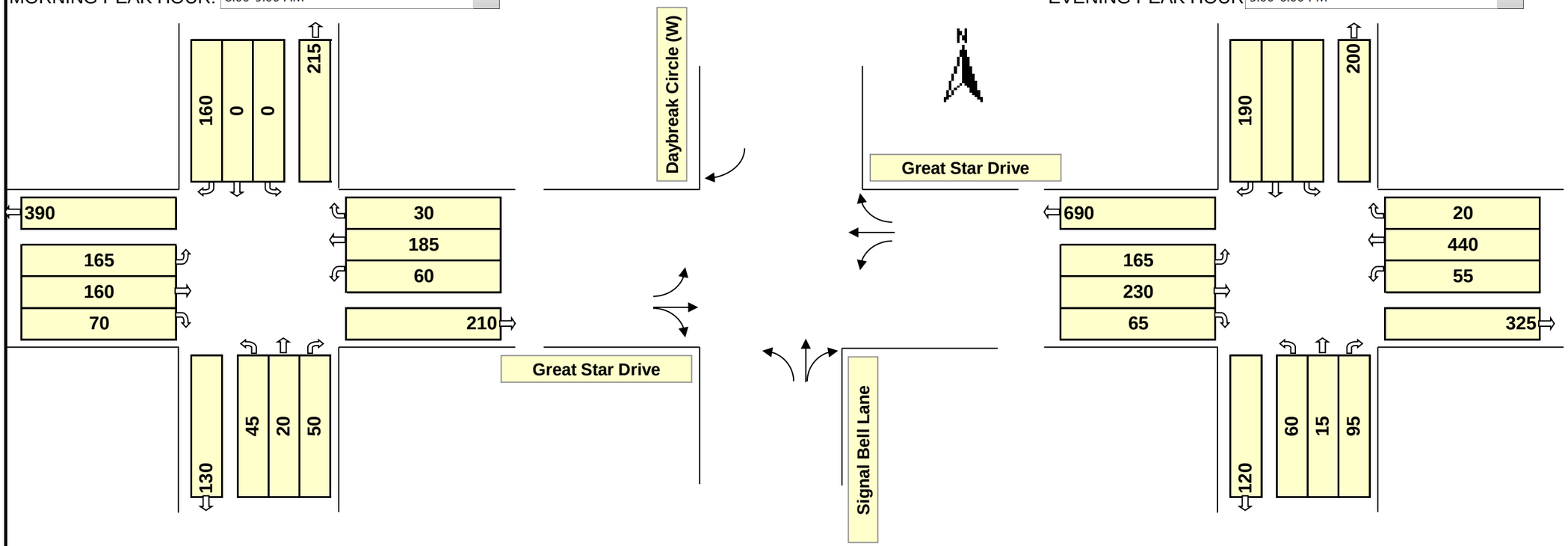
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	50	20	0.0	0	70	1.00	70	0	70	☐
	SBR+NBL	160	0	0.0	0	160	1.00	160	45	205	☑
	EBTR+WBL	70	160	0.0	0	230	1.00	230	60	290	☐
	WBT+EBL	0	185	0.0	0	185	1.00	185	165	350	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **555** — Level of Service: **A** — V/C **0.35**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	95	15	0.0	0	110	1.00	110	0	110	☐
	SBR+NBL	190	0	0.0	0	190	1.00	190	60	250	☑
	EBTR+WBL	65	230	0.0	0	295	1.00	295	55	350	☐
	WBT+EBL	0	440	0.0	0	440	1.00	440	165	605	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **855** — Level of Service: **A** — V/C **0.53**

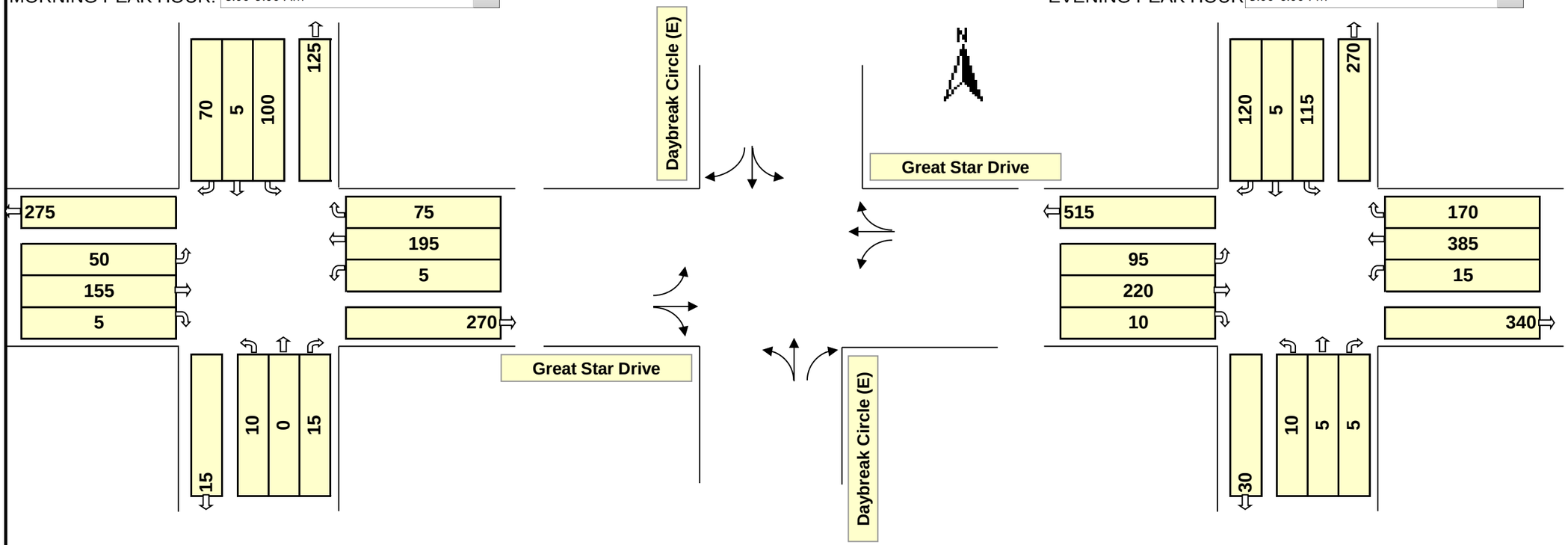
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **Existing** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	10	11	1.00	11	100	111	☐
	SBTL+NBL	0	5	1.1	100	115	1.00	115	10	125	☑
	EBTR+WBL	5	155	0.0	0	160	1.00	160	5	165	☐
	WBTR+EBL	75	195	0.0	0	270	1.00	270	50	320	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **445** — Level of Service: **A** — V/C **0.28**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	5	1.1	10	16	1.00	16	115	131	☐
	SBTL+NBL	0	5	1.1	115	132	1.00	132	10	142	☑
	EBTR+WBL	10	220	0.0	0	230	1.00	230	15	245	☐
	WBTR+EBL	170	385	0.0	0	555	1.00	555	95	650	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **792** — Level of Service: **A** — V/C **0.49**

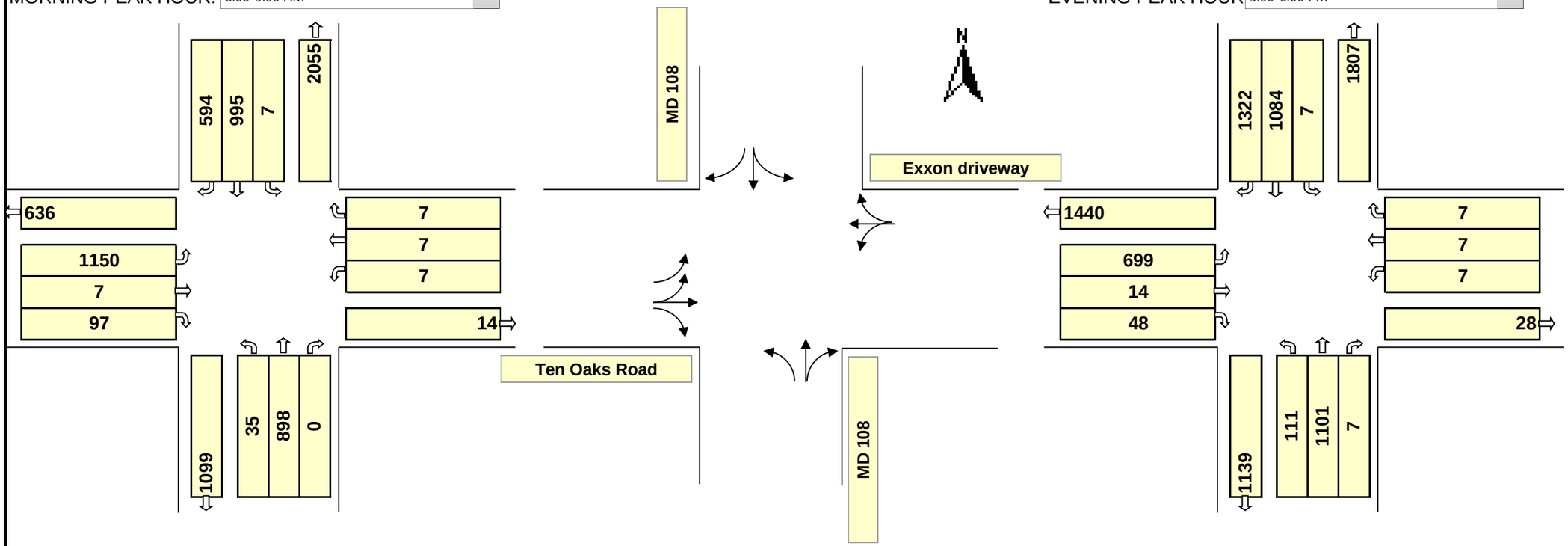
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	898	0.0	0	898	1.00	898	7	905	☐
	SBTL+NBL	0	995	4.0	7	1023	1.00	1023	35	1058	☑
	EBTL	0	7	1.0	1150	1157	0.60	694	0	694	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1773** — Level of Service: **F** — V/C **1.11**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	1.00	1108	7	1115	☐
	SBTL+NBL	0	1084	5.0	7	1119	1.00	1119	111	1230	☑
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it gets 'covered' by EBL & SBTL

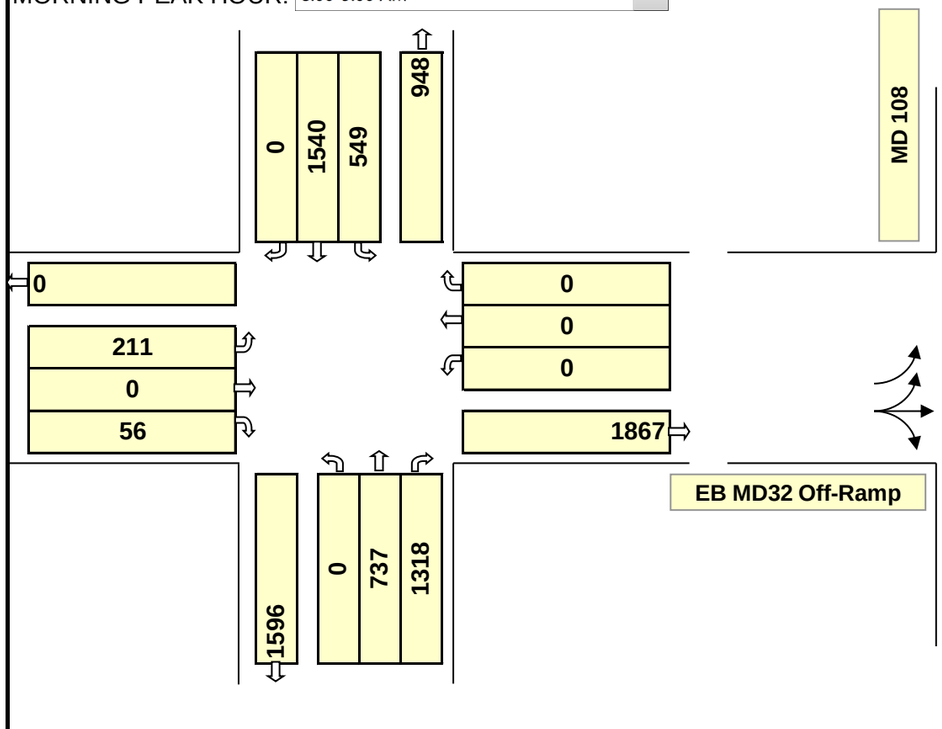
* Critical Volume — TOTAL: **1679** — Level of Service: **F** — V/C **1.05**

Filename, Location & Path:

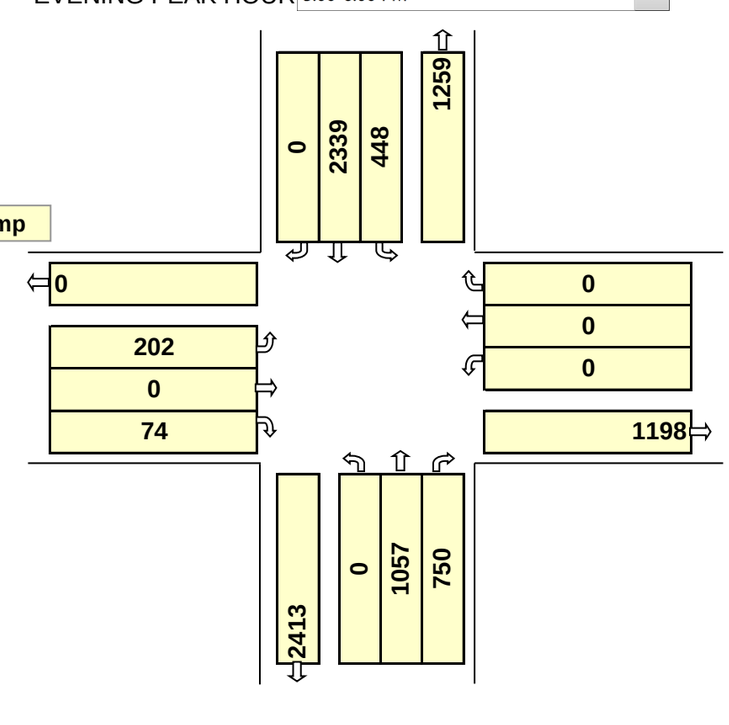
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	737	0.0	0	2055	0.55	1130	549	1679	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	211	267	0.60	160	0	160	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1839** — Level of Service: **F** — V/C **1.15**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	448	1442	☑
	SBT	0	2339	0.0	0	2339	0.55	1286	0	1286	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

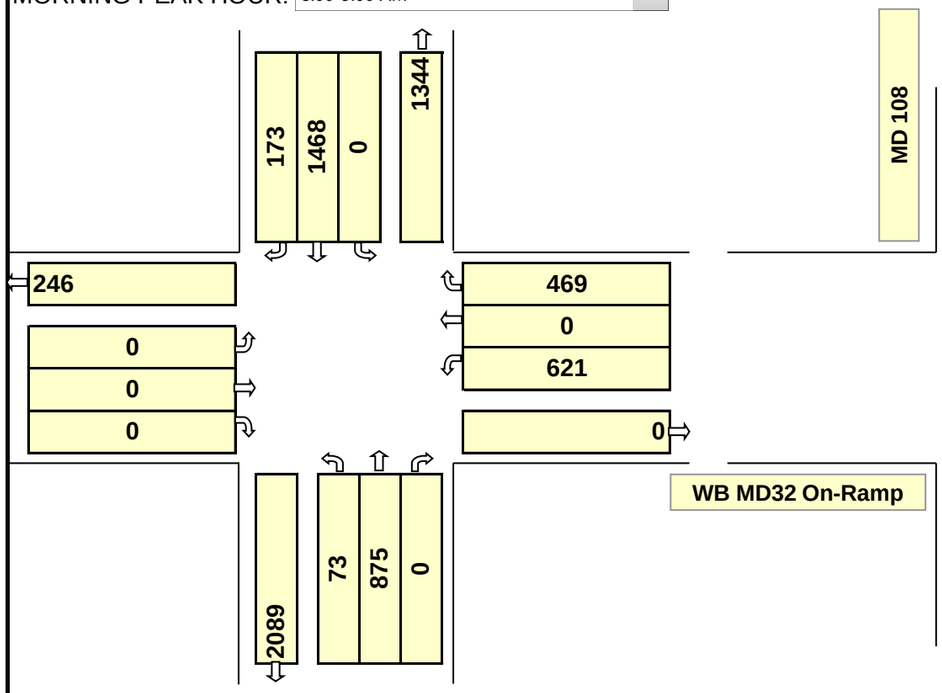
* Critical Volume — TOTAL: **1607** — Level of Service: **F** — V/C **1.00**

Filename, Location & Path:

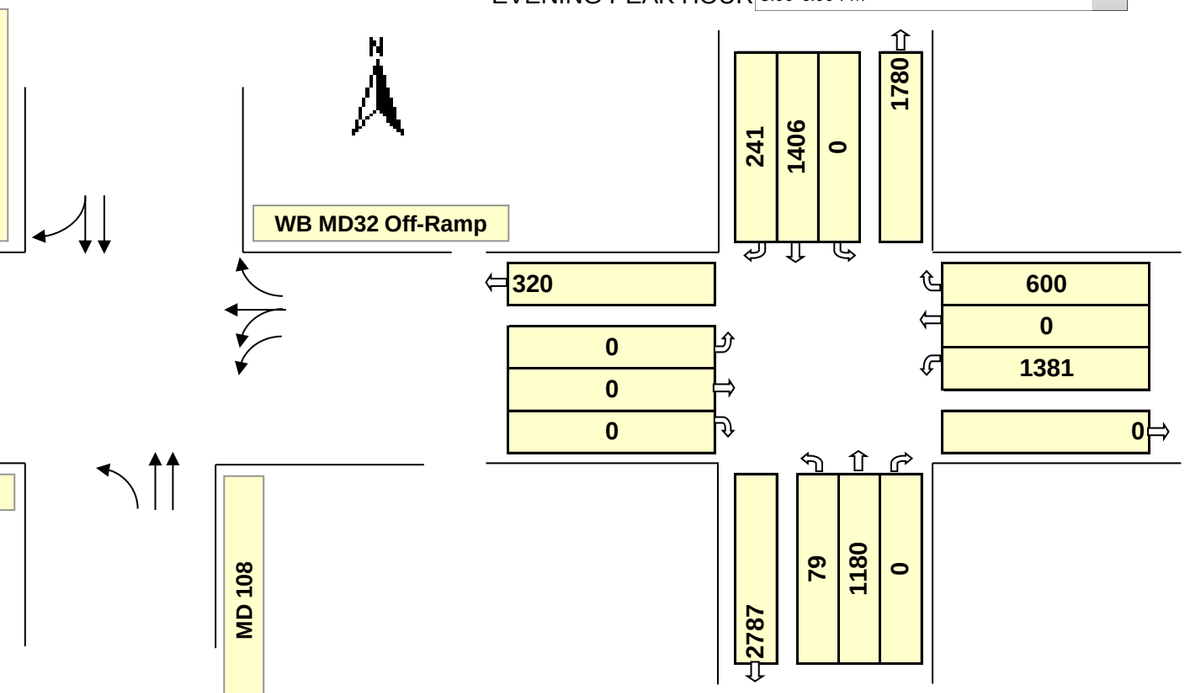
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at WB MD 32 Ramps** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	875	0.0	0	875	0.55	481	0	481	☐
	SBTR+NBL	173	1468	0.0	0	1641	0.55	903	73	976	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	621	621	0.60	373	0	373	☐
	WBR-SBL	469	0	0.0	0	469	1	469	0	469	☑
											☐

Remarks:

* Critical Volume — TOTAL: **1445** — Level of Service: **D** — V/C **0.90**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1180	0.0	0	1180	0.55	649	0	649	☐
	SBTR+NBL	241	1406	0.0	0	1647	0.55	906	79	985	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	1381	1381	0.60	829	0	829	☑
	WBR-SBL	600	0	0.0	0	600	1.00	600	0	600	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1813** — Level of Service: **F** — V/C **1.13**

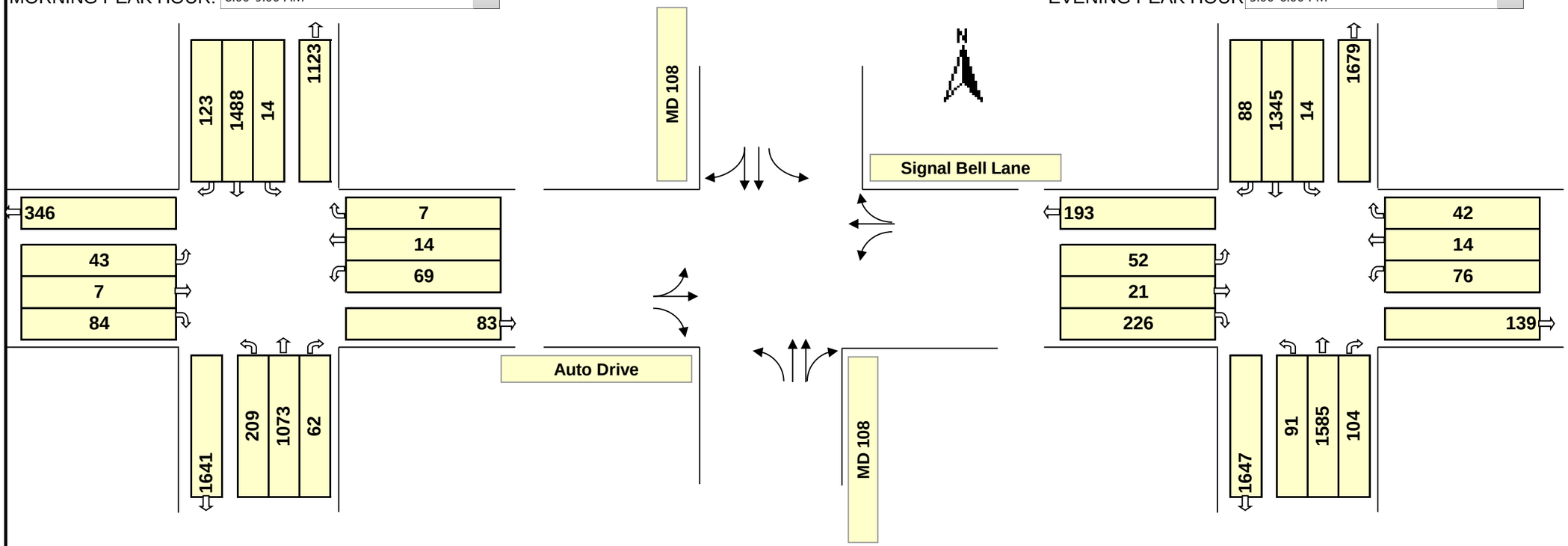
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Concurrent

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	62	1073	0.0	0	1135	0.55	624	14	638	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL+WBL	0	7	1.1	43	54	1.00	54	69	123	☑
	WBTR+EBL	7	14	0.0	0	21	1.00	21	43	64	☐
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WB right-turn volume not reduced by SB left-turn volume due to short turn lane which occasionally is blocked by WB left-turn queues

* Critical Volume — TOTAL: **1218** — Level of Service: **C** — V/C **0.76**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL+WBL	0	21	1.1	52	78	1.00	78	76	154	☑
	WBTR+EBL	42	14	0.0	0	56	1.00	56	52	108	☐
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks: WB rights not reduced (see AM comment).

