

TRAFFIC IMPACT ANALYSIS

Hotel Madison & Mason Street Parking Deck

Harrisonburg, Virginia

January 31, 2015
Revised February 27, 2015

Prepared for:

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TABLE OF CONTENTS

- EXECUTIVE SUMMARY..... *ii*
- INTRODUCTION
 - Existing and Proposed Site Usage..... 1
 - Scope of Study..... 3
- ANALYSIS OF EXISTING CONDITIONS (2014)
 - Methodology..... 3
 - Area Roadway Network..... 4
 - Traffic Volumes..... 4
 - Capacity and Levels of Service at Critical Points..... 6
- ANALYSIS OF FUTURE BACKGROUND CONDITIONS (2016)
 - Traffic Volumes..... 6
 - Capacity and Levels of Service at Critical Points..... 6
- PROPOSED SITE DEVELOPMENT
 - Trip Generation..... 16
 - Trip Distribution..... 16
 - Trip Reduction..... 19
- ANALYSIS OF FUTURE TOTAL CONDITIONS (2016)
 - Traffic Volumes..... 22
 - Roadway Improvements..... 22
 - Capacity and Levels of Service at Critical Points..... 24
- ANALYSIS OF POST-BUILD CONDITIONS (2022)
 - Background Conditions..... 29
 - Proposed Conditions (with Improvements)..... 29
- PARTIAL CLOSURE OF SOUTH MASON
 - Traffic Volumes..... 40
 - Roadway Improvements..... 40
 - Capacity and Levels of Service at Critical Points..... 45
 - Post-Build Conditions..... 45
- CRASH ANALYSIS..... 56
- MASS TRANSIT CONSIDERATIONS..... 56
- PEDESTRIAN ANALYSIS..... 57
- CONCLUSION..... 58
- LIST OF APPENDICES..... 60
- APPENDICES

Executive Summary

This Traffic Impact Analysis (TIA) examines the proposed partial redevelopment of the City of Harrisonburg block bounded by South Main Street, Martin Luther King, Jr Way (MLK), East Grace Street and South Mason Street. The parcels on the site comprise approximately 7.4 acres within the ‘North Campus’ of James Madison University (JMU). The proposed redevelopment project includes the construction of Madison Hotel & Conference Center (by dpM Partners, with participation from the City of Harrisonburg and JMU) and the Mason Street Parking Deck (by JMU).

The hotel will reside nearest South Main Street, and is presently slated to include 205 rooms and an approximate 26.5K GSF conference center. Aside from service areas, all parking for the hotel and conference center will be served from the Mason Street Parking Deck. Service access is proposed from MLK with probable connection through the site to East Grace Street. A patron drop-off loop with two points of access is proposed along South Main Street.

The Mason Street Parking Deck is proposed to house approximately 1,000 spaces. All spaces will be angled and aisles will be marked to promote one-way traffic flow within the structure. Partial access (right-in, right-out) is proposed on MLK, just to the east of the hotel site. This entry-exit will access the parking structure’s lowest floor. Additional, full access is proposed on South Mason Street, and will access the structure’s third floor.

This study evaluated the proposed development’s effect on all intersections bordering on the affected city block, three of which are presently signalized. Basis of intersection analysis is calculable controlled delay and associated levels of service, along with queueing lengths experienced at approach lane groups. Further, pedestrian/transit accommodations were examined and a crash analysis of the corridor was performed.

This study found that the proposed development has a significant impact on the surrounding roadway network, necessitating multiple roadway improvements for mitigation. Recommended roadway improvements resulting from this study are as follows:

- 1) Addition of 150’ right-turn lane with 100’ taper to northbound approach of S Main & MLK
- 2) Addition of 200’ left-turn lane with 100’ taper to eastbound approach of MLK & S Mason
- 3) Addition of 200’ left-turn lane with 100’ taper to westbound approach of MLK & S Mason
- 4) Channelize eastbound right-turns from West Grace to allow right-turns on red (RTOR)
- 5) Provide dual westbound left-turn lanes on East Grace with 200’ storage, 200’ taper
- 6) Incorporate 10-second leading pedestrian phase to north-south crossing at MLK & Main

This study also examined the impact of a potential closure of the southern portion of South Mason Street, between its intersection with East Grace and the proposed points of access for the parking deck. This closure, if enacted, would have a significant impact on the adjacent signalized intersections that would not easily be mitigated through additional roadway improvements. Closure would also have a negative impact on existing bus routes with service points in the vicinity. Due to the adverse impacts anticipated, it is the opinion of this analysis that such a closure *not* be enacted. Alternative measures of protecting pedestrian movements within the vicinity of South Mason & East Grace should be explored instead.

The crash analysis showed a predominance of rear-end collisions, typical of congested areas with extended queues. No further mitigation, beyond those measures already mentioned, is recommended as a result of this analysis.

It is further recommended that significant measures be incorporated along South Mason to properly channel pedestrian flows to designated crossings. The southeast pedestrian entrance to the parking deck should be well marked to deter pedestrians from entering at vehicular entrances, a physical barrier (semi-transparent fence, preferably) should be installed between sidewalk and curb to prevent uncontrolled crossings, and mid-block crossing points should be limited to one to avoid conflicts with entering / exiting / queueing vehicles in the vicinity. The mid-block crosswalk should be well marked, possibly with a speed tray or inlaid flashing markers and signage.

In sum, it is the opinion of this TIA that the impacts of the proposed development can satisfactorily be mitigated by the measures stated.

INTRODUCTION

Existing and Proposed Site Usage

This Traffic Impact Analysis (TIA) examines the proposed partial redevelopment of the City of Harrisonburg block bounded by South Main Street, Martin Luther King, Jr Way (MLK), East Grace Street and South Mason Street. The parcels on the site comprise approximately 7.4 acres within the ‘North Campus’ of James Madison University (JMU). A vicinity map of the site can be found as Figure 1 below.