* Critical Volume — TOTAL: **1097** — Level of Service: **B** — V/C **0.69**

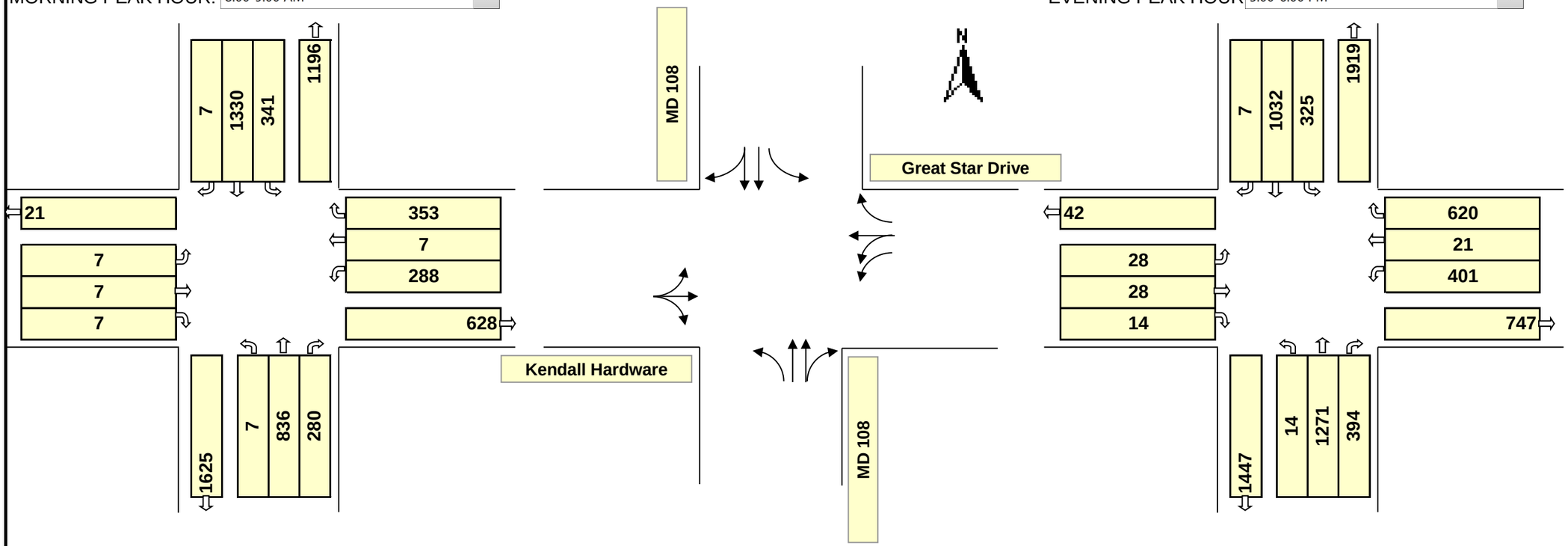
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	836	0.0	0	1116	0.55	614	341	955	☑
	SBTR+NBL	7	1330	0.0	0	1337	0.55	735	7	742	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	353	0	0.0	341	12	1.00	12	0	12	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1153** — Level of Service: **C** — V/C **0.72**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1271	0.0	0	1665	0.55	916	325	1241	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☐
	WBR-SBL	620	0	0.0	325	295	1.00	295	0	295	☑
											☐

Remarks: WBR critical volume gets reduced by SBL & WBL volume

* Critical Volume — TOTAL: **1606** — Level of Service: **F** — V/C **1.00**

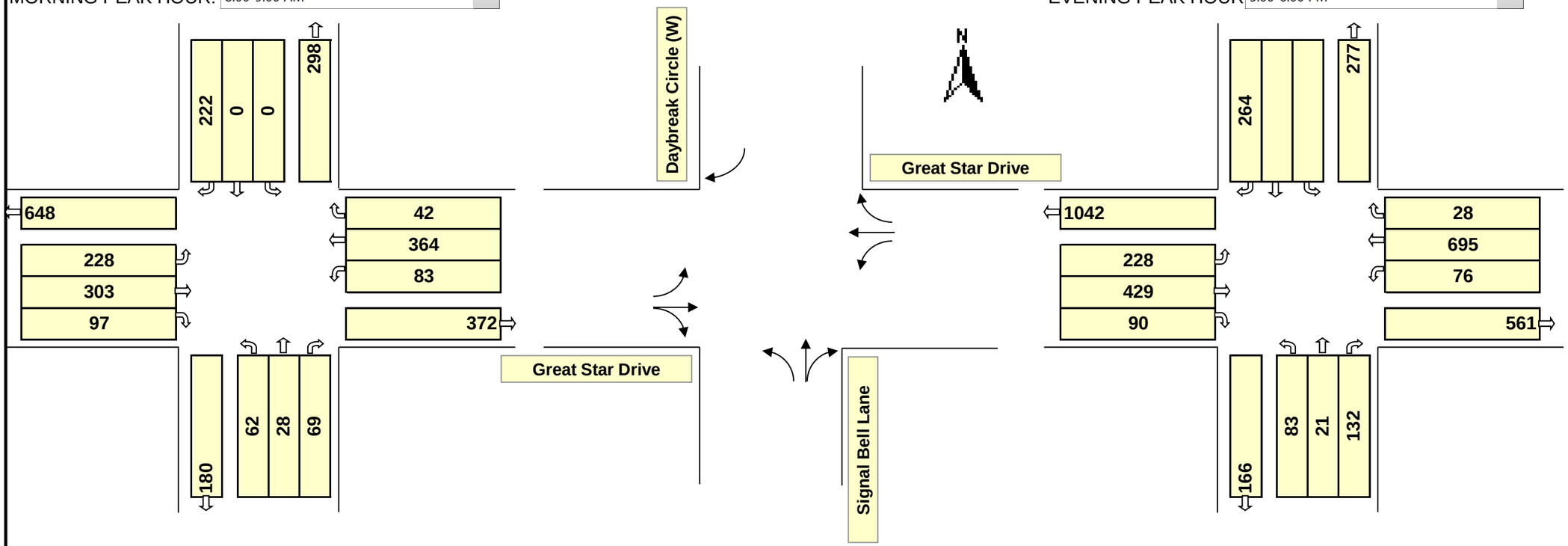
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	69	28	0.0	0	97	1.00	97	0	97	☐
	SBR+NBL	222	0	0.0	0	222	1.00	222	62	284	☑
	EBTR+WBL	97	303	0.0	0	400	1.00	400	83	483	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **876** — Level of Service: **A** — V/C **0.55**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	132	21	0.0	0	153	1.00	153	0	153	☐
	SBR+NBL	264	0	0.0	0	264	1.00	264	83	347	☑
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1270** — Level of Service: **C** — V/C **0.79**

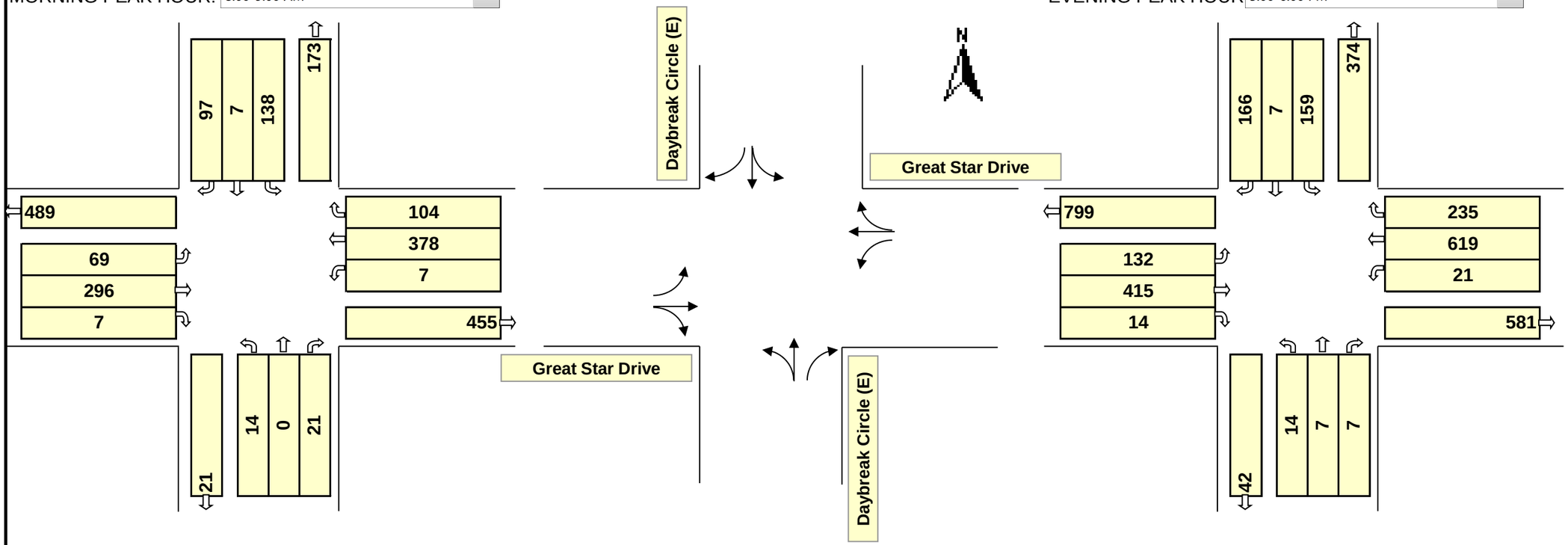
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 No Build** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	378	0.0	0	482	1.00	482	69	551	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **724** V/C
Level of Service: **A** **0.45**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	415	0.0	0	429	1.00	429	21	450	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	132	986	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1182** V/C
Level of Service: **C** **0.74**

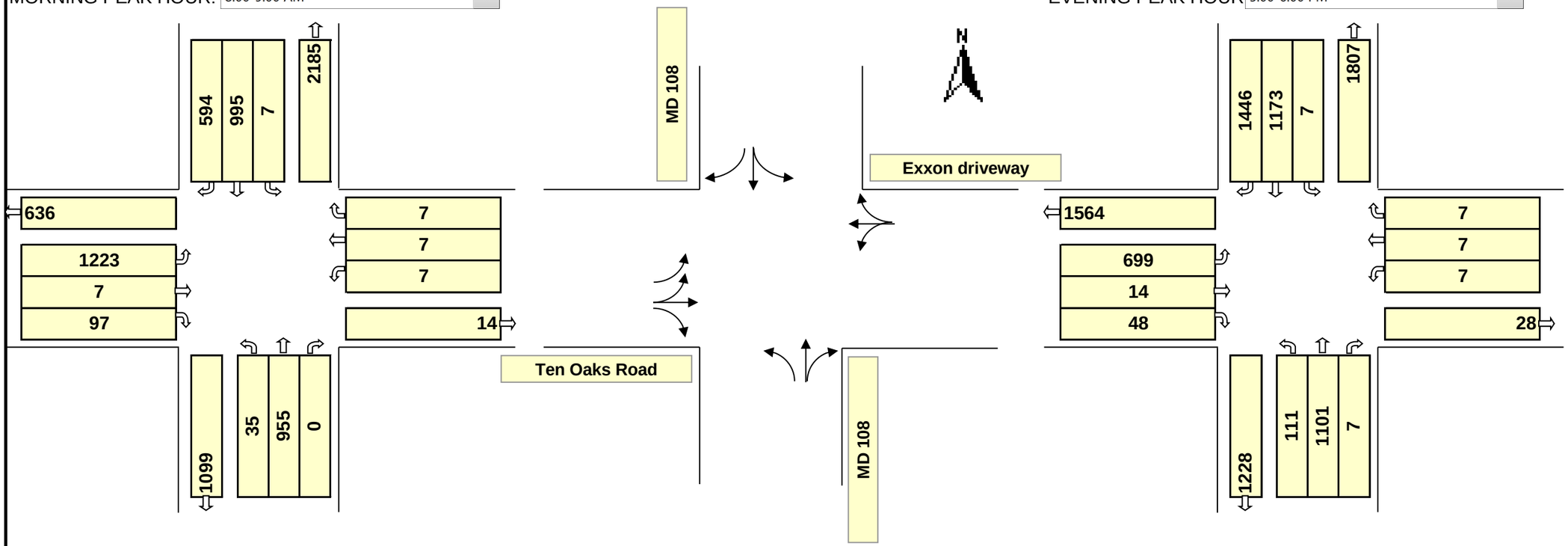
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	955	0.0	0	955	1.00	955	7	962	☐
	SBTL+NBL	0	995	4.0	7	1023	1.00	1023	35	1058	☑
	EBTL	0	7	1.0	1223	1230	0.60	738	0	738	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1817** — Level of Service: **F** — V/C **1.14**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	1.00	1108	7	1115	☐
	SBTL+NBL	0	1173	5.0	7	1208	1.00	1208	111	1319	☑
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it gets 'covered' by EBL & SBTL

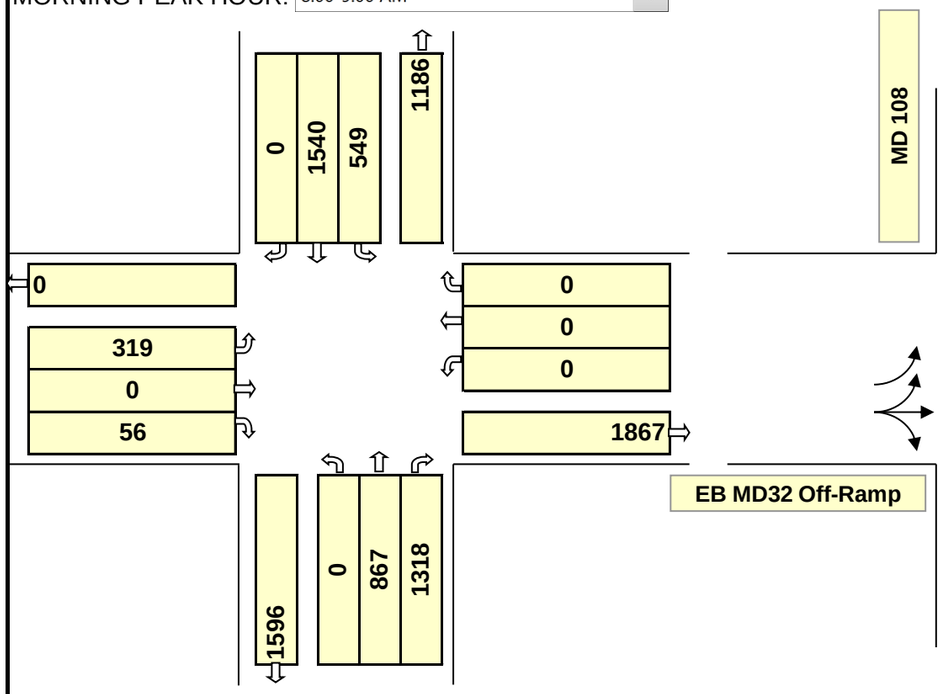
* Critical Volume — TOTAL: **1768** — Level of Service: **F** — V/C **1.10**

Filename, Location & Path:

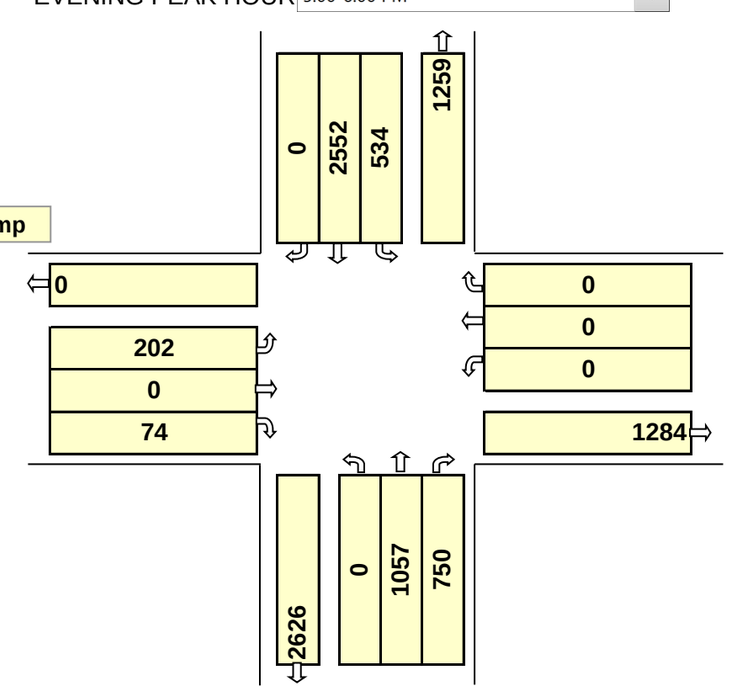
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	867	0.0	0	2185	0.55	1202	549	1751	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	319	375	0.60	225	0	225	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1976** — Level of Service: **F** — V/C **1.23**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	534	1528	☑
	SBT	0	2552	0.0	0	2552	0.55	1404	0	1404	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1693** — Level of Service: **F** — V/C **1.06**

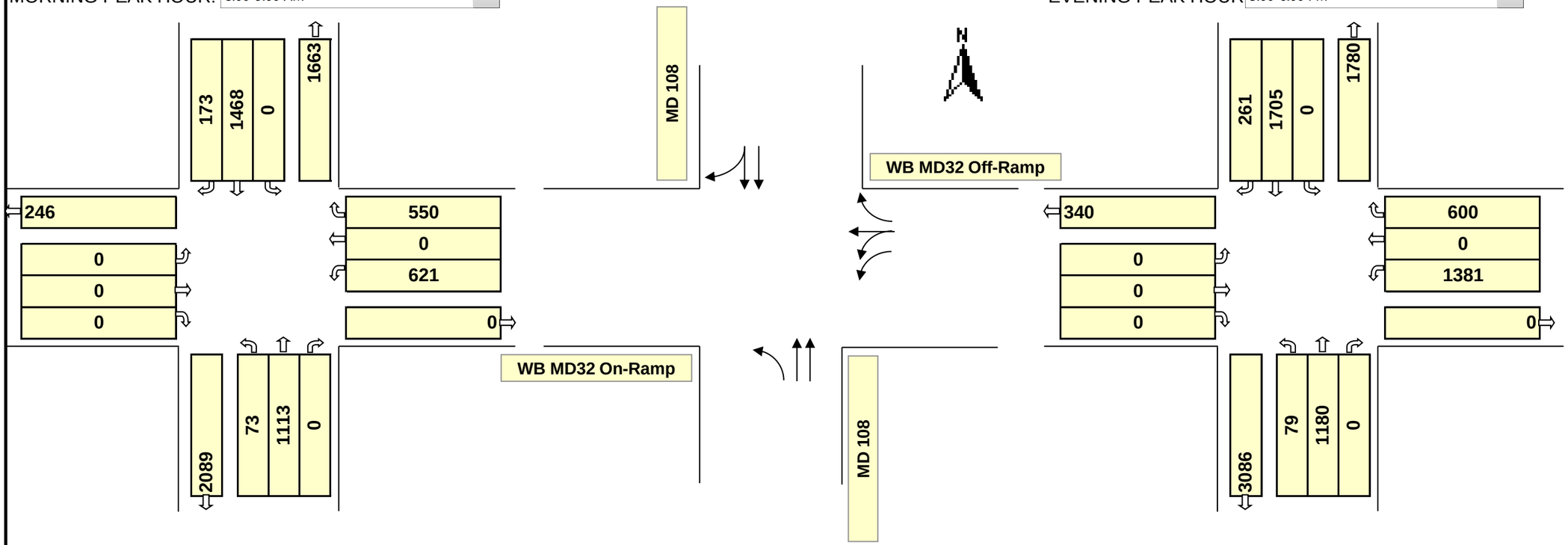
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at WB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1113	0.0	0	1113	0.55	612	0	612	☐
	SBTR+NBL	173	1468	0.0	0	1641	0.55	903	73	976	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	621	621	0.60	373	0	373	☐
	WBR-SBL	550	0	0.0	0	550	1	550	0	550	☑
											☐

Remarks:

* Critical Volume — TOTAL: **1526** — Level of Service: **E** — V/C **0.95**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1180	0.0	0	1180	0.55	649	0	649	☐
	SBTR+NBL	261	1705	0.0	0	1966	0.55	1081	79	1160	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	1381	1381	0.60	829	0	829	☑
	WBR-SBL	600	0	0.0	0	600	1.00	600	0	600	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1989** — Level of Service: **F** — V/C **1.24**

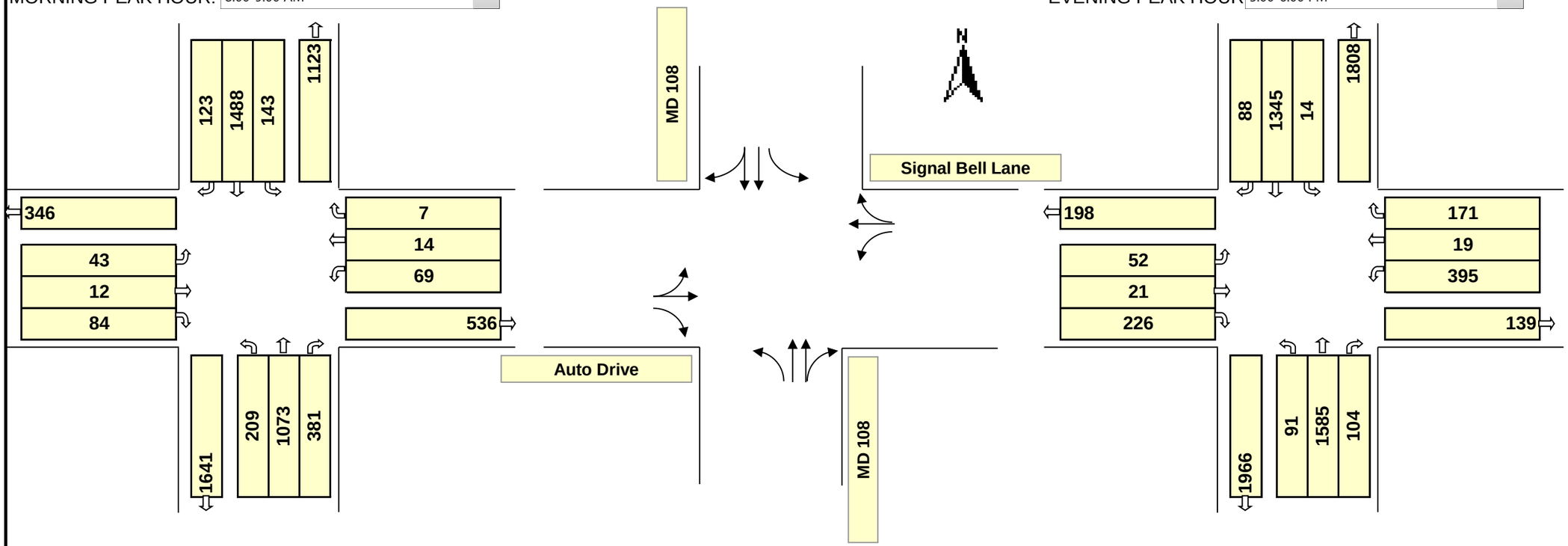
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Concurrent

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	381	1073	0.0	0	1454	0.55	800	143	943	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL+WBL	0	12	1.1	43	59	1.00	59	69	128	☑
	WBTR+EBL	7	14	0.0	0	21	1.00	21	43	64	☐
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WB right-turn volume not reduced by SB left-turn volume due to short turn lane which occasionally is blocked by WB left-turn queues

* Critical Volume

TOTAL: **1223** V/C

Level of Service: **C** **0.76**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL+WBL	0	21	1.1	52	78	1.00	78	395	473	☑
	WBTR+EBL	171	19	0.0	0	190	1.00	190	52	242	☐
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks: WB rights not reduced (see AM comment).

* Critical Volume

TOTAL: **1416** V/C

Level of Service: **D** **0.89**

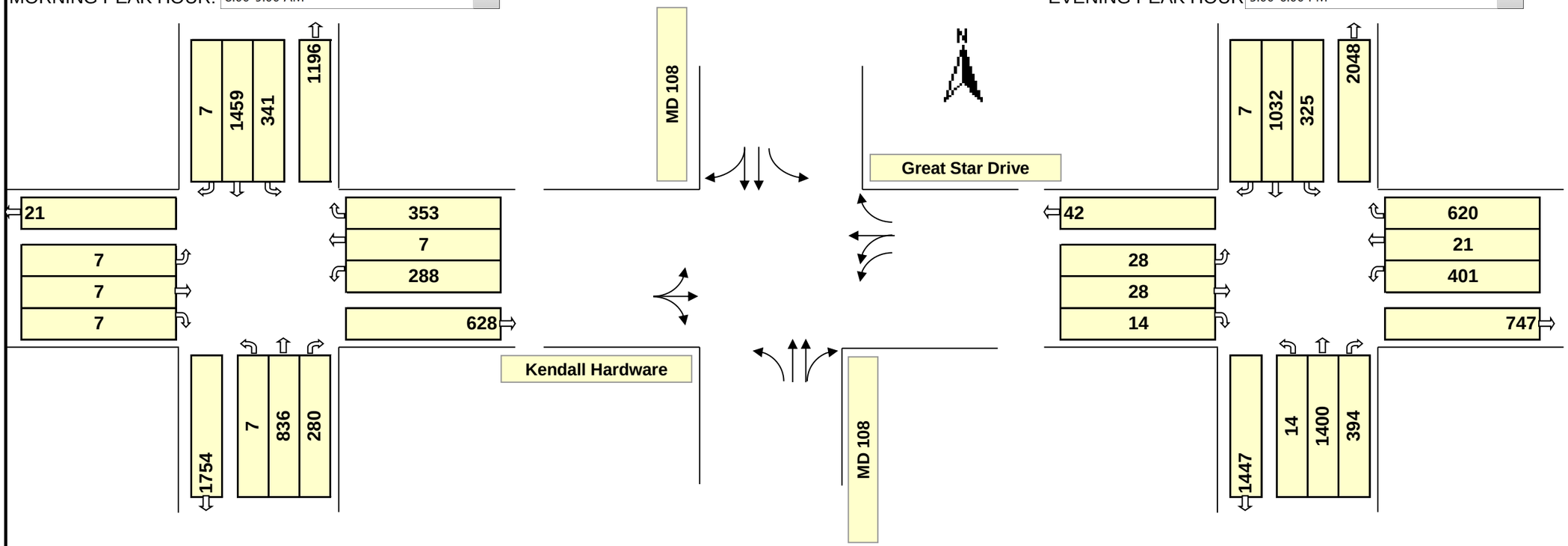
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	836	0.0	0	1116	0.55	614	341	955	☑
	SBTR+NBL	7	1459	0.0	0	1466	0.55	806	7	813	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	353	0	0.0	341	12	1.00	12	0	12	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1153** — Level of Service: **C** — V/C **0.72**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1400	0.0	0	1794	0.55	987	325	1312	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☐
	WBR-SBL	620	0	0.0	325	295	1.00	295	0	295	☑
											☐

Remarks: WBR critical volume gets reduced by SBL & WBL volume

* Critical Volume — TOTAL: **1677** — Level of Service: **F** — V/C **1.05**

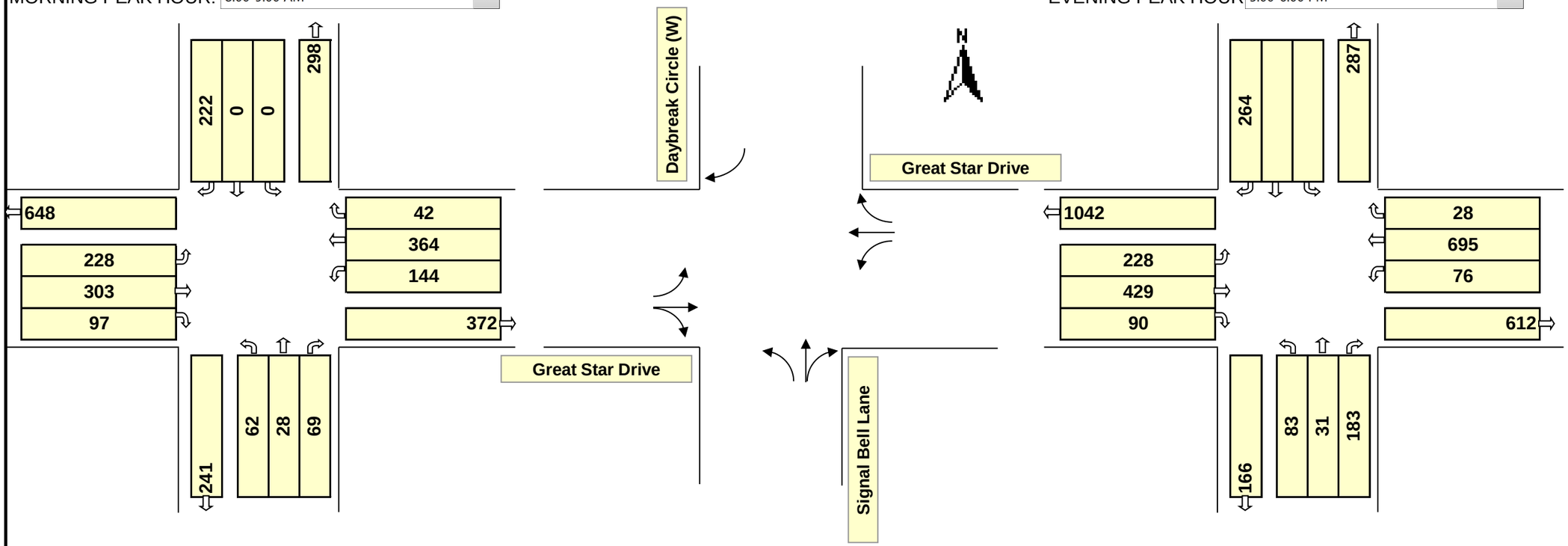
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	69	28	0.0	0	97	1.00	97	0	97	☐
	SBR+NBL	222	0	0.0	0	222	1.00	222	62	284	☑
	EBTR+WBL	97	303	0.0	0	400	1.00	400	144	544	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **876** — Level of Service: **A** — V/C **0.55**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	183	31	0.0	0	214	1.00	214	0	214	☐
	SBR+NBL	264	0	0.0	0	264	1.00	264	83	347	☑
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1270** — Level of Service: **C** — V/C **0.79**

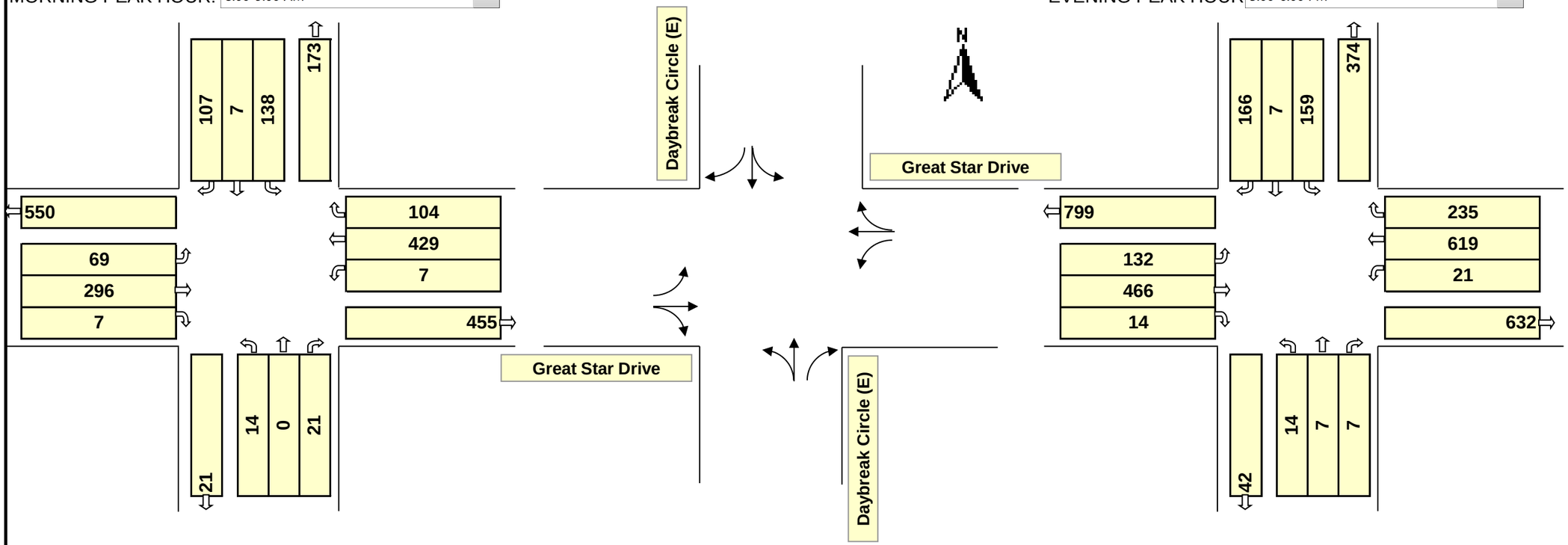
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltA** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	429	0.0	0	533	1.00	533	69	602	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **775** V/C — Level of Service: **A** **0.48**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	466	0.0	0	480	1.00	480	21	501	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	132	986	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1182** V/C — Level of Service: **C** **0.74**

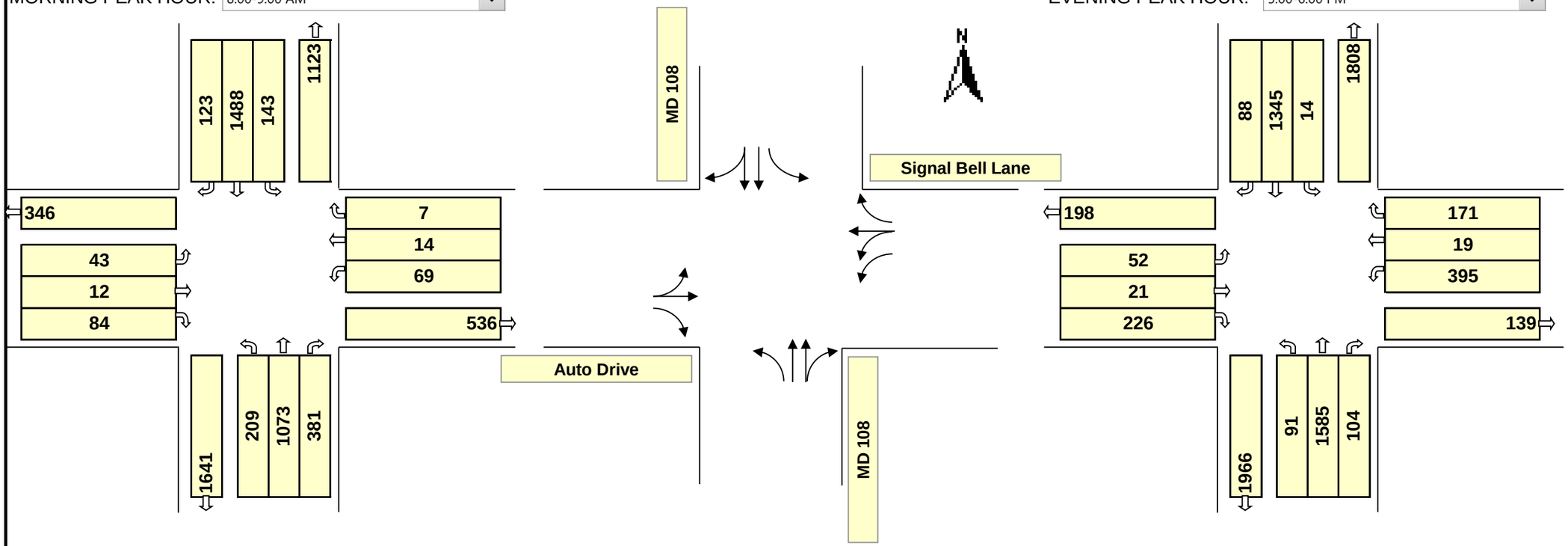
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltA Opt1** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR: 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 (Split)

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	381	1073	0.0	0	1454	0.55	800	143	943	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	12	1.0	43	55	1.00	55	0	55	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1200** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☑
	WBTL	0	19	1.0	395	414	0.60	248	0	248	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1264** — Level of Service: **C** — V/C **0.79**

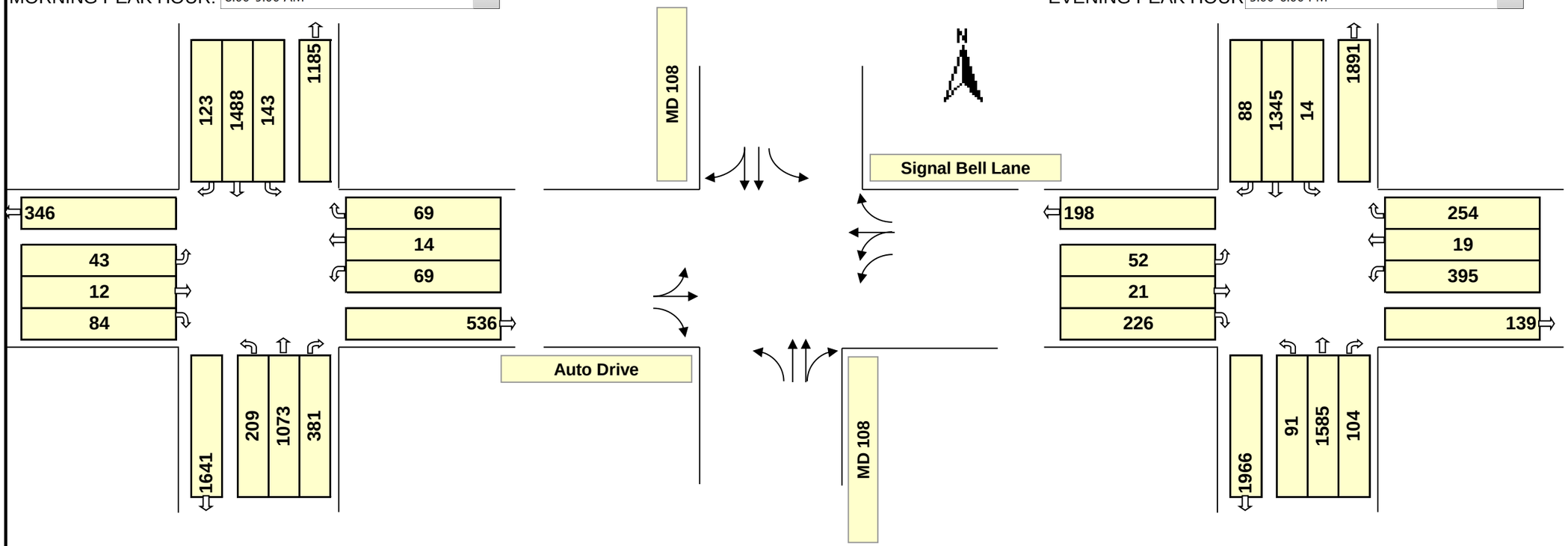
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltA Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	381	1073	0.0	0	1454	0.55	800	143	943	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	12	1.0	43	55	1.00	55	0	55	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WBR covered by SBL

* Critical Volume — TOTAL: **1200** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☐
	WBTL	0	19	1.0	395	414	0.60	248	0	248	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☑
											☐

Remarks: WB rights covered by WBTL

* Critical Volume — TOTAL: **1326** — Level of Service: **D** — V/C **0.83**

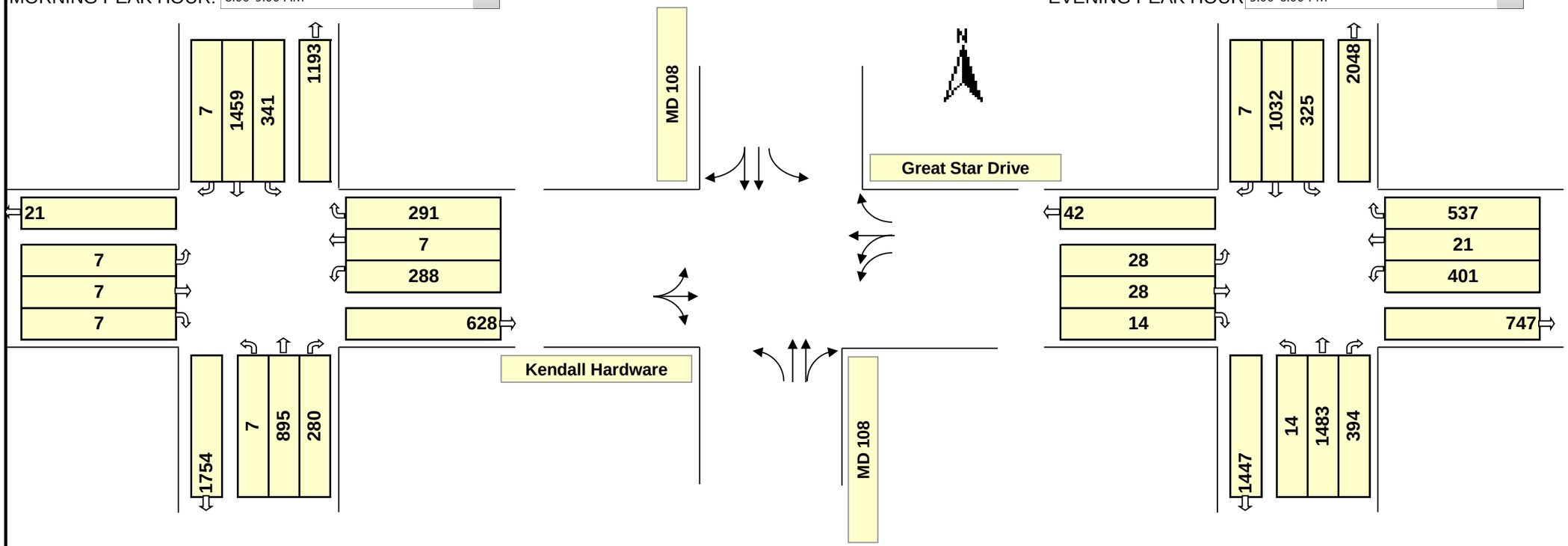
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltA Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	895	0.0	0	1175	0.55	646	341	987	☑
	SBTR+NBL	7	1459	0.0	0	1466	0.55	806	7	813	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	291	0	0.0	341	-50	1.00	-50	0	-50	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1185** — Level of Service: **C** — V/C **0.74**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1483	0.0	0	1877	0.55	1032	325	1357	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☑
	WBR-SBL	537	0	0.0	325	212	1.00	212	0	212	☐
											☐

Remarks: WBR-SBL < WBTL; therefore, not critical

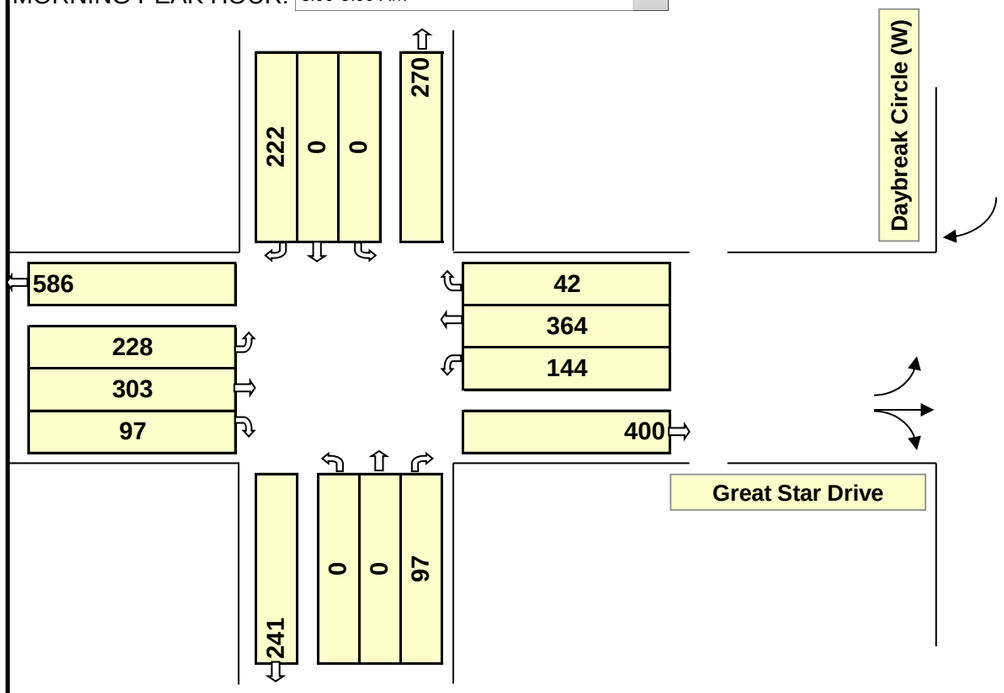
* Critical Volume — TOTAL: **1681** — Level of Service: **F** — V/C **1.05**

Filename, Location & Path:

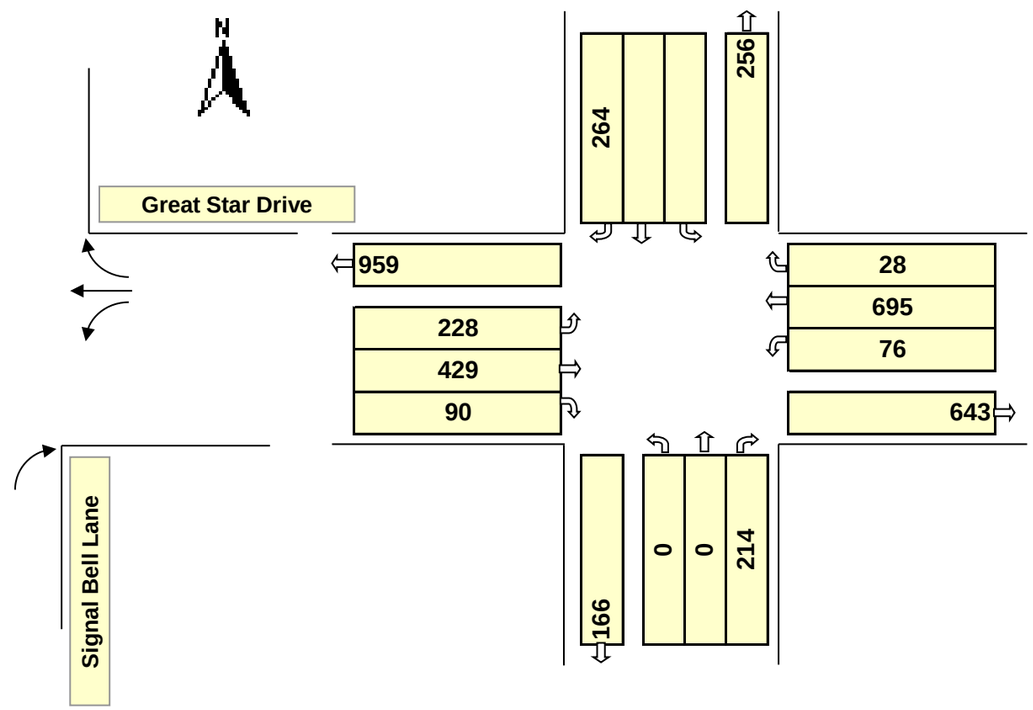
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltA Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	97	0	0.0	0	97	1.00	97	0	97	☐
	SBR	222	0	0.0	0	222	1.00	222	0	222	☐
	EBTR+WBL	97	303	0.0	0	400	1.00	400	144	544	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
	SBR-EBL										☐
											☐

Remarks: NB & SB rights get covered by overlap lefts

* Critical Volume — TOTAL: **592** — Level of Service: **A** — V/C **0.37**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	214	0	0.0	0	214	1.00	214	0	214	☐
	SBR	264	0	0.0	0	264	1.00	264	0	264	☐
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
	SBR-EBL	264	0	0.0	228	36	1.00	36	0	36	☐
	NBR - WBL	214	0	0.0	76	138	1.00	138	0	138	☑

Remarks:

* Critical Volume — TOTAL: **1061** — Level of Service: **B** — V/C **0.66**

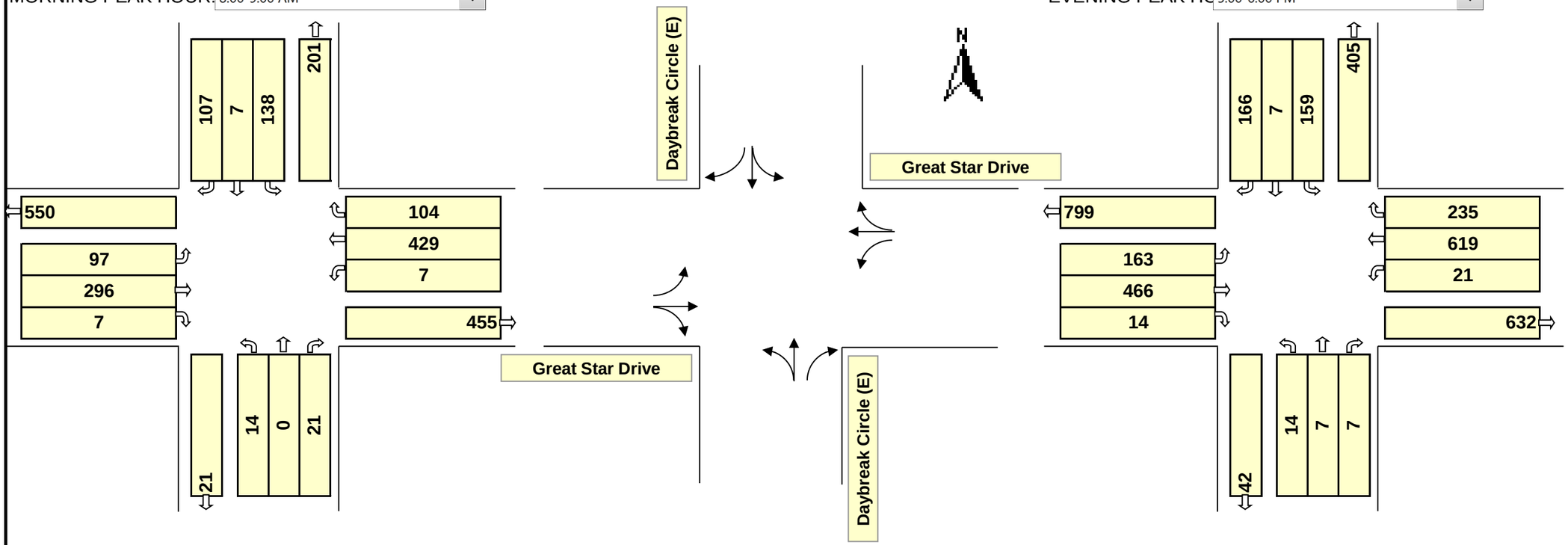
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltA Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HO 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	429	0.0	0	533	1.00	533	97	630	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **803** V/C
Level of Service: **A** **0.50**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	466	0.0	0	480	1.00	480	21	501	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	163	1017	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1213** V/C
Level of Service: **C** **0.76**

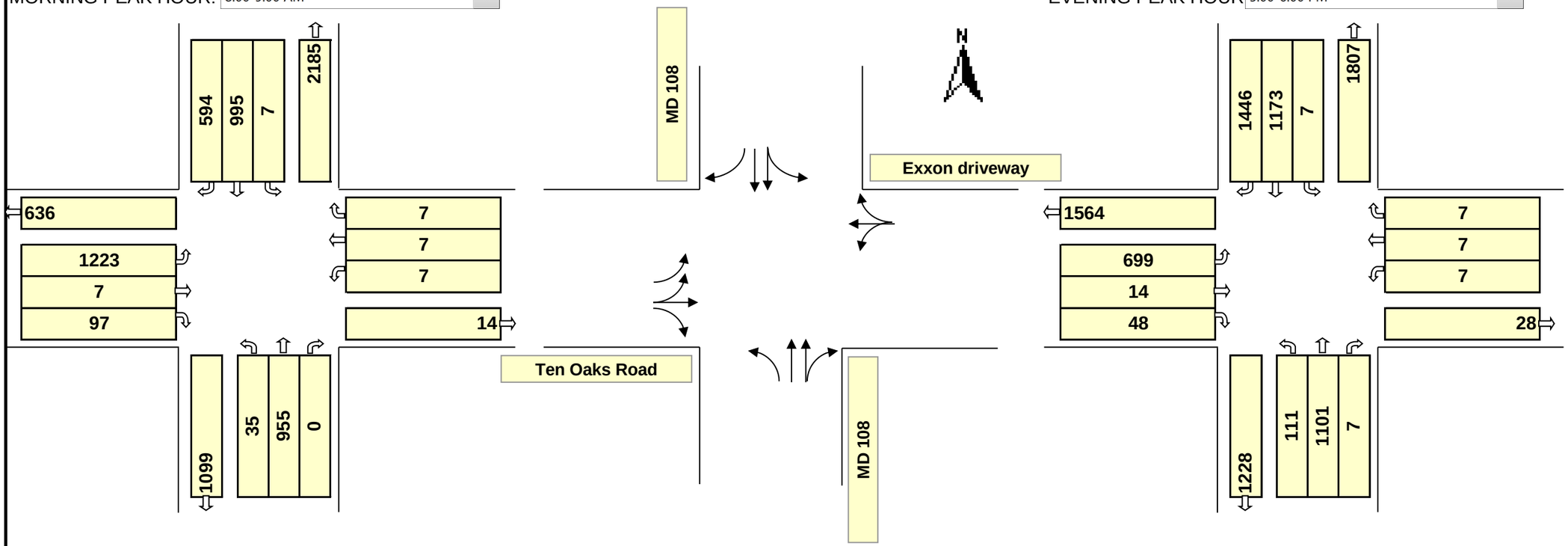
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltA Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	955	0.0	0	955	0.55	525	7	532	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1223	1230	0.60	738	0	738	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	734	-140	1.00	-140	0	-140	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1357** — Level of Service: **D** — V/C **0.85**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1173	5.0	7	1208	0.55	664	111	775	☐
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1446	0	0.0	419	1027	1.00	1027	0	1027	☑
											☐

Remarks: SBR becomes critical

* Critical Volume — TOTAL: **1475** — Level of Service: **E** — V/C **0.92**

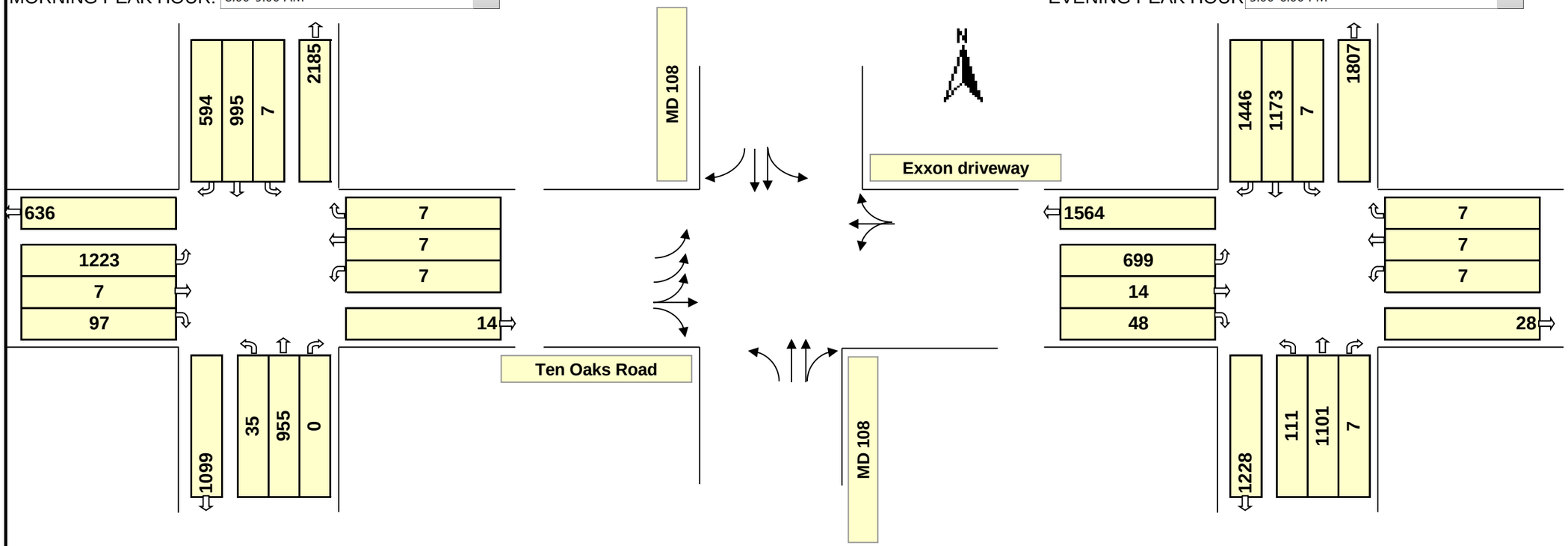
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltA Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	955	0.0	0	955	0.55	525	7	532	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1223	1230	0.40	492	0	492	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	489	105	1.00	105	0	105	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL and SBT

* Critical Volume — TOTAL: **1111** — Level of Service: **B** — V/C **0.69**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1173	5.0	7	1208	0.55	664	111	775	☐
	EBTL	0	14	1.0	699	713	0.40	285	0	285	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1446	0	0.0	280	1166	1.00	1166	0	1166	☑
											☐

Remarks: SBR becomes critical

* Critical Volume — TOTAL: **1473** — Level of Service: **E** — V/C **0.92**

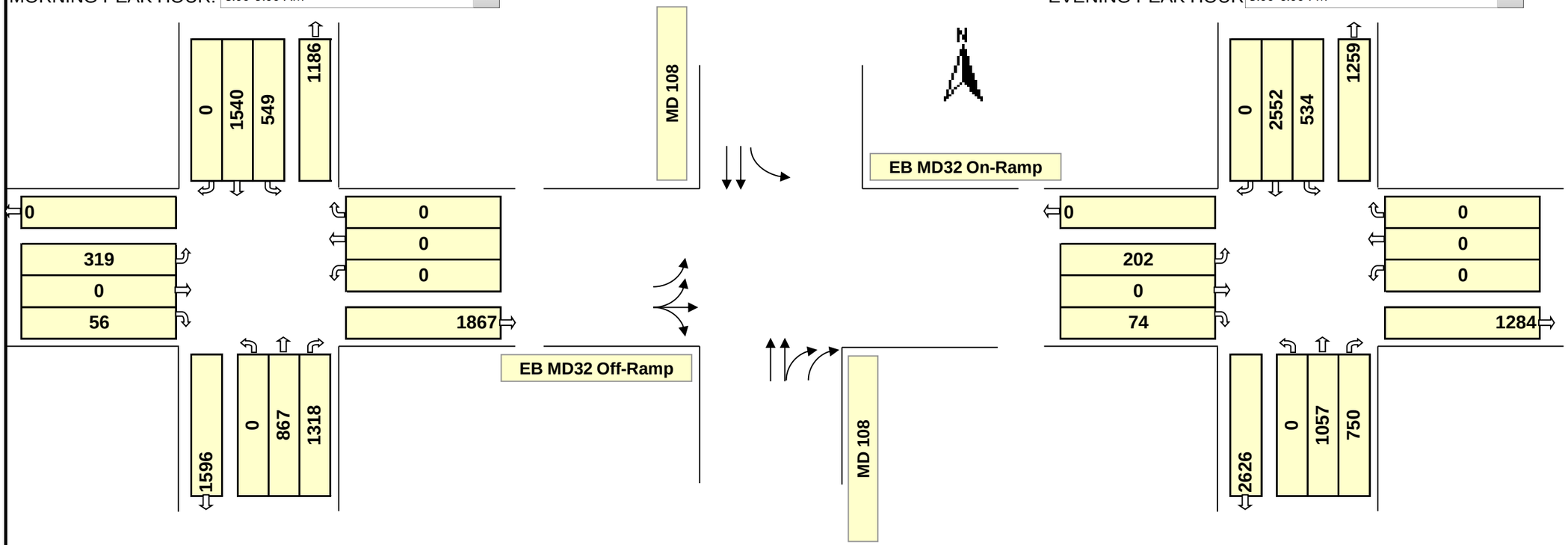
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltA Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	867	0.0	0	2185	0.55	1202	549	1751	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	319	375	0.60	225	0	225	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1976** — Level of Service: **F** — V/C **1.23**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	534	1528	☑
	SBT	0	2552	0.0	0	2552	0.55	1404	0	1404	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1693** — Level of Service: **F** — V/C **1.06**

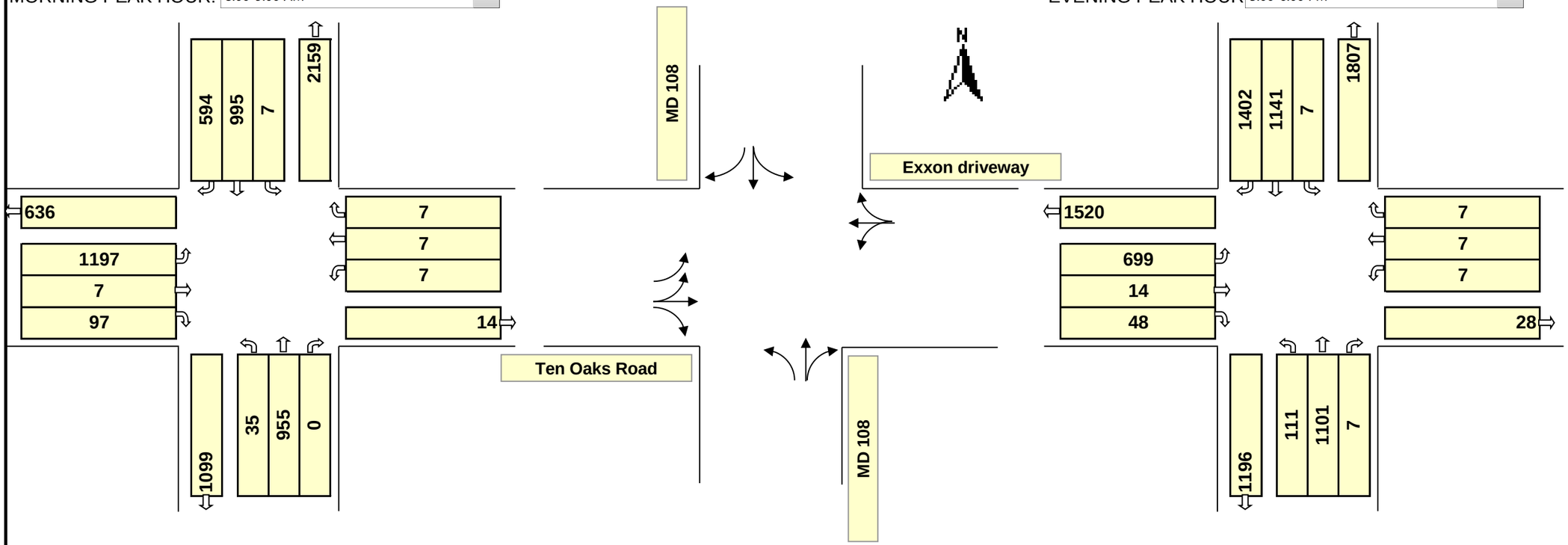
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	955	0.0	0	955	1.00	955	7	962	☐
	SBTL+NBL	0	995	4.0	7	1023	1.00	1023	35	1058	☑
	EBTL	0	7	1.0	1197	1204	0.60	722	0	722	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1801** — Level of Service: **F** — V/C **1.13**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	1.00	1108	7	1115	☐
	SBTL+NBL	0	1141	5.0	7	1176	1.00	1176	111	1287	☑
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it gets 'covered' by EBL & SBTL

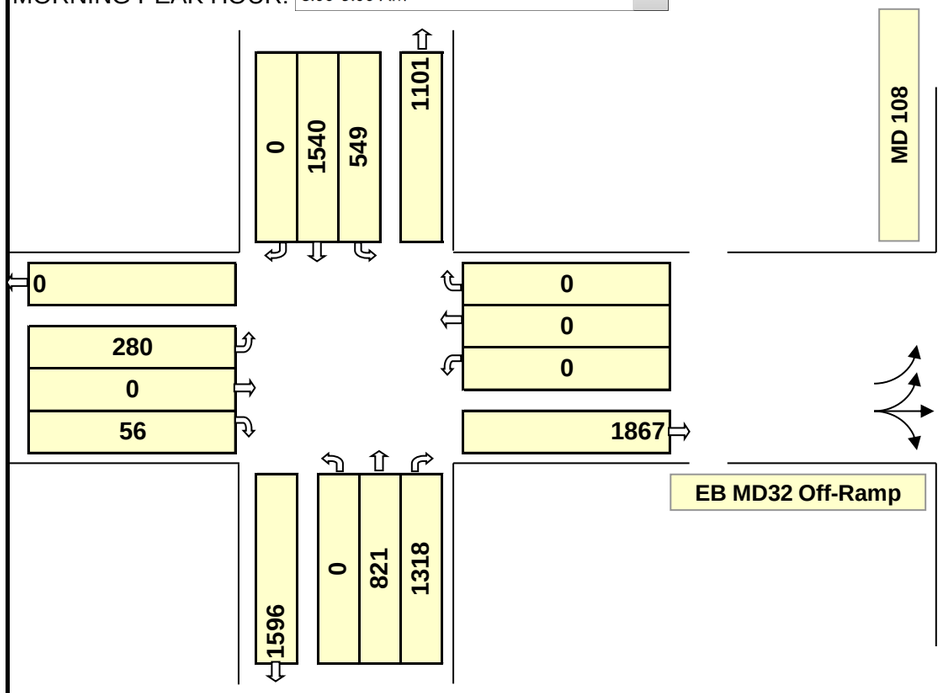
* Critical Volume — TOTAL: **1736** — Level of Service: **F** — V/C **1.08**

Filename, Location & Path:

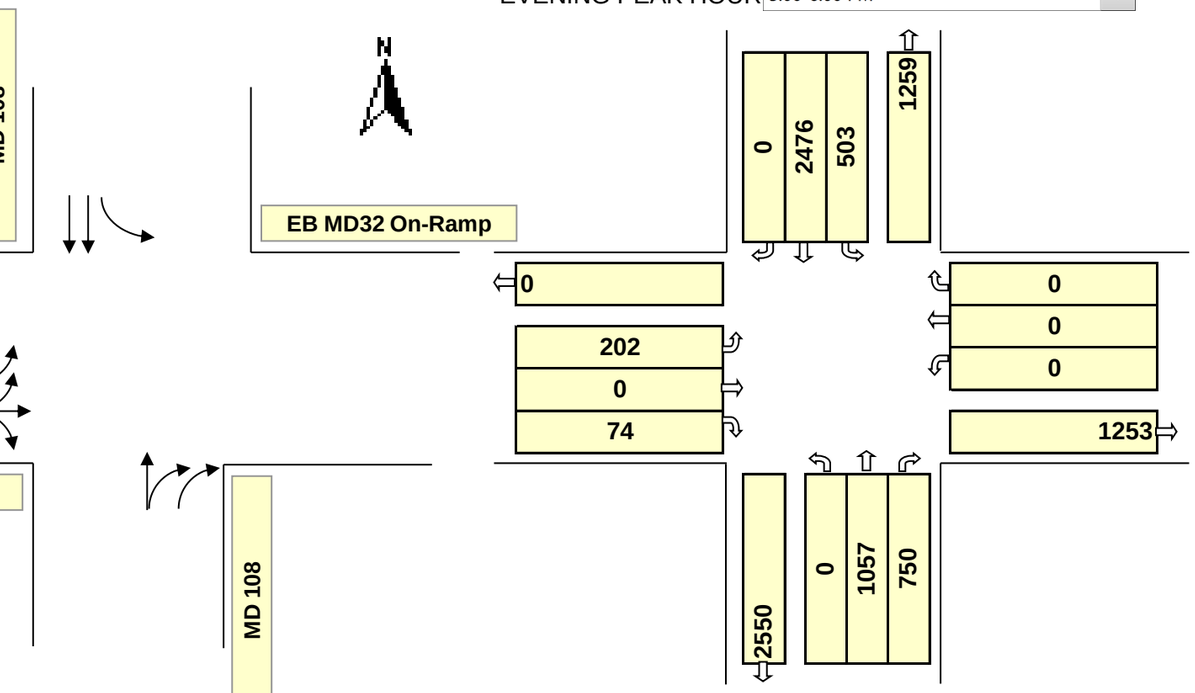
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	821	0.0	0	2139	0.55	1176	549	1725	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	280	336	0.60	202	0	202	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1927** — Level of Service: **F** — V/C **1.20**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	503	1497	☑
	SBT	0	2476	0.0	0	2476	0.55	1362	0	1362	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1662** — Level of Service: **F** — V/C **1.04**

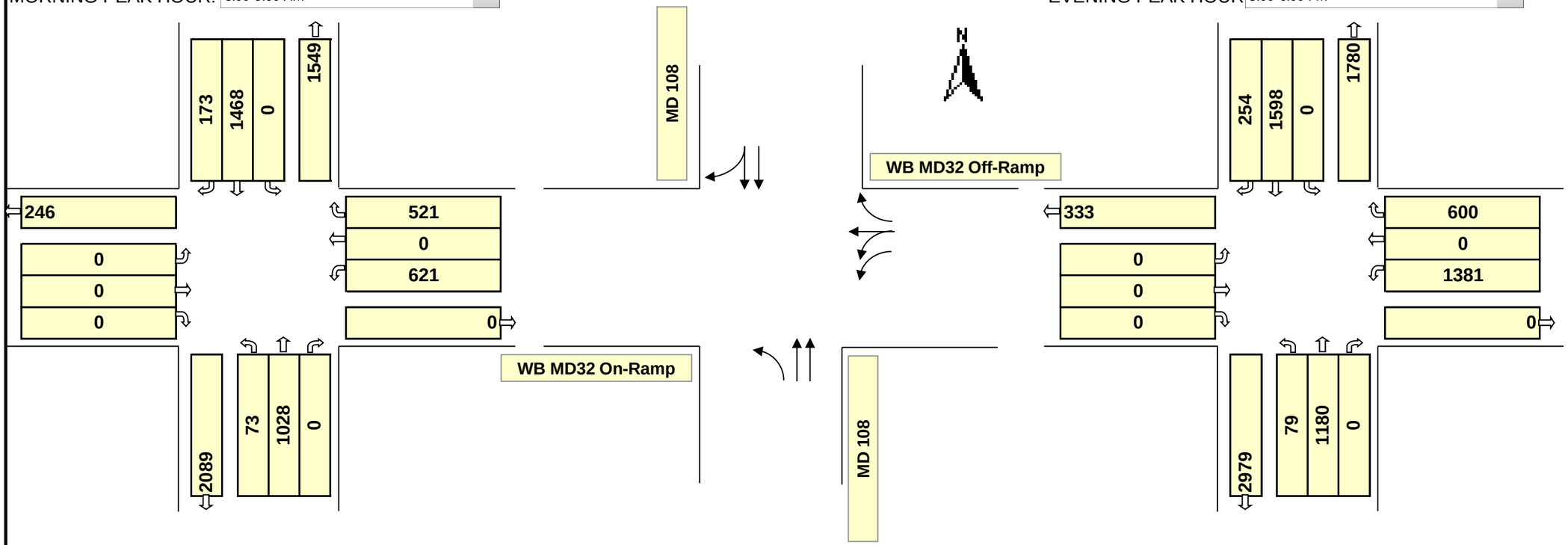
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at WB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1028	0.0	0	1028	0.55	565	0	565	☐
	SBTR+NBL	173	1468	0.0	0	1641	0.55	903	73	976	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	621	621	0.60	373	0	373	☐
	WBR-SBL	521	0	0.0	0	521	1	521	0	521	☑
											☐

Remarks:

* Critical Volume — TOTAL: **1497** — Level of Service: **E** — V/C **0.94**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1180	0.0	0	1180	0.55	649	0	649	☐
	SBTR+NBL	254	1598	0.0	0	1852	0.55	1019	79	1098	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	1381	1381	0.60	829	0	829	☑
	WBR-SBL	600	0	0.0	0	600	1.00	600	0	600	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1926** — Level of Service: **F** — V/C **1.20**

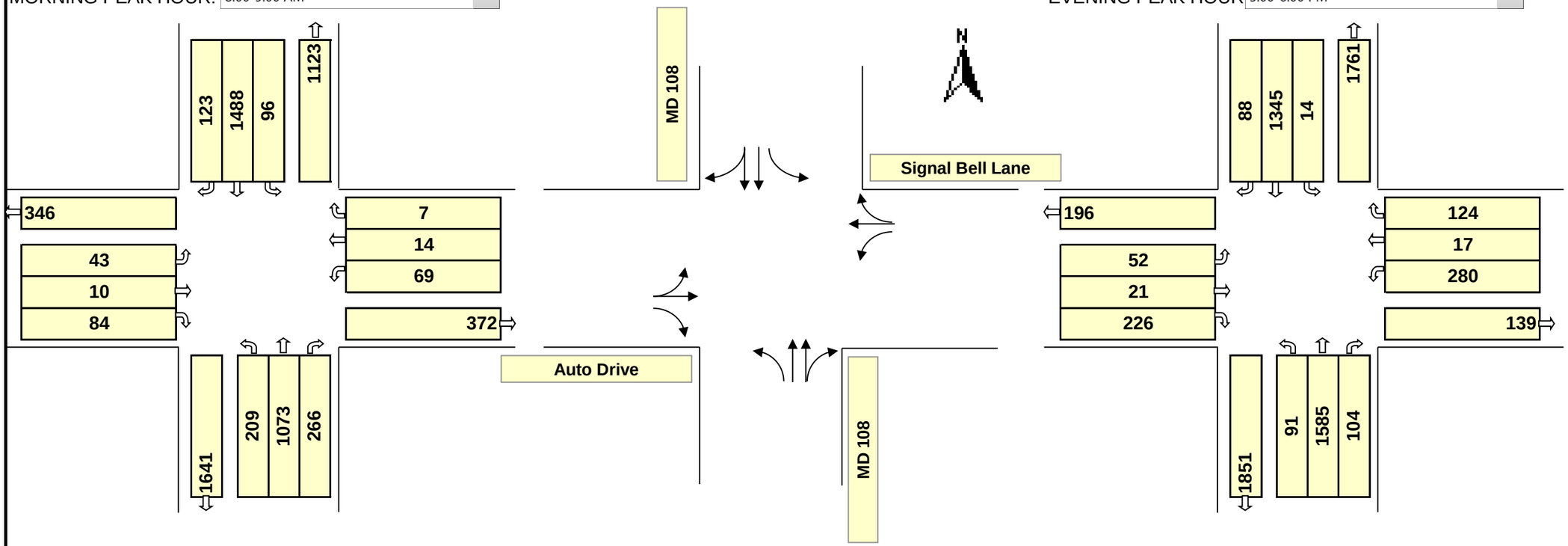
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Concurrent

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	266	1073	0.0	0	1339	0.55	736	96	832	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL+WBL	0	10	1.1	43	57	1.00	57	69	126	☑
	WBTR+EBL	7	14	0.0	0	21	1.00	21	43	64	☐
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WB right-turn volume not reduced by SB left-turn volume due to short turn lane which occasionally is blocked by WB left-turn queues

* Critical Volume

TOTAL: **1221** V/C

Level of Service: **C** **0.76**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL+WBL	0	21	1.1	52	78	1.00	78	280	358	☑
	WBTR+EBL	124	17	0.0	0	141	1.00	141	52	193	☐
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks: WB rights not reduced (see AM comment).

* Critical Volume

TOTAL: **1301** V/C

Level of Service: **D** **0.81**

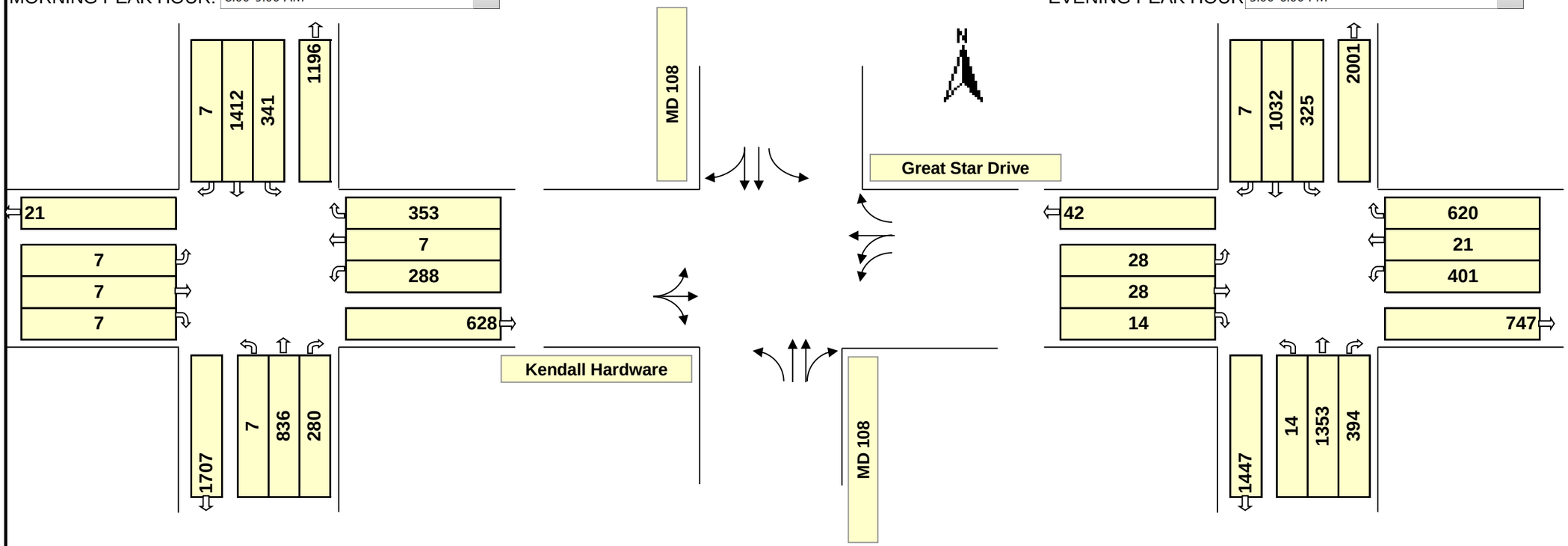
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	836	0.0	0	1116	0.55	614	341	955	☑
	SBTR+NBL	7	1412	0.0	0	1419	0.55	780	7	787	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	353	0	0.0	341	12	1.00	12	0	12	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1153** — Level of Service: **C** — V/C **0.72**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1353	0.0	0	1747	0.55	961	325	1286	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☐
	WBR-SBL	620	0	0.0	325	295	1.00	295	0	295	☑
											☐

Remarks: WBR critical volume gets reduced by SBL & WBL volume

* Critical Volume — TOTAL: **1651** — Level of Service: **F** — V/C **1.03**

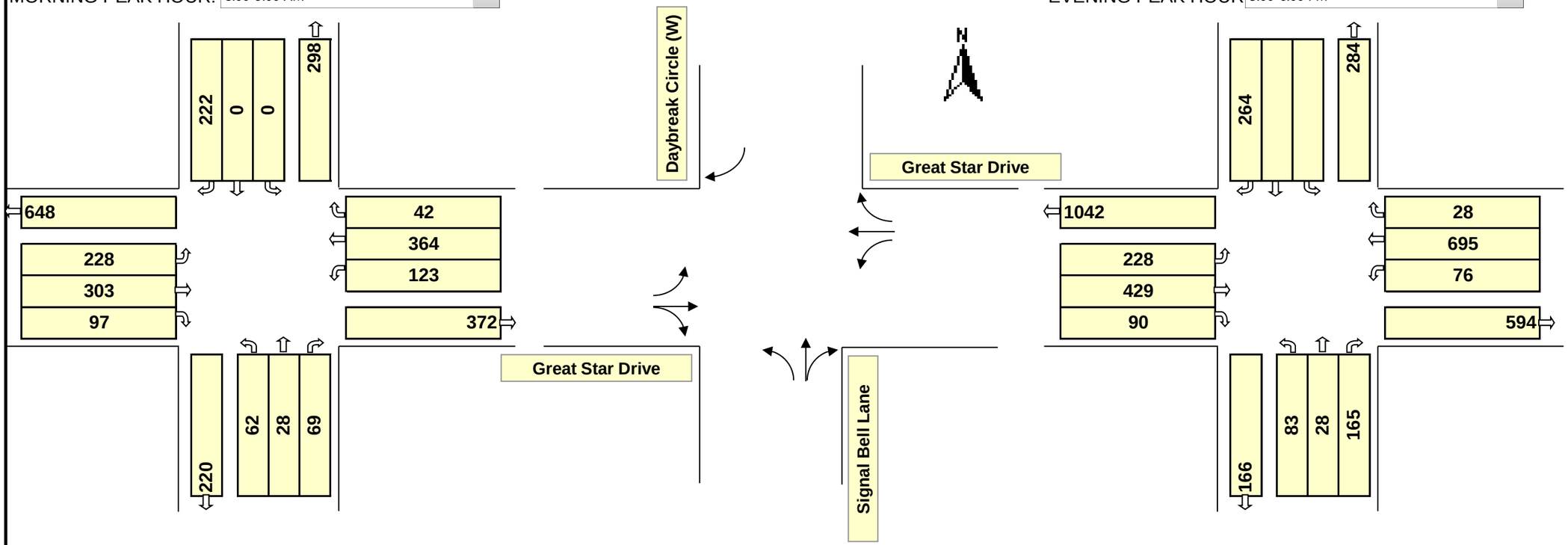
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	69	28	0.0	0	97	1.00	97	0	97	☐
	SBR+NBL	222	0	0.0	0	222	1.00	222	62	284	☑
	EBTR+WBL	97	303	0.0	0	400	1.00	400	123	523	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **876** — Level of Service: **A** — V/C **0.55**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	165	28	0.0	0	193	1.00	193	0	193	☐
	SBR+NBL	264	0	0.0	0	264	1.00	264	83	347	☑
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1270** — Level of Service: **C** — V/C **0.79**

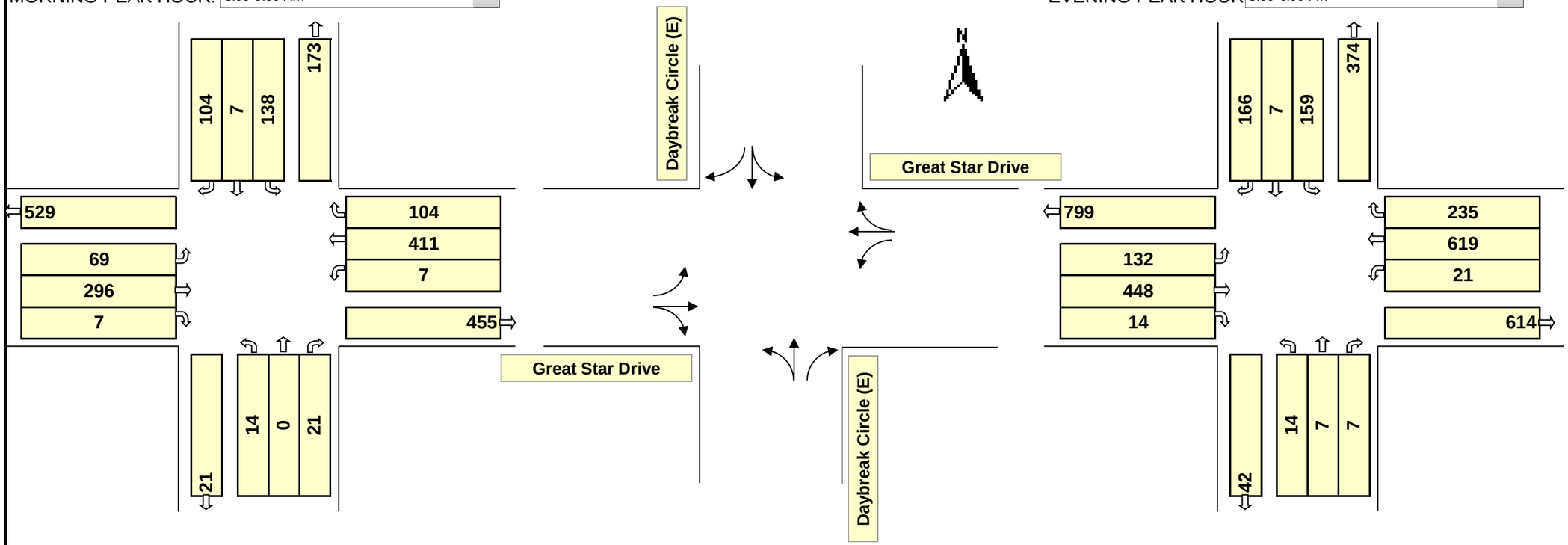
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltB** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	411	0.0	0	515	1.00	515	69	584	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **757** — Level of Service: **A** — V/C **0.47**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	448	0.0	0	462	1.00	462	21	483	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	132	986	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1182** — Level of Service: **C** — V/C **0.74**

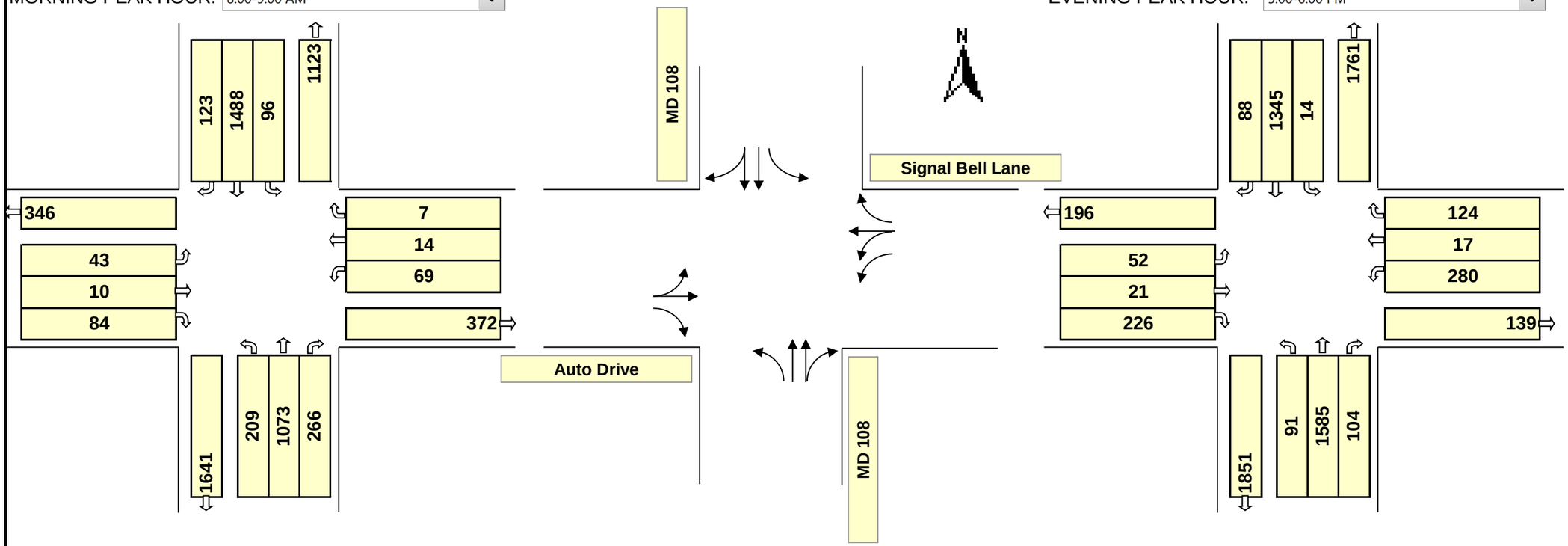
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltB Opt1** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR: 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 (Split)

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	266	1073	0.0	0	1339	0.55	736	96	832	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	10	1.0	43	53	1.00	53	0	53	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1198** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☑
	WBTL	0	17	1.0	280	297	0.60	178	0	178	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1194** — Level of Service: **C** — V/C **0.75**

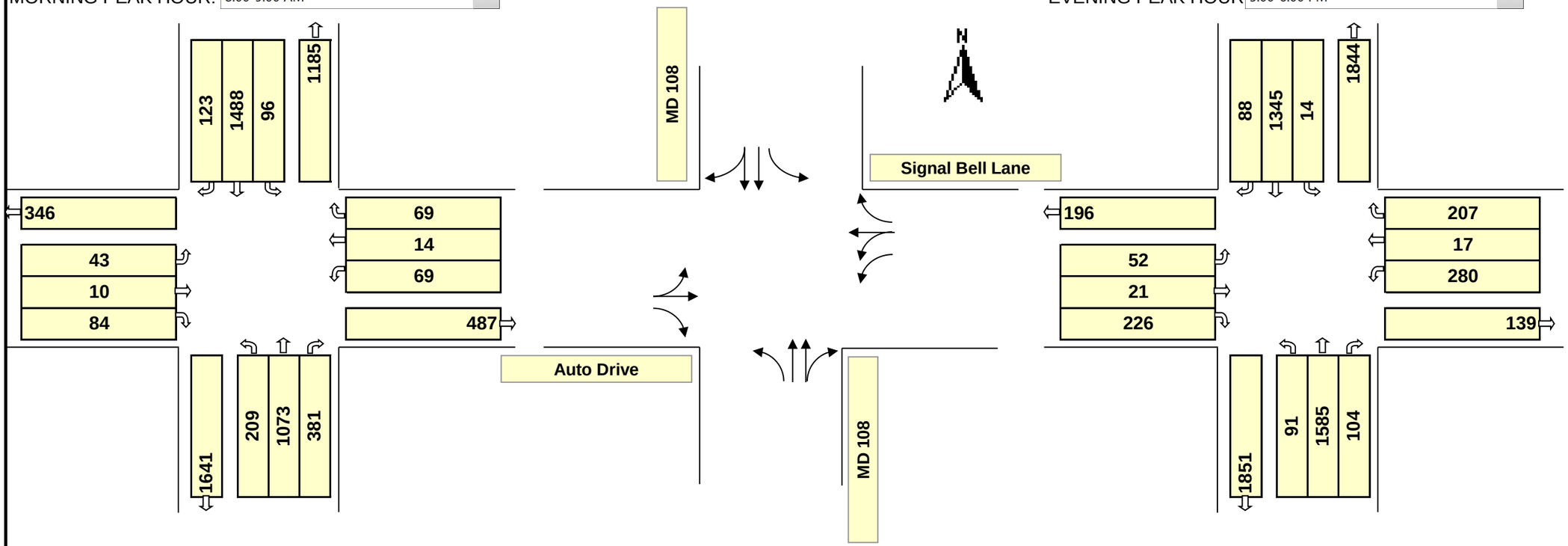
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltB Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	381	1073	0.0	0	1454	0.55	800	96	896	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	10	1.0	43	53	1.00	53	0	53	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WBR covered by SBL

* Critical Volume — TOTAL: **1198** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☐
	WBTL	0	17	1.0	280	297	0.60	178	0	178	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☑
											☐

Remarks: WB rights covered by WBTL

* Critical Volume — TOTAL: **1256** — Level of Service: **C** — V/C **0.79**

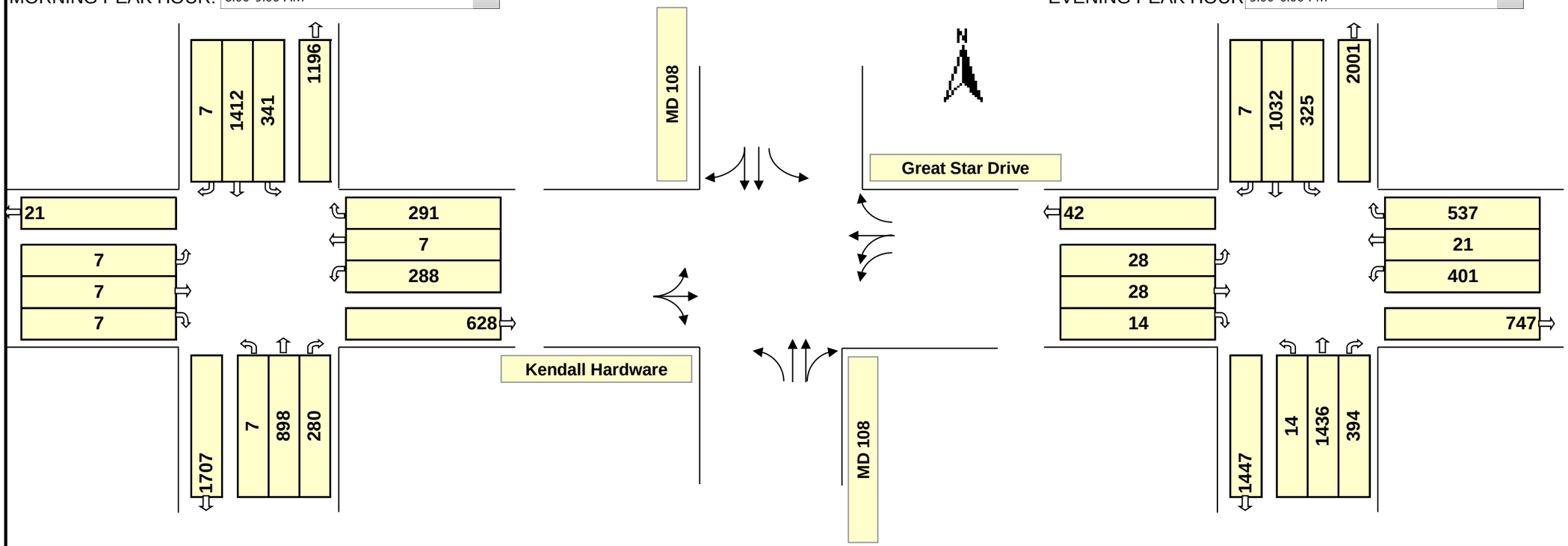
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltB Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	898	0.0	0	1178	0.55	648	341	989	☑
	SBTR+NBL	7	1412	0.0	0	1419	0.55	780	7	787	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	291	0	0.0	341	-50	1.00	-50	0	-50	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1187** — Level of Service: **C** — V/C **0.74**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1436	0.0	0	1830	0.55	1007	325	1332	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☑
	WBR-SBL	537	0	0.0	325	212	1.00	212	0	212	☐
											☐

Remarks: WBR-SBL < WBTL; therefore, not critical

* Critical Volume — TOTAL: **1655** — Level of Service: **F** — V/C **1.03**

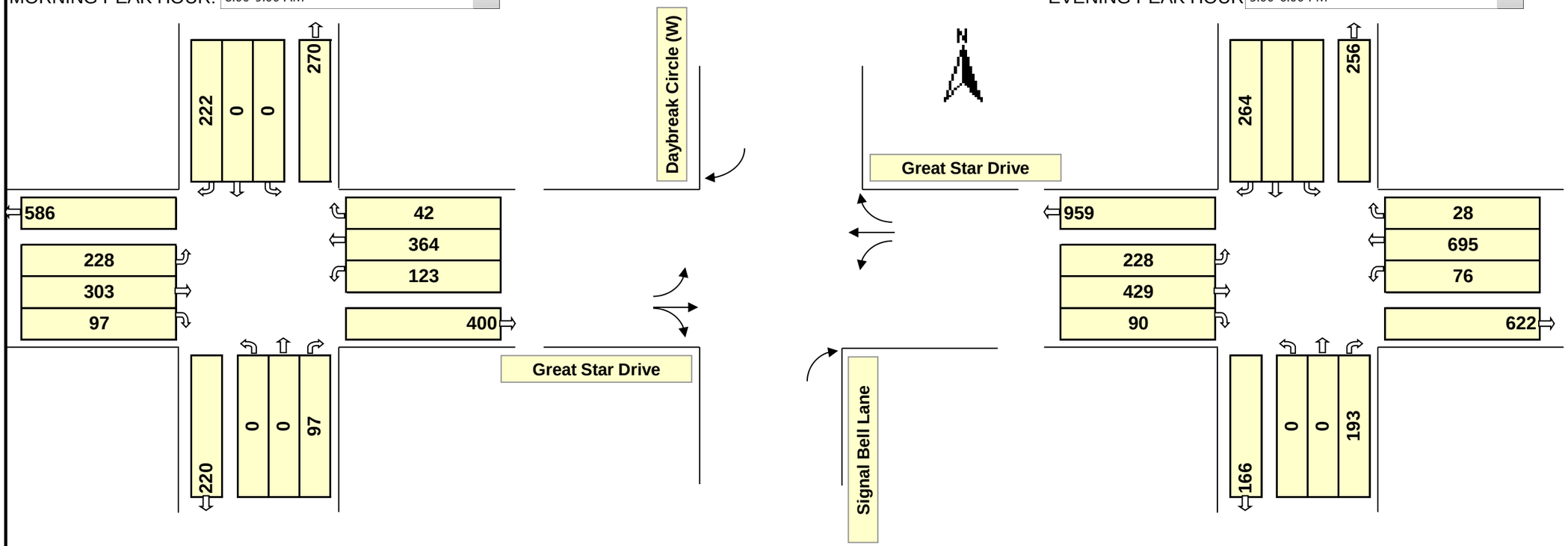
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltB Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	97	0	0.0	0	97	1.00	97	0	97	☐
	SBR	222	0	0.0	0	222	1.00	222	0	222	☐
	EBTR+WBL	97	303	0.0	0	400	1.00	400	123	523	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
	SBR-EBL										☐
											☐

Remarks: NB & SB rights get covered by overlap lefts

* Critical Volume — TOTAL: **592** — Level of Service: **A** — V/C **0.37**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	193	0	0.0	0	193	1.00	193	0	193	☐
	SBR	264	0	0.0	0	264	1.00	264	0	264	☐
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
	SBR-EBL	264	0	0.0	228	36	1.00	36	0	36	☐
	NBR - WBL	193	0	0.0	76	117	1.00	117	0	117	☑

Remarks:

* Critical Volume — TOTAL: **1040** — Level of Service: **B** — V/C **0.65**

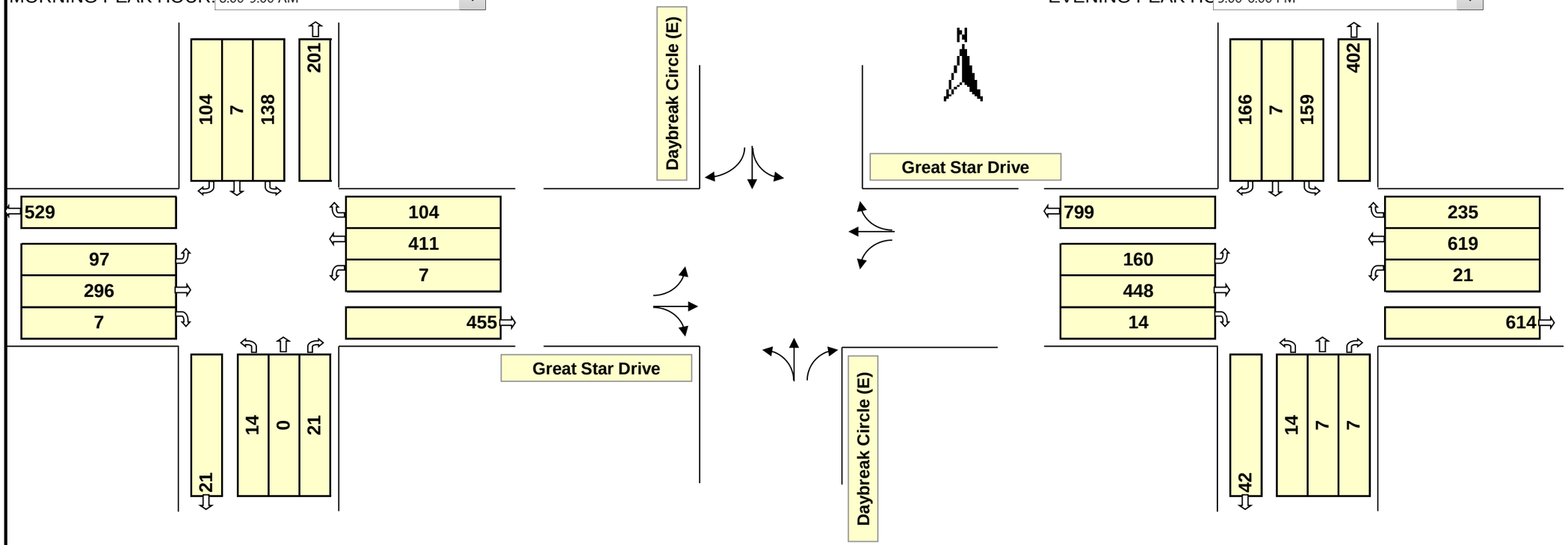
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltB Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HO 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	411	0.0	0	515	1.00	515	97	612	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **785** — Level of Service: **A** — V/C **0.49**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	448	0.0	0	462	1.00	462	21	483	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	160	1014	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1210** — Level of Service: **C** — V/C **0.76**

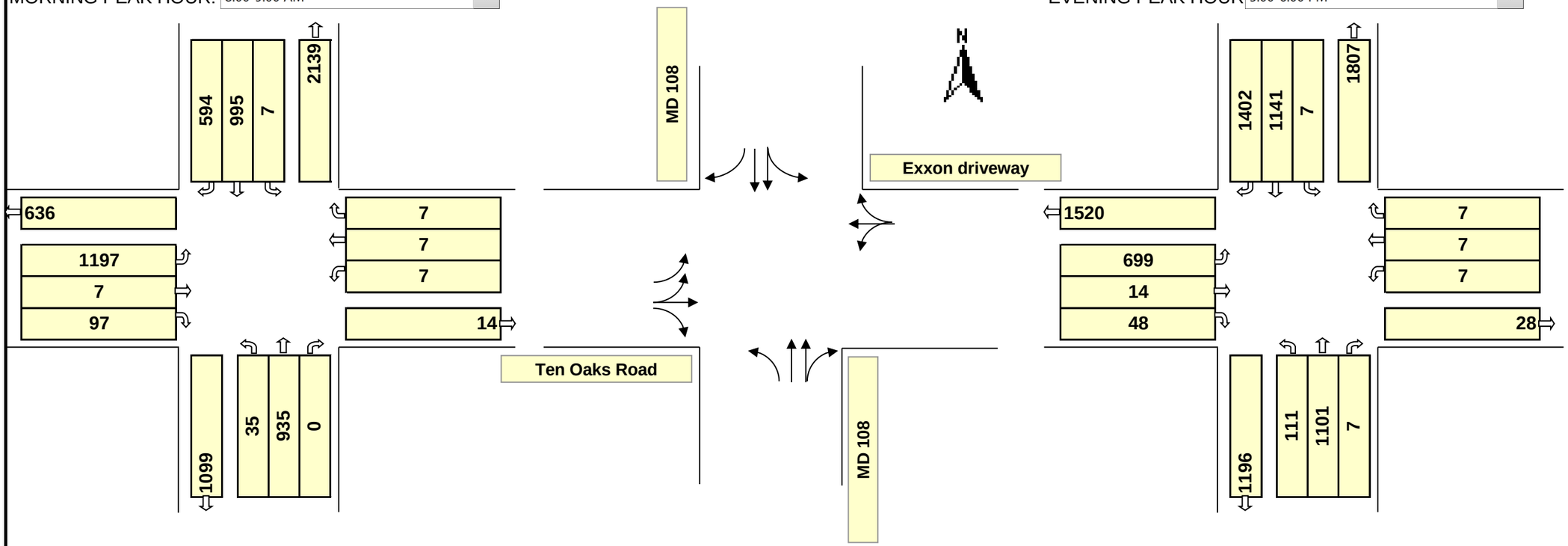
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltB Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	935	0.0	0	935	0.55	514	7	521	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1197	1204	0.60	722	0	722	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	718	-124	1.00	-124	0	-124	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1341** — Level of Service: **D** — V/C **0.84**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1141	5.0	7	1176	0.55	647	111	758	☐
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1402	0	0.0	419	983	1.00	982.6	0	983	☑
											☐

Remarks: SBR becomes critical

* Critical Volume — TOTAL: **1431** — Level of Service: **D** — V/C **0.89**

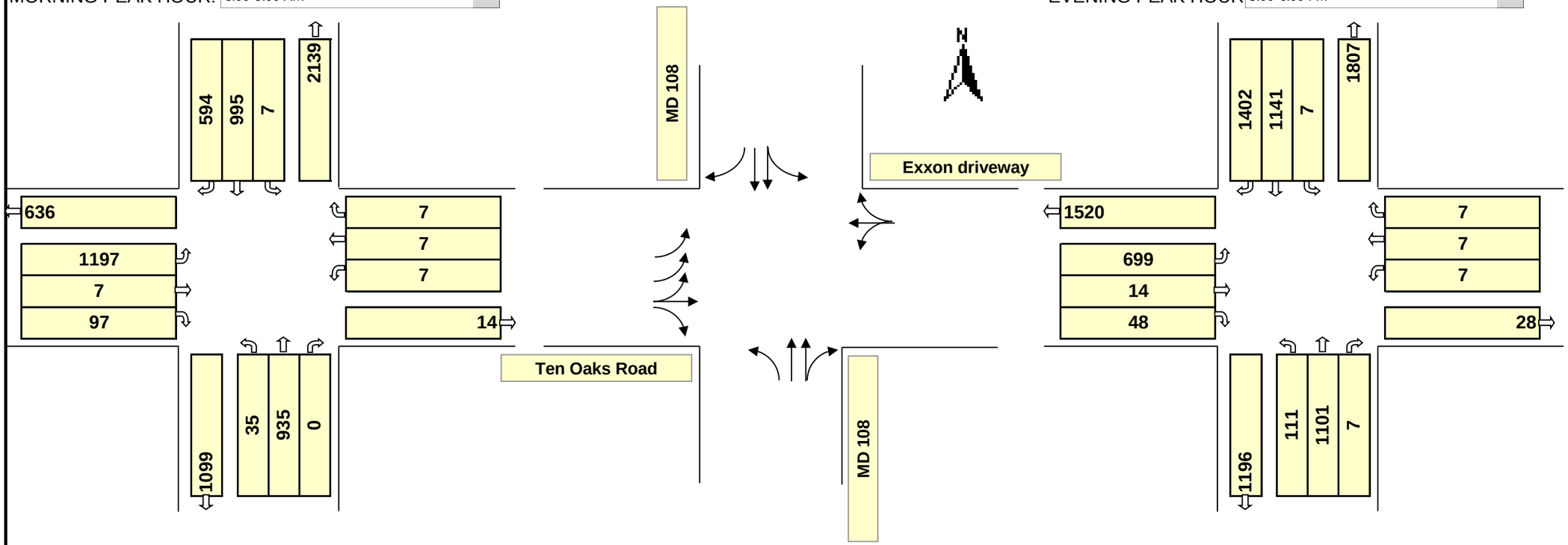
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltB Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	935	0.0	0	935	0.55	514	7	521	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1197	1204	0.40	482	0	482	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	479	115	1.00	115	0	115	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL and SBT

* Critical Volume — TOTAL: **1100** — Level of Service: **B** — V/C **0.69**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1141	5.0	7	1176	0.55	647	111	758	☐
	EBTL	0	14	1.0	699	713	0.40	285	0	285	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1402	0	0.0	280	1122	1.00	1122	0	1122	☑
											☐

Remarks: SBR becomes critical

* Critical Volume — TOTAL: **1429** — Level of Service: **D** — V/C **0.89**

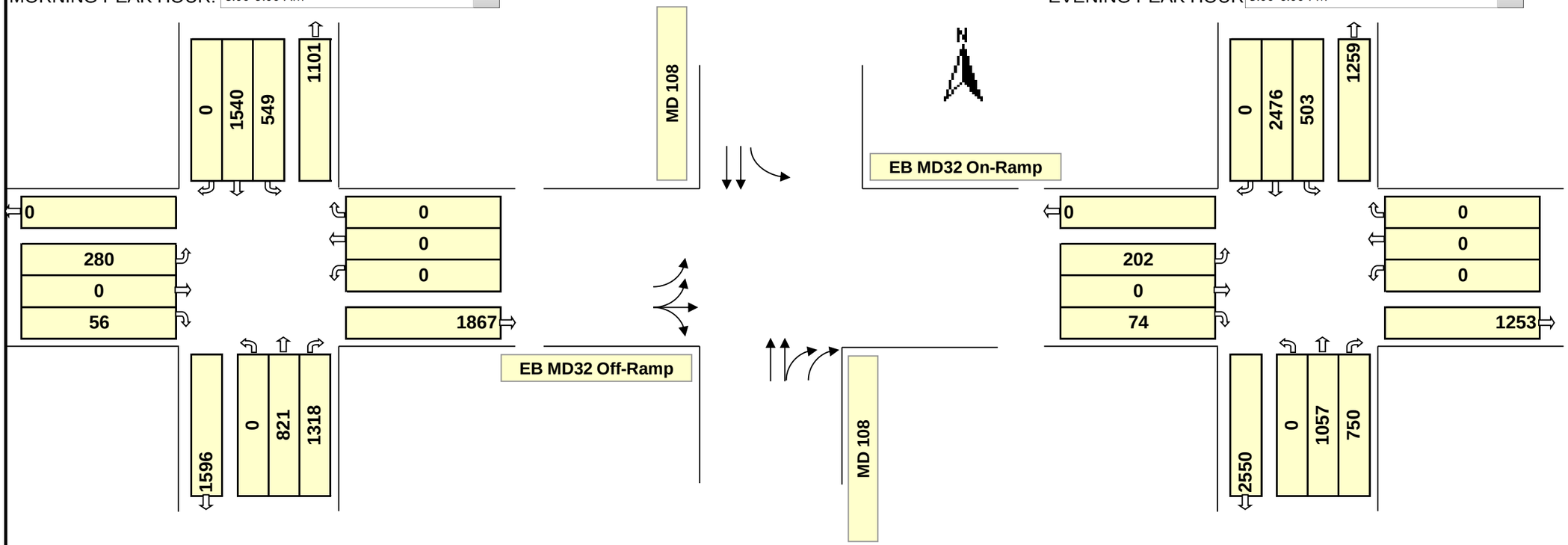
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltB Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	821	0.0	0	2139	0.55	1176	549	1725	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	280	336	0.60	202	0	202	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1927** — Level of Service: **F** — V/C **1.20**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	503	1497	☑
	SBT	0	2476	0.0	0	2476	0.55	1362	0	1362	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1662** — Level of Service: **F** — V/C **1.04**

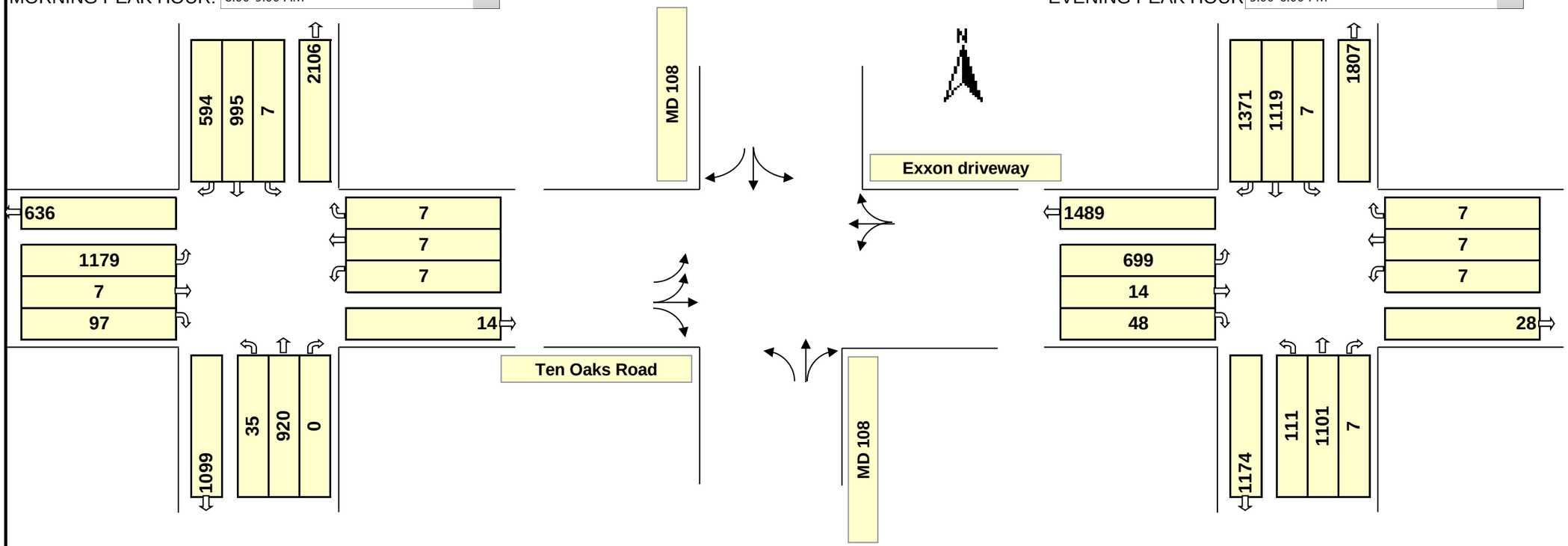
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	920	0.0	0	920	1.00	920	7	927	☐
	SBTL+NBL	0	995	4.0	7	1023	1.00	1023	35	1058	☑
	EBTL	0	7	1.0	1179	1186	0.60	712	0	712	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1791** — Level of Service: **F** — V/C **1.12**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	1.00	1108	7	1115	☐
	SBTL+NBL	0	1119	5.0	7	1154	1.00	1154	111	1265	☑
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
											☐
											☐

Remarks: SBR not critical because it gets 'covered' by EBL & SBTL

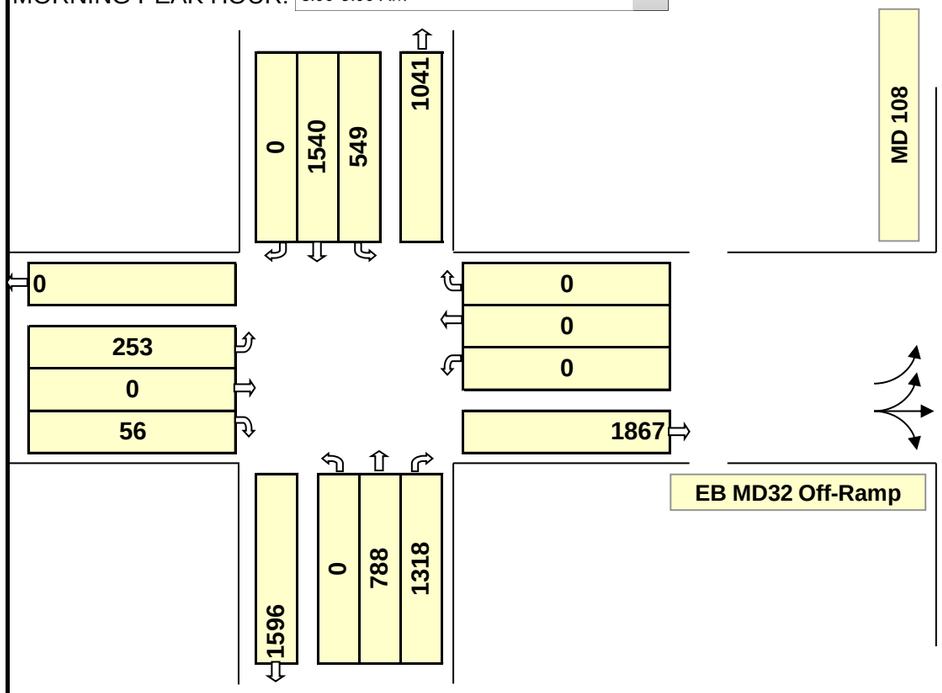
* Critical Volume — TOTAL: **1714** — Level of Service: **F** — V/C **1.07**

Filename, Location & Path:

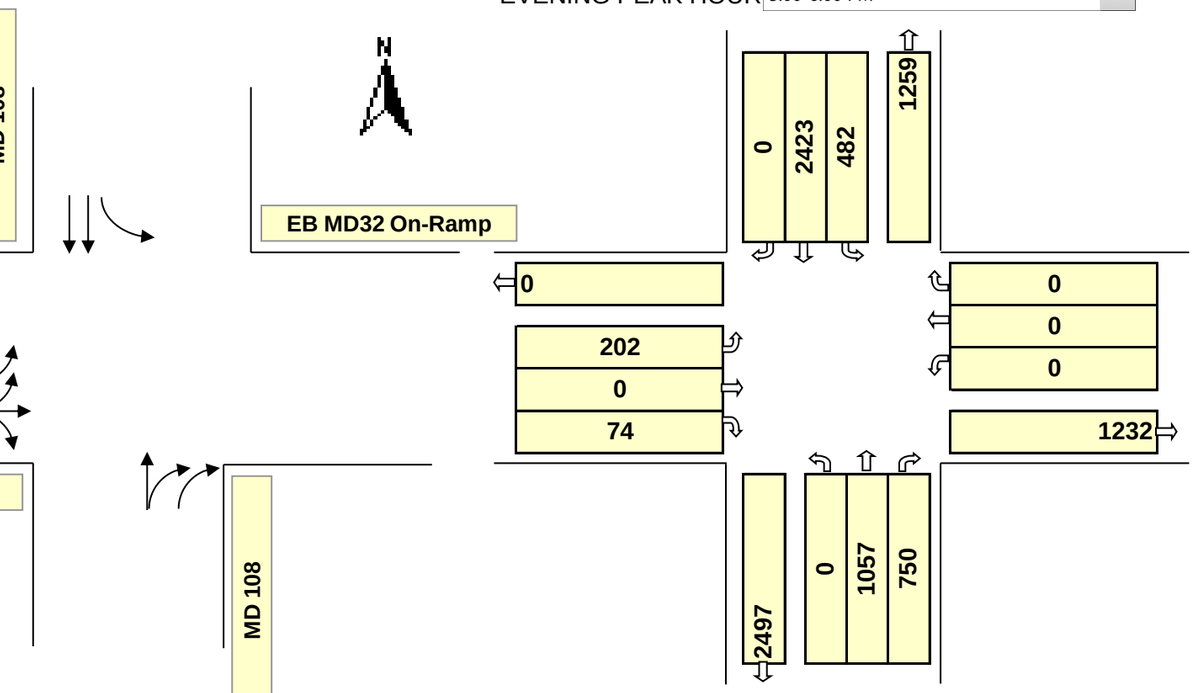
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	788	0.0	0	2106	0.55	1158	549	1707	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	253	309	0.60	185	0	185	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1893** — Level of Service: **F** — V/C **1.18**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	482	1476	☑
	SBT	0	2423	0.0	0	2423	0.55	1333	0	1333	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1641** — Level of Service: **F** — V/C **1.03**

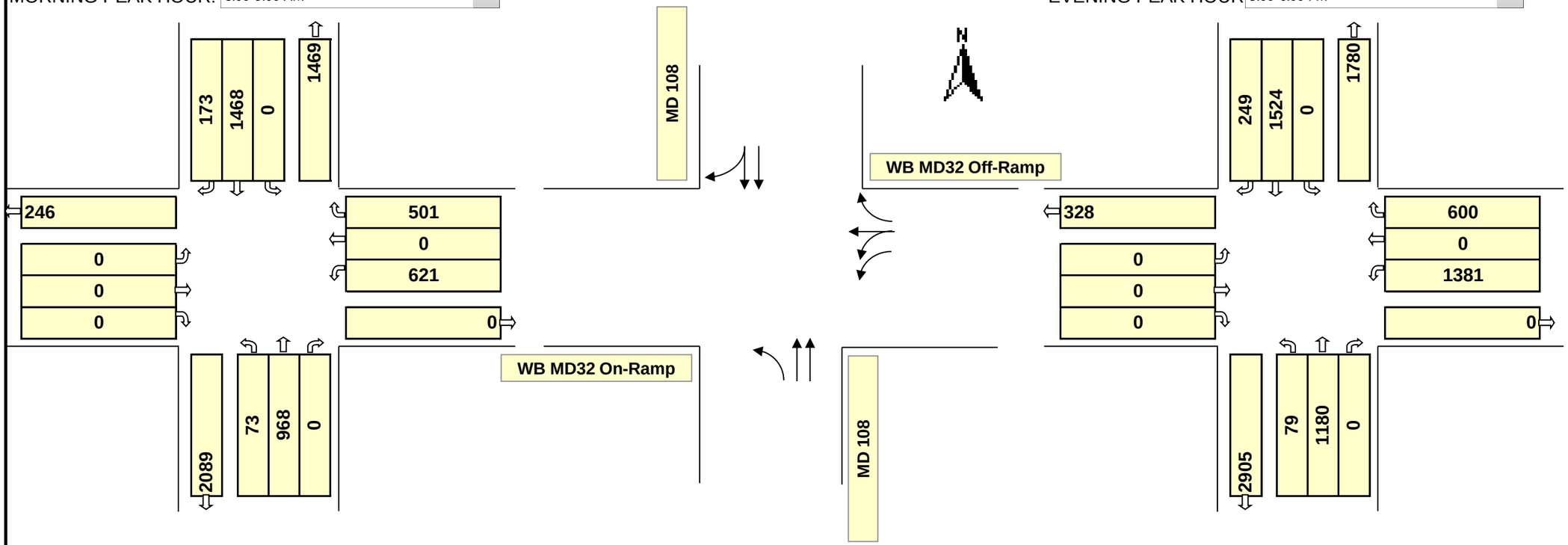
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at WB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	968	0.0	0	968	0.55	532	0	532	☐
	SBTR+NBL	173	1468	0.0	0	1641	0.55	903	73	976	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	621	621	0.60	373	0	373	☐
	WBR-SBL	501	0	0.0	0	501	1	501	0	501	☑
											☐

Remarks:

* Critical Volume — TOTAL: **1477** — Level of Service: **E** — V/C **0.92**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBT	0	1180	0.0	0	1180	0.55	649	0	649	☐
	SBTR+NBL	249	1524	0.0	0	1773	0.55	975	79	1054	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
	WBTL	0	0	1.0	1381	1381	0.60	829	0	829	☑
	WBR-SBL	600	0	0.0	0	600	1.00	600	0	600	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1883** — Level of Service: **F** — V/C **1.18**

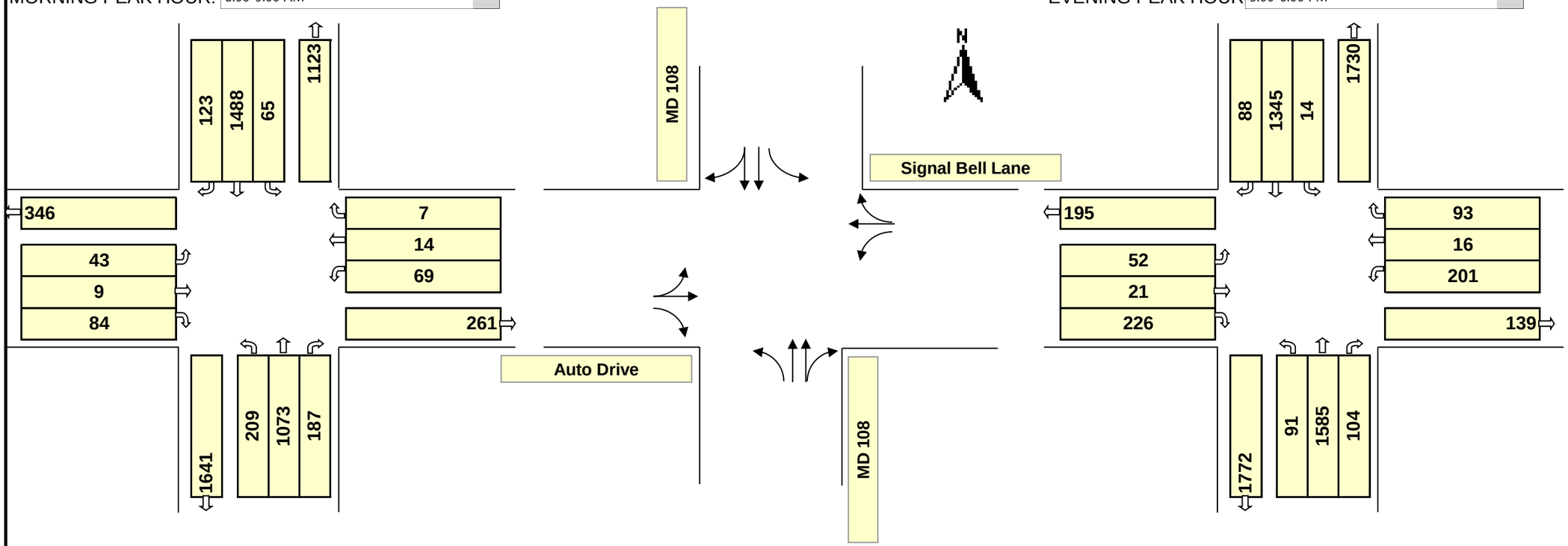
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Concurrent

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	187	1073	0.0	0	1260	0.55	693	65	758	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL+WBL	0	9	1.1	43	56	1.00	56	69	125	☑
	WBTR+EBL	7	14	0.0	0	21	1.00	21	43	64	☐
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WB right-turn volume not reduced by SB left-turn volume due to short turn lane which occasionally is blocked by WB left-turn queues

* Critical Volume

TOTAL: **1220** V/C

Level of Service: **C** **0.76**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL+WBL	0	21	1.1	52	78	1.00	78	201	279	☑
	WBTR+EBL	93	16	0.0	0	109	1.00	109	52	161	☐
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks: WB rights not reduced (see AM comment).

* Critical Volume

TOTAL: **1222** V/C

Level of Service: **C** **0.76**

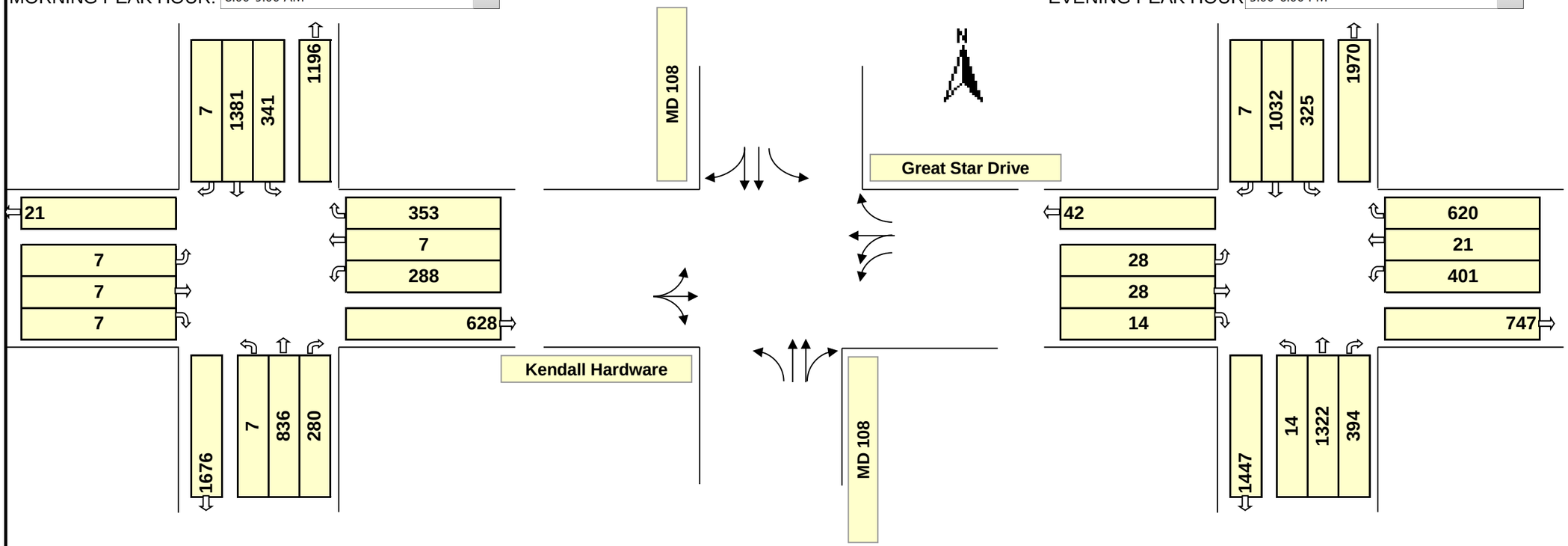
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	836	0.0	0	1116	0.55	614	341	955	☑
	SBTR+NBL	7	1381	0.0	0	1388	0.55	763	7	770	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	353	0	0.0	341	12	1.00	12	0	12	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1153** — Level of Service: **C** — V/C **0.72**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1322	0.0	0	1716	0.55	944	325	1269	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☐
	WBR-SBL	620	0	0.0	325	295	1.00	295	0	295	☑
											☐

Remarks: WBR critical volume gets reduced by SBL & WBL volume

* Critical Volume — TOTAL: **1634** — Level of Service: **F** — V/C **1.02**

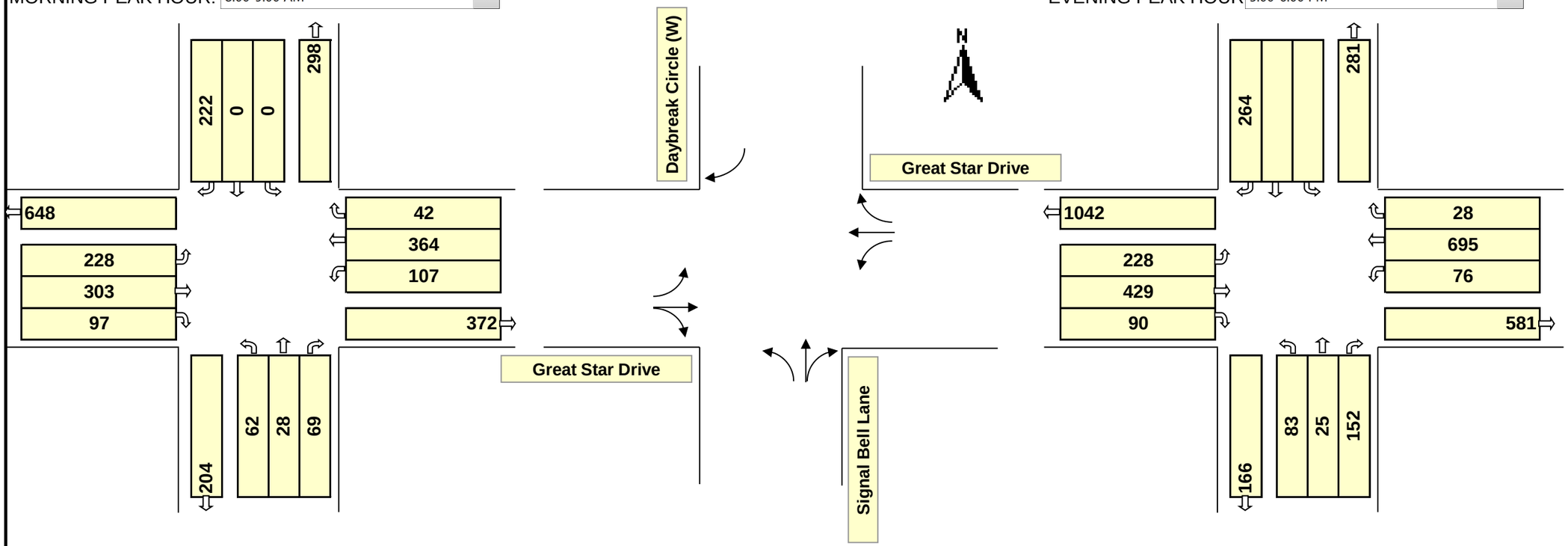
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	69	28	0.0	0	97	1.00	97	0	97	☐
	SBR+NBL	222	0	0.0	0	222	1.00	222	62	284	☑
	EBTR+WBL	97	303	0.0	0	400	1.00	400	107	507	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **876** — Level of Service: **A** — V/C **0.55**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR	152	25	0.0	0	177	1.00	177	0	177	☐
	SBR+NBL	264	0	0.0	0	264	1.00	264	83	347	☑
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1270** — Level of Service: **C** — V/C **0.79**

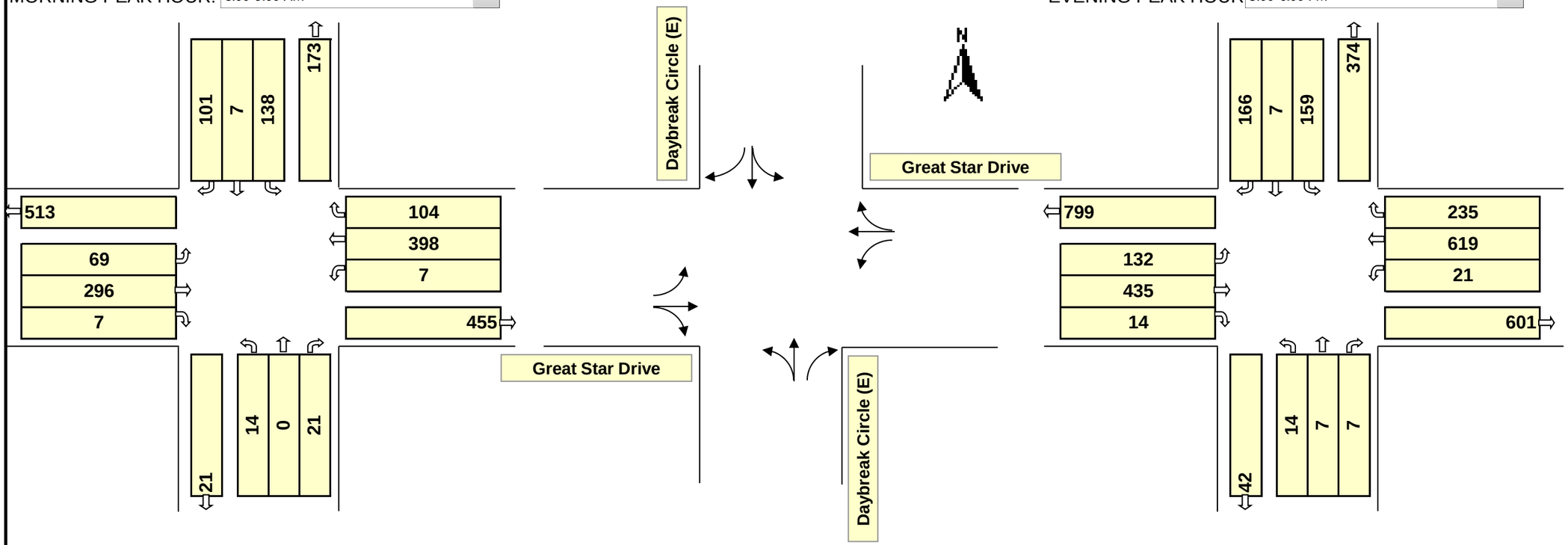
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltC** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	398	0.0	0	502	1.00	502	69	571	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **744** — Level of Service: **A** — V/C **0.46**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	435	0.0	0	449	1.00	449	21	470	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	132	986	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1182** — Level of Service: **C** — V/C **0.74**

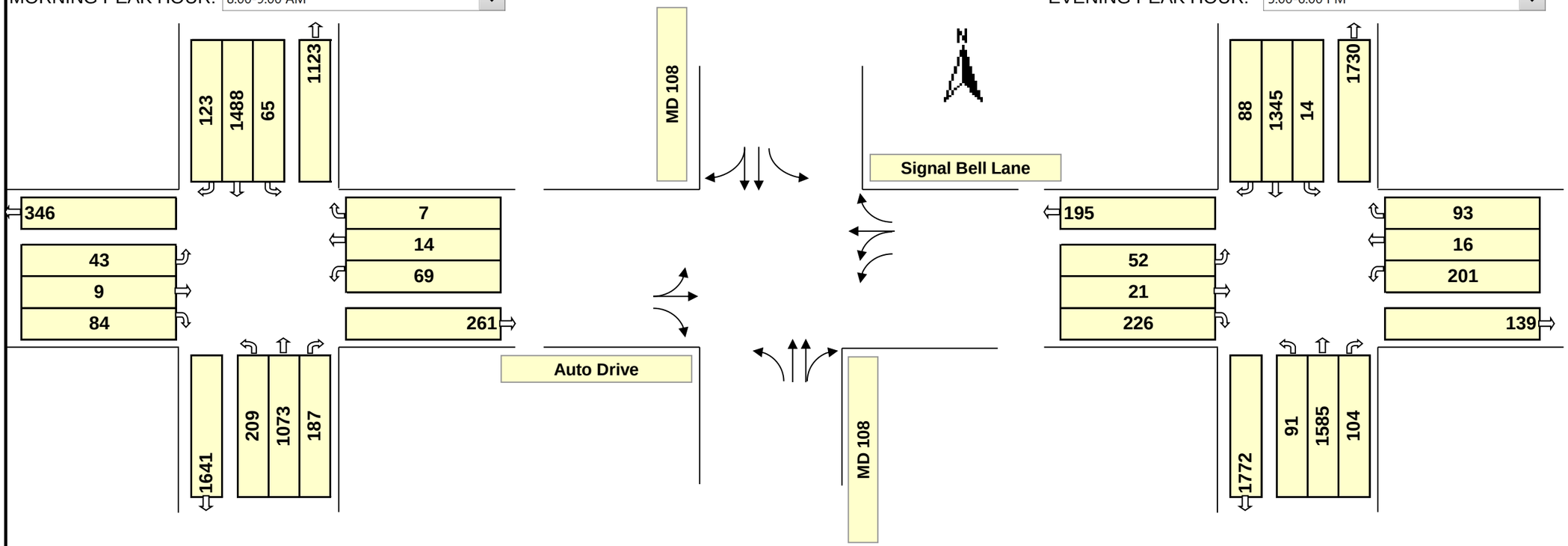
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltC Opt1** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR: 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 (Split)

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	187	1073	0.0	0	1260	0.55	693	65	758	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	9	1.0	43	52	1.00	52	0	52	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1197** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☑
	WBTL	0	16	1.0	201	217	0.60	130	0	130	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☐
											☐

Remarks:

* Critical Volume — TOTAL: **1146** — Level of Service: **B** — V/C **0.72**

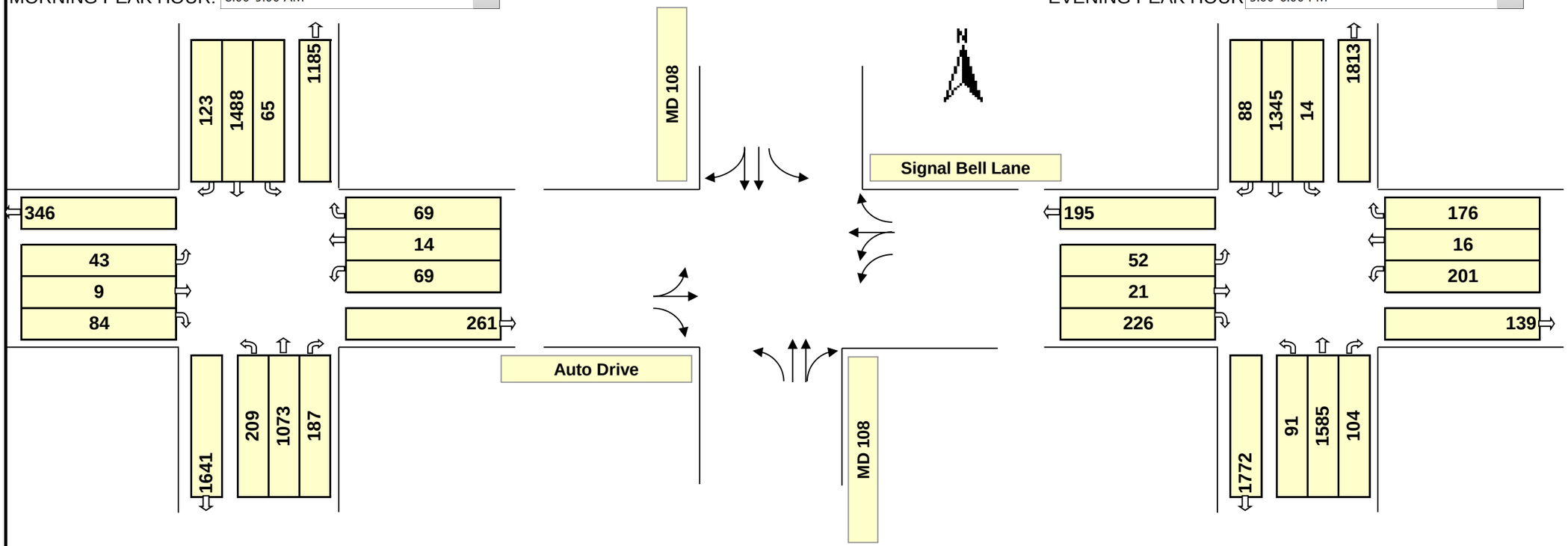
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Auto Dr/Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltC Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	187	1073	0.0	0	1260	0.55	693	65	758	☐
	SBTR+NBL	123	1488	0.0	0	1611	0.55	886	209	1095	☑
	EBTL	0	9	1.0	43	52	1.00	52	0	52	☑
	WBTL	0	14	1.0	69	83	0.60	50	0	50	☑
	EBR-NBL	84	0	0.0	209	-125	1.00	-125	0	-125	☐
											☐

Remarks: WBR covered by SBL

* Critical Volume — TOTAL: **1197** — Level of Service: **C** — V/C **0.75**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	104	1585	0.0	0	1689	0.55	929	14	943	☑
	SBTR+NBL	88	1345	0.0	0	1433	0.55	788	91	879	☐
	EBTL	0	21	1.0	52	73	1.00	73	0	73	☐
	WBTL	0	16	1.0	201	217	0.60	130	0	130	☑
	EBR-NBL	226	0	0.0	91	135	1.00	135	0	135	☑
											☐

Remarks: WB rights covered by WBTL

* Critical Volume — TOTAL: **1208** — Level of Service: **C** — V/C **0.76**

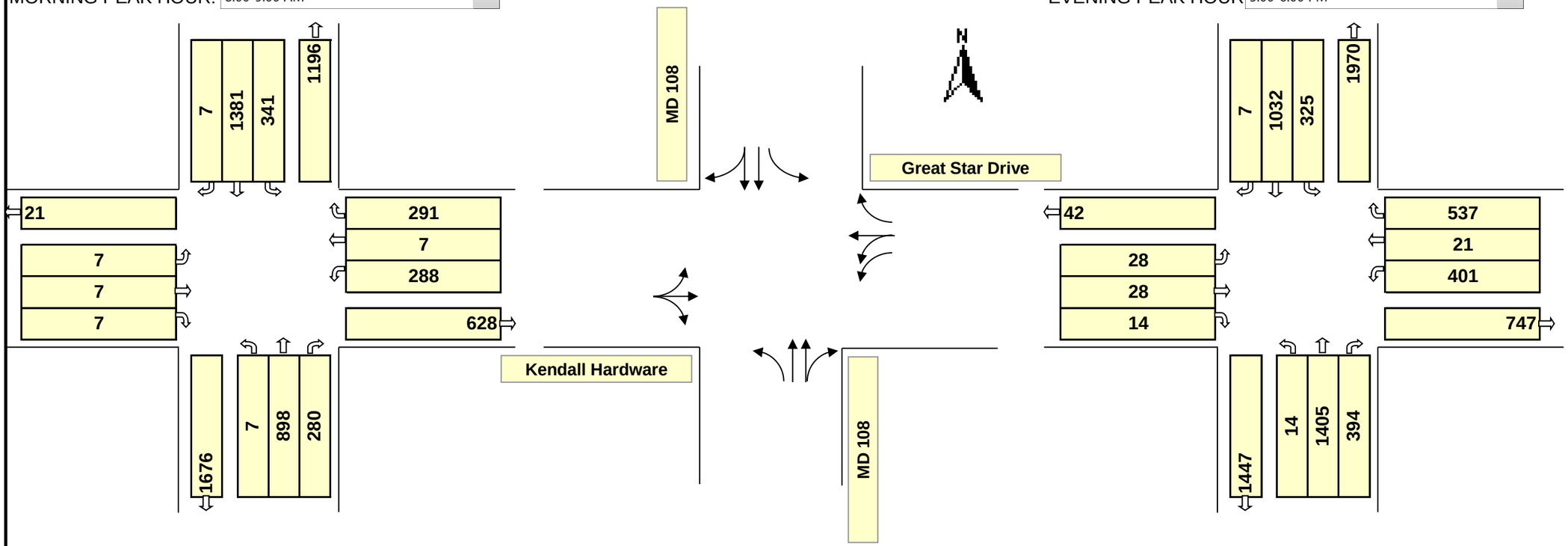
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Great Star Drive** County: **Howard**
Condition: **2025 Build AltC Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8 Split

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)	L.T. Factor (PCE)
			1000	A	≤	1000		
1	=	1.00	1150	B	≤	1150	≤ 199	1.1
2	=	0.55	1300	C	≤	1300	≤ 599	2.0
3	=	0.40	1450	D	≤	1450	≤ 799	3.0
4	=	0.30	1600	E	≤	1600	≤ 999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥ 1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	280	898	0.0	0	1178	0.55	648	341	989	☑
	SBTR+NBL	7	1381	0.0	0	1388	0.55	763	7	770	☐
	EBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	WBTL	0	7	1.0	288	295	0.60	177	0	177	☑
	WBR-SBL	291	0	0.0	341	-50	1.00	-50	0	-50	☐
											☐

Remarks: WBR-SBL < 0; therefore, not a critical volume

* Critical Volume — TOTAL: **1187** — Level of Service: **C** — V/C **0.74**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	394	1405	0.0	0	1799	0.55	989	325	1314	☑
	SBTR+NBL	7	1032	0.0	0	1039	0.55	571	14	585	☐
	EBRTL	14	28	1.0	28	70	1.00	70	0	70	☑
	WBTL	0	21	1.0	401	422	0.60	253	0	253	☑
	WBR-SBL	537	0	0.0	325	212	1.00	212	0	212	☐
											☐

Remarks: WBR-SBL < WBTL; therefore, not critical

* Critical Volume — TOTAL: **1638** — Level of Service: **F** — V/C **1.02**

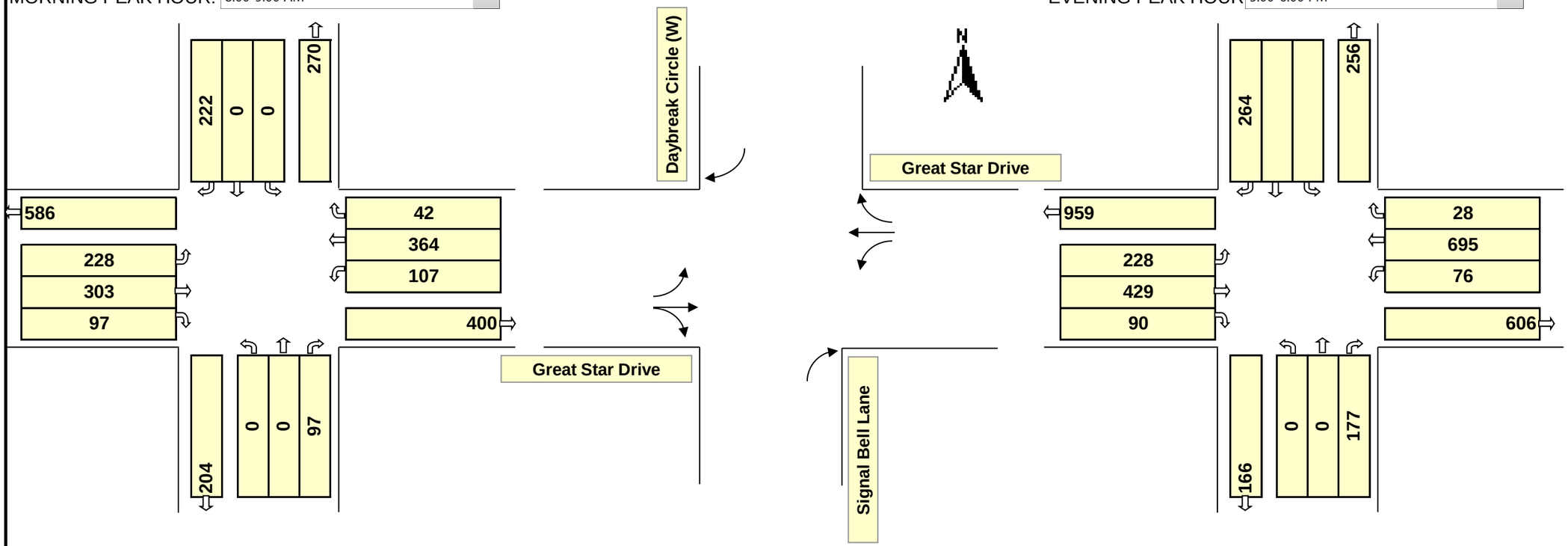
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Signal Bell Ln** County: **Howard**
Condition: **2025 Build AltC Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Intersection Control: Signal☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	97	0	0.0	0	97	1.00	97	0	97	☐
	SBR	222	0	0.0	0	222	1.00	222	0	222	☐
	EBTR+WBL	97	303	0.0	0	400	1.00	400	107	507	☐
	WBT+EBL	0	364	0.0	0	364	1.00	364	228	592	☑
	SBR-EBL										☐
											☐

Remarks: NB & SB rights get covered by overlap lefts

* Critical Volume — TOTAL: **592** — Level of Service: **A** — V/C **0.37**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBR	177	0	0.0	0	177	1.00	177	0	177	☐
	SBR	264	0	0.0	0	264	1.00	264	0	264	☐
	EBTR+WBL	90	429	0.0	0	519	1.00	519	76	595	☐
	WBT+EBL	0	695	0.0	0	695	1.00	695	228	923	☑
	SBR-EBL	264	0	0.0	228	36	1.00	36	0	36	☐
	NBR - WBL	177	0	0.0	76	101	1	101	0	101	☑

Remarks:

* Critical Volume — TOTAL: **1024** — Level of Service: **B** — V/C **0.64**

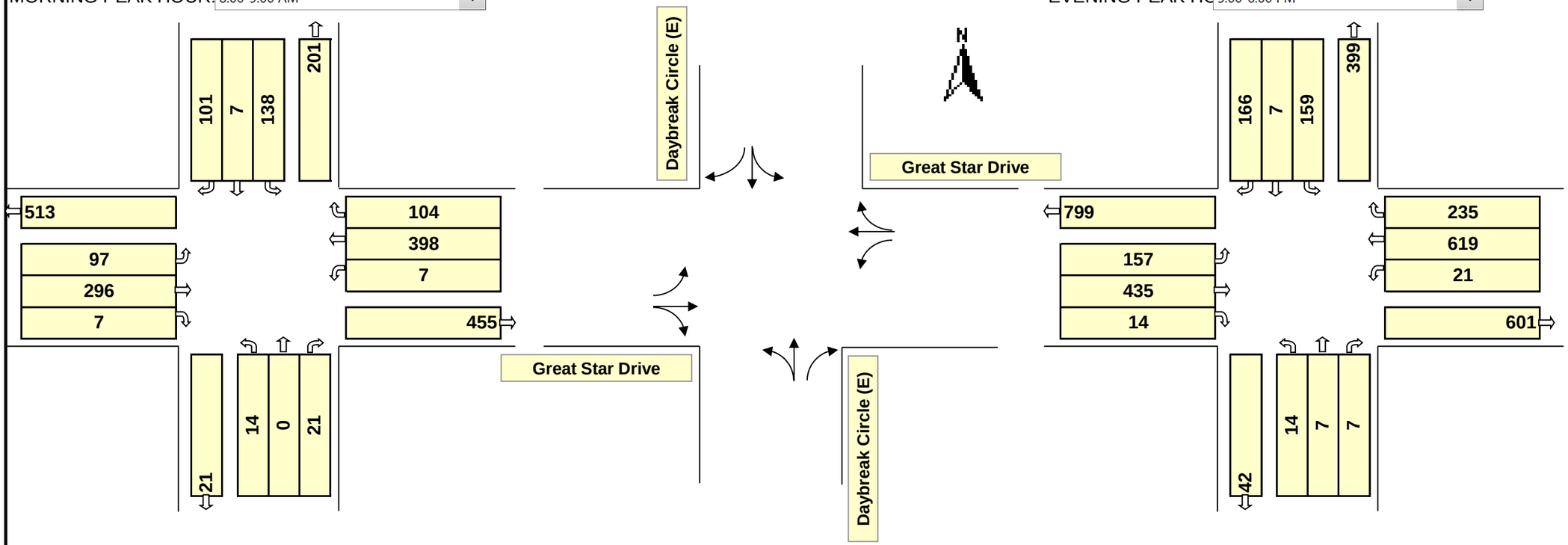
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **Great Star Dr @ Daybreak Circle (East)** County: **Howard**
Condition: **2025 Build AltC Opt2** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HO 5:00-6:00 PM



Intersection Control: Signal ☐ Stop ☑ 2 -Way

RTOR: NB ☐ SB ☐ EB ☐ WB ☐

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	0	1.1	14	15	1.00	15	138	153	☐
	SBTL+NBL	0	7	1.1	138	159	1.00	159	14	173	☑
	EBTR+WBL	7	296	0.0	0	303	1.00	303	7	310	☐
	WBTR+EBL	104	398	0.0	0	502	1.00	502	97	599	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **772** V/C
Level of Service: **A** **0.48**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTL+SBL	0	7	1.1	14	22	1.00	22	159	181	☐
	SBTL+NBL	0	7	1.1	159	182	1.00	182	14	196	☑
	EBTR+WBL	14	435	0.0	0	449	1.00	449	21	470	☐
	WBTR+EBL	235	619	0.0	0	854	1.00	854	157	1011	☑
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1207** V/C
Level of Service: **C** **0.75**

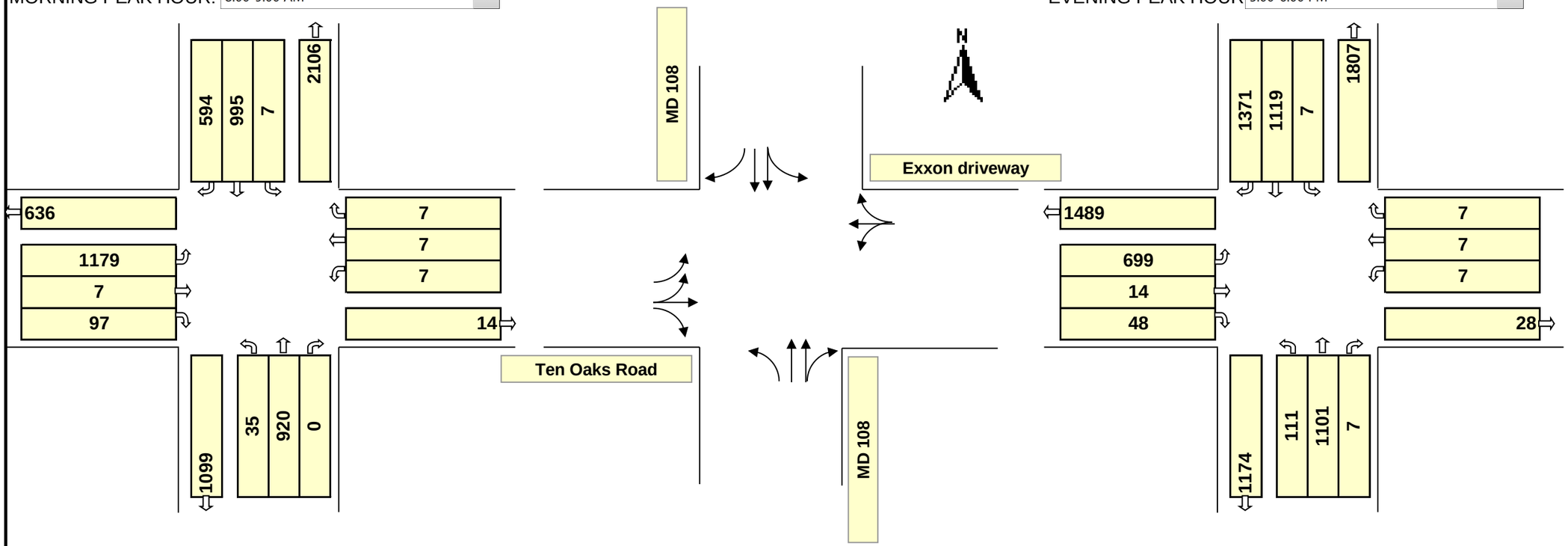
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltC Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	920	0.0	0	920	0.55	506	7	513	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1179	1186	0.60	712	0	712	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	707	-113	1.00	-113	0	-113	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL

* Critical Volume — TOTAL: **1330** — Level of Service: **D** — V/C **0.83**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1119	5.0	7	1154	0.55	635	111	746	☐
	EBTL	0	14	1.0	699	713	0.60	428	0	428	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1371	0	0.0	419	952	1.00	951.6	0	952	☑
											☐

Remarks: SBR becomes critical

* Critical Volume — TOTAL: **1400** — Level of Service: **D** — V/C **0.88**

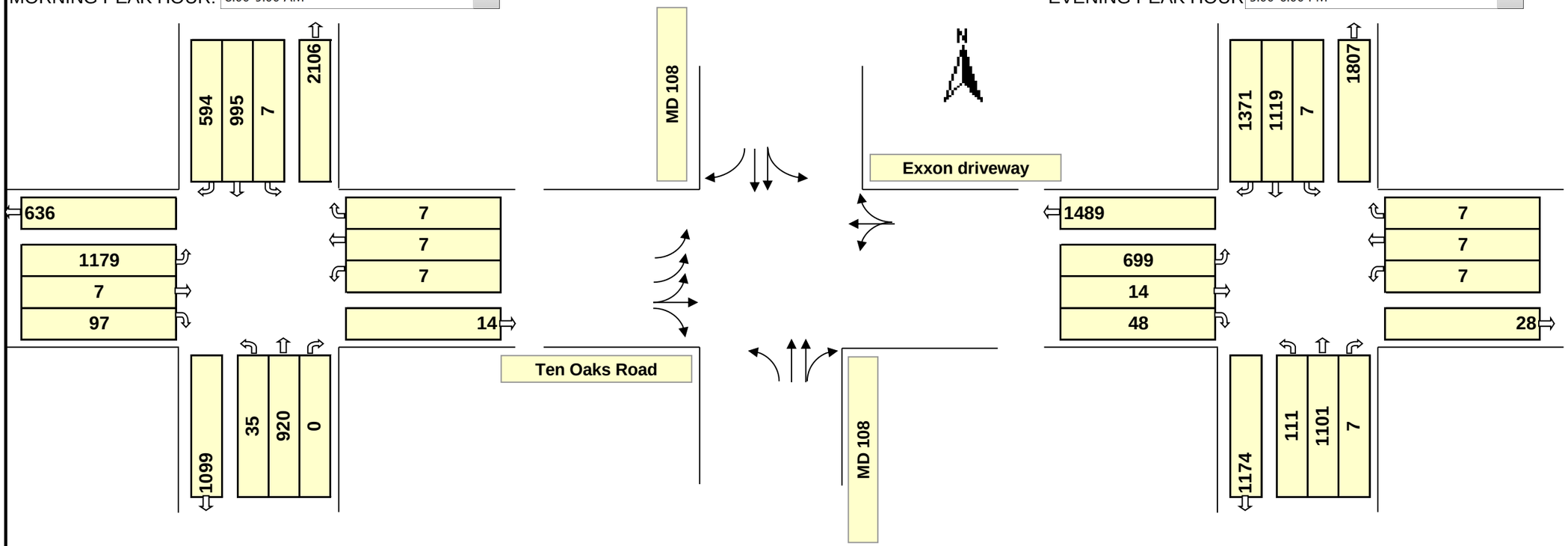
Filename, Location & Path:

TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at Ten Oaks Road** County: **Howard**
Condition: **2025 Build AltC Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM

EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
			Split
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	0	920	0.0	0	920	0.55	506	7	513	☐
	SBTL+NBL	0	995	4.0	7	1023	0.55	563	35	598	☑
	EBTL	0	7	1.0	1179	1186	0.40	474	0	474	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	594	0	0.0	472	122	1.00	122	0	122	☐
											☐

Remarks: SBR not critical because it is 'covered' by EBL and SBT

* Critical Volume — TOTAL: **1093** — Level of Service: **B** — V/C **0.68**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	7	1101	0.0	0	1108	0.55	609	7	616	☐
	SBTL+NBL	0	1119	5.0	7	1154	0.55	635	111	746	☐
	EBTL	0	14	1.0	699	713	0.40	285	0	285	☑
	WBRTL	7	7	1.0	7	21	1.00	21	0	21	☑
	SBR-EBL	1371	0	0.0	280	1091	1.00	1091	0	1091	☑
											☐

Remarks: SBR becomes critical

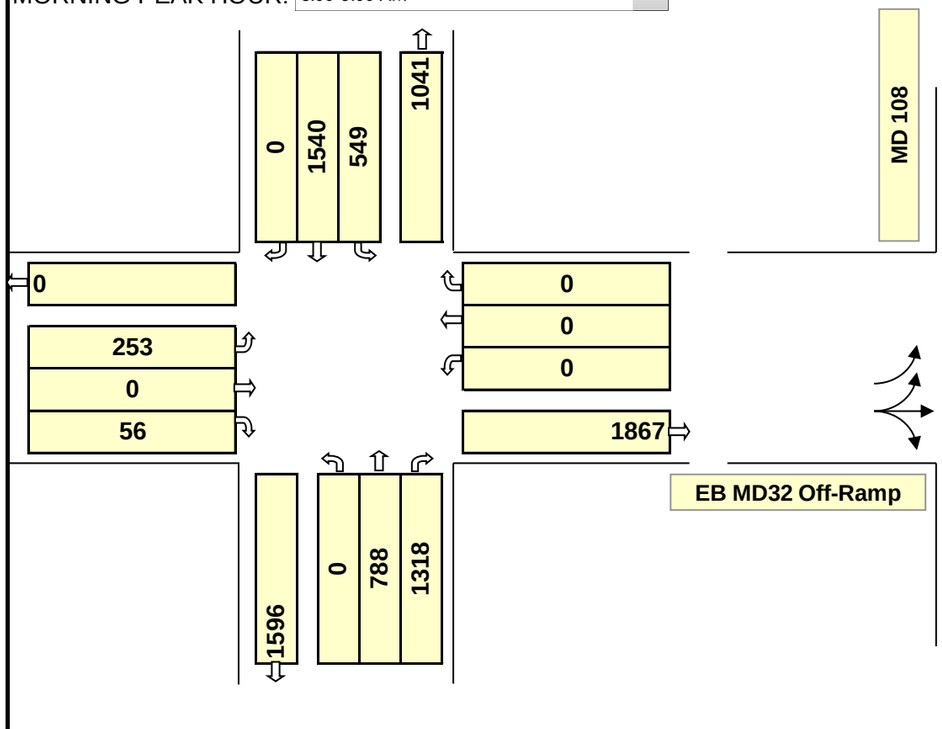
* Critical Volume — TOTAL: **1398** — Level of Service: **D** — V/C **0.87**

Filename, Location & Path:

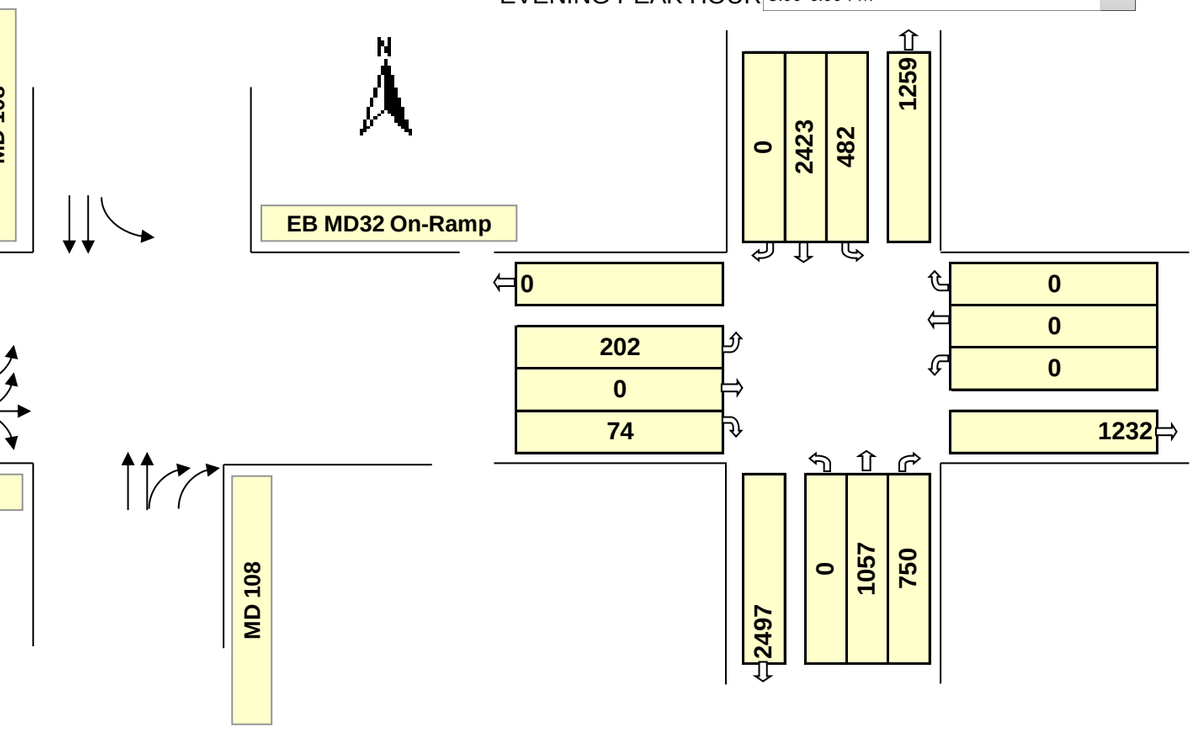
TURNING MOVEMENT SUMMARY AND LEVEL OF SERVICE

Project: **Clarksville Parking Study** WR&A W.O. #: **31760-009**
Location: **MD 108 at EB MD 32 Ramps** County: **Howard**
Condition: **2025 Build AltC Opt3** Computed by: **GRF** Date: **01/14/15**

MORNING PEAK HOUR: 8:00-9:00 AM



EVENING PEAK HOUR 5:00-6:00 PM



Phasing (ϕ)

ϕ 1	ϕ 2	ϕ 3	ϕ 4
ϕ 5	ϕ 6	ϕ 7	ϕ 8

Intersection Control: Signal ☑ Stop ☐ -Way

RTOR: NB ☑ SB ☑ EB ☑ WB ☑

No. of Lanes		Lane Use Factor	Service Level			Critical Lane Volume	Opposing Volume (vhp)		L.T. Factor (PCE)
			1000	A	≤	1000			
1	=	1.00	1150	B	≤	1150	≤	199	1.1
2	=	0.55	1300	C	≤	1300	≤	599	2.0
3	=	0.40	1450	D	≤	1450	≤	799	3.0
4	=	0.30	1600	E	≤	1600	≤	999	4.0
Double L.T.	=	0.60	1600	F	>	1600	≥	1000	5.0

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	1318	788	0.0	0	2106	0.55	1158	549	1707	☑
	SBT	0	1540	0.0	0	1540	0.55	847	0	847	☐
	EBRTL	56	0	1.0	253	309	0.60	185	0	185	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1893** — Level of Service: **F** — V/C **1.18**

ϕ	Movement	Right	Thru	PCE	Left	Volume (1)	Lane Factor (2)	Lane Volume (1)X(2)	Oppo-sing Lefts	Critical Lane Volume	*
	NBTR+SBL	750	1057	0.0	0	1807	0.55	994	482	1476	☑
	SBT	0	2423	0.0	0	2423	0.55	1333	0	1333	☐
	EBRTL	74	0	1.0	202	276	0.60	166	0	166	☑
		0	0	0.0	0	0	1.00	0	0	0	☐
											☐
											☐

Remarks:

* Critical Volume — TOTAL: **1641** — Level of Service: **F** — V/C **1.03**

Filename, Location & Path:

Appendix E: Cost Estimates

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

Improvements To ADA Access

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$13,848.45
GRADING					$1,500.00
REMOVAL OF EXISTING SIDEWALK/PAVEMENT	50	CY	$30.00	$1,500.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$19,783.50
PAVING					$2,250.00
CROSSWALK PAVEMENT MARKINGS	225	LF	$10.00	$2,250.00	
SHOULDER					$35,817.00
CURB AND GUTTER	363	LF	$50.00	$18,150.00	
SIDEWALK	1,613	SF	$9.00	$14,517.00	
DETECTABLE WARNING SURFACE	70	SF	$45.00	$3,150.00	
LANDSCAPING:					$3,956.70
30% CONTINGENCY					$23,147
NEAT CONSTRUCTION SUBTOTAL					$100,302
CONSULTANT DESIGN (10%)					$10,030
CONSTRUCTION INSPECTION AND MANAGEMENT (12%)					$12,036
TOTAL PROJECT COST					$122,369
SAY					$122,000

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

PARKING ALTERNATIVE A: 10' SETBACK

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$28,914.20
GRADING					$5,950.00
REMOVAL OF EXISTING PAVEMENT	170	CY	$35.00	$5,950.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$41,306.00
PAVING					$23,650.00
SURFACE COURSE - ROADWAY	110	TON	$145.00	$15,950.00	
BASE COURSE - ROADWAY	20	TON	$135.00	$2,700.00	
6" AGGREGATE	200	SY	$25.00	$5,000.00	
SHOULDER					$53,012.00
CURB AND GUTTER	436	LF	$50.00	$21,800.00	
SIDEWALK	3,318	SF	$9.00	$29,862.00	
DETECTABLE WARNING SURFACE	30	SF	$45.00	$1,350.00	
LANDSCAPING					$6,608.96
LIGHTING					$22,500.00
LIGHT POLES	3	EA	$7,500.00	$22,500.00	
30% CONTINGENCY					$54,582.35
ALTERNATIVE A PARKING STRUCTURE					$9,958,744
NUMBER OF SPACES WITHIN THE STRUCTURE	568	EA	$17,533.00	$9,958,744.00	
NEAT CONSTRUCTION SUBTOTAL					$10,195,268
CONSULTANT DESIGN (10%)					$1,019,527
CONSTRUCTION INSPECTION AND MANAGEMENT (12%)					$1,223,432
TOTAL PROJECT COST (PRESENT VALUE)					$12,438,226
SAY					$12,500,000

Note: The unit cost per parking space within the structure is the median parking structure construction cost in Washington D.C. from Carl Walker's Industry Insight April 2014 Issue titled Parking Structure Cost Outlook for 2014 by Gary Cudney, P.E.

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

PARKING ALTERNATIVE B: 30' SETBACK

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$51,151.80
GRADING					$8,400.00
REMOVAL OF EXISTING PAVEMENT	240	CY	$35.00	$8,400.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$73,074.00
PAVING					$74,150.00
SURFACE COURSE - ROADWAY	360	TON	$145.00	$52,200.00	
BASE COURSE - ROADWAY	70	TON	$135.00	$9,450.00	
6" AGGREGATE	500	SY	$25.00	$12,500.00	
SHOULDER					$63,598.00
CURB AND GUTTER	890	LF	$50.00	$44,500.00	
SIDEWALK	1,942	SF	$9.00	$17,478.00	
DETECTABLE WARNING SURFACE	36	SF	$45.00	$1,620.00	
LANDSCAPING					$11,691.84
LIGHTING					$60,000.00
LIGHT POLES	8	EA	$7,500.00	$60,000.00	
30% CONTINGENCY					$102,619.69
ALTERNATIVE B PARKING STRUCTURE					$6,048,885
NUMBER OF SPACES WITHIN THE STRUCTURE	345	EA	$17,533.00	$6,048,885.00	
NEAT CONSTRUCTION SUBTOTAL					$6,493,570
CONSULTANT DESIGN (10%)					$649,357
CONSTRUCTION INSPECTION AND MANAGEMENT (12%)					$779,228
TOTAL PROJECT COST (PRESENT VALUE)					$7,922,156
SAY					$7,900,000

Note: The unit cost per parking space within the structure is the median parking structure construction cost in Washington D.C. from Carl Walker's Industry Insight April 2014 Issue titled Parking Structure Cost Outlook for 2014 by Gary Cudney, P.E.

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

PARKING ALTERNATIVE C: SINGLE STORY DECK

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$68,878.25
GRADING					$13,475.00
REMOVAL OF EXISTING PAVEMENT	385	CY	$35.00	$13,475.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$98,397.50
STRUCTURES					$713,000.00
RAMP RETAINING WALL	4,300	SF	$150.00	$645,000.00	
RAMP BACKFILL	1,700	CY	$40.00	$68,000.00	
PAVING					$158,500.00
SURFACE COURSE - ROADWAY	720	TON	$145.00	$104,400.00	
BASE COURSE - ROADWAY	160	TON	$135.00	$21,600.00	
6" AGGREGATE	1,300	SY	$25.00	$32,500.00	
SHOULDER					$24,820.00
CURB AND GUTTER	428	LF	$50.00	$21,400.00	
SIDEWALK	330	SF	$9.00	$2,970.00	
DETECTABLE WARNING SURFACE	10	SF	$45.00	$450.00	
LANDSCAPING					$15,743.60
LIGHTING					$30,000.00
LIGHT POLES	4	EA	$7,500.00	$30,000.00	
30% CONTINGENCY					$336,844.31
ALTERNATIVE C PARKING STRUCTURE					$2,244,224
NUMBER OF SPACES WITHIN THE STRUCTURE	128	EA	$17,533.00	$2,244,224.00	
NEAT CONSTRUCTION SUBTOTAL					$3,703,883
CONSULTANT DESIGN (10%)					$370,388
CONSTRUCTION INSPECTION AND MANAGEMENT (12%)					$444,466
TOTAL PROJECT COST (PRESENT VALUE)					$4,518,737
SAY					$4,500,000

Note: The unit cost per parking space within the structure is the median parking structure construction cost in Washington D.C. from Carl Walker's Industry Insight April 2014 Issue titled Parking Structure Cost Outlook for 2014 by Gary Cudney, P.E.

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

PARKING ALTERNATIVE C-1: SINGLE STORY WITH OPTION FOR FUTURE EXPANSION

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$28,914.20
GRADING					$5,950.00
REMOVAL OF EXISTING PAVEMENT	170	CY	$35.00	$5,950.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$41,306.00
PAVING					$23,650.00
SURFACE COURSE - ROADWAY	110	TON	$145.00	$15,950.00	
BASE COURSE - ROADWAY	20	TON	$135.00	$2,700.00	
6" AGGREGATE	200	SY	$25.00	$5,000.00	
SHOULDER					$53,012.00
CURB AND GUTTER	436	LF	$50.00	$21,800.00	
SIDEWALK	3,318	SF	$9.00	$29,862.00	
DETECTABLE WARNING SURFACE	30	SF	$45.00	$1,350.00	
LANDSCAPING					$6,608.96
LIGHTING					$22,500.00
LIGHT POLES	3	EA	$7,500.00	$22,500.00	
30% CONTINGENCY					$54,582.35
ALTERNATIVE A PARKING STRUCTURE					$5,242,367
NUMBER OF SPACES ON GROUND FLOOR OF STRUCTURE	131	EA	$17,533.00	$2,296,823.00	
NUMBER OF SPACES ON FIRST LEVEL OF THE STRUCTURE	140	EA	$21,039.60	$2,945,544.00	
NEAT CONSTRUCTION SUBTOTAL					$5,478,891
CONSULTANT DESIGN (10%)					$547,889
CONSTRUCTION INSPECTION AND MANAGEMENT (12%)					$657,467
TOTAL PROJECT COST (PRESENT VALUE)					$6,684,246
SAY					$6,700,000

Note: The unit cost per parking space on the first level of the structure is 20% higher than the median parking structure construction cost in Washington D.C. from Carl Walker's Industry Insight April 2014 Issue titled Parking Structure Cost Outlook for 2014 by Gary Cudney, P.E.

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

Roadway Improvement 1: Add Departure Lanes on Signal Bell Lane @ MD-108

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$24,729.25
GRADING					$5,890.00
EXCAVATION	163	CY	$30.00	$4,890.00	
BORROW	25	CY	$40.00	$1,000.00	
REMOVAL OF EXISTING PAVEMENT	-	CY	$35.00	$0.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$35,327.50
PAVING					$37,450.00
SURFACE COURSE - ROADWAY	40	TON	$145.00	$5,800.00	
BASE COURSE - ROADWAY	90	TON	$135.00	$12,150.00	
6" AGGREGATE	700	SY	$25.00	$17,500.00	
PAVEMENT MARKINGS	1	LS	$2,000.00	$2,000.00	
SHOULDER					$27,315.00
CURB AND GUTTER	306	LF	$50.00	$15,300.00	
SIDEWALK	1,220	SF	$9.00	$10,980.00	
DETECTABLE WARNING SURFACE	23	SF	$45.00	$1,035.00	
LANDSCAPING:					$4,945.85
TRAFFIC					$67,000.00
TRAFFIC SIGNAL POLE AND MAST ARM	1	LS	$60,000.00	$60,000.00	
RELOCATE STREET LIGHTS	2	EA	$3,500.00	$7,000.00	
RIGHT OF WAY					$24,000.00
FEE SIMPLE	1,600	SF	$15.00	$24,000.00	
30% CONTINGENCY					$67,997
NEAT CONSTRUCTION SUBTOTAL					$294,655
ADA IMPROVEMENTS					$100,302
CONSULTANT DESIGN (10%)					$39,496
CONSTRUCTION MANAGEMENT AND INSPECTION (12%)					$47,395
TOTAL PROJECT COST					$481,848
SAY					$482,000

APPENDIX D: SITE IMPROVEMENTS COST ESTIMATE

Clarksville Parking Study

Roadway Improvement 2: Restrict Left Turns from Signal Bell onto Great Star Dr.

ITEM	QUANTITY	UNITS	UNIT COST	COST	SUMMARY
SITE PREPARATION / MOBILIZATION / MAINTENANCE OF TRAFFIC					$20,071.10
GRADING					$3,575.00
REMOVAL OF EXISTING PAVEMENT	45	CY	$35.00	$1,575.00	
BORROW	50	CY	$40.00	$2,000.00	
STORMWATER MANAGEMENT/DRAINAGE/EROSION AND SEDIMENT CONTROL					$28,673.00
PAVING					$45,100.00
SAWCUT	275	LF	$2.00	$550.00	
RE-STRIPING/PAVEMENT MARKINGS ALONG SIGNAL BELL LANE	1	LS	$3,000.00	$3,000.00	
SURFACE COURSE - ROADWAY	260	TON	$145.00	$37,700.00	
BASE COURSE - ROADWAY	10	TON	$135.00	$1,350.00	
6" AGGREGATE	100	SY	$25.00	$2,500.00	
SHOULDER					$8,671.00
CURB AND GUTTER	125	LF	$50.00	$6,250.00	
SIDEWALK	119	SF	$9.00	$1,071.00	
DETECTABLE WARNING SURFACE	20	SF	$45.00	$900.00	
STAMPED ASPHALT MEDIAN	18	SY	$25.00	$450.00	
LANDSCAPING:					$5,734.60
TRAFFIC					$220,500.00
SIGNING	1	LS	$500.00	$500.00	
FULL TRAFFIC SIGNAL AT GREAT STAR DR. AND DAYBREAK CIR.	1	LS	$220,000.00	$220,000.00	
30% CONTINGENCY					$99,697
NEAT CONSTRUCTION SUBTOTAL					$432,022
ADA IMPROVEMENTS					$100,302
ROADWAY IMPROVEMENT NO. 1					$294,655
CONSULTANT DESIGN (10%)					$82,698
CONSTRUCTION MANAGEMENT AND INSPECTION (12%)					$99,238
TOTAL PROJECT COST					$1,008,915
SAY					$1,000,000

Appendix F: Alternative C Parking Structure Photo Rendering

Clarksville PARKING STUDY

TEN OAKS BALLROOM ALTERNATIVE C PARKING STRUCTURE - PHOTO RENDERING

Conceptual - February 2015

Howard County MARYLAND

WHITMAN, REQUARDT & ASSOCIATES, LLP

ENGINEERS · ARCHITECTS · PLANNERS

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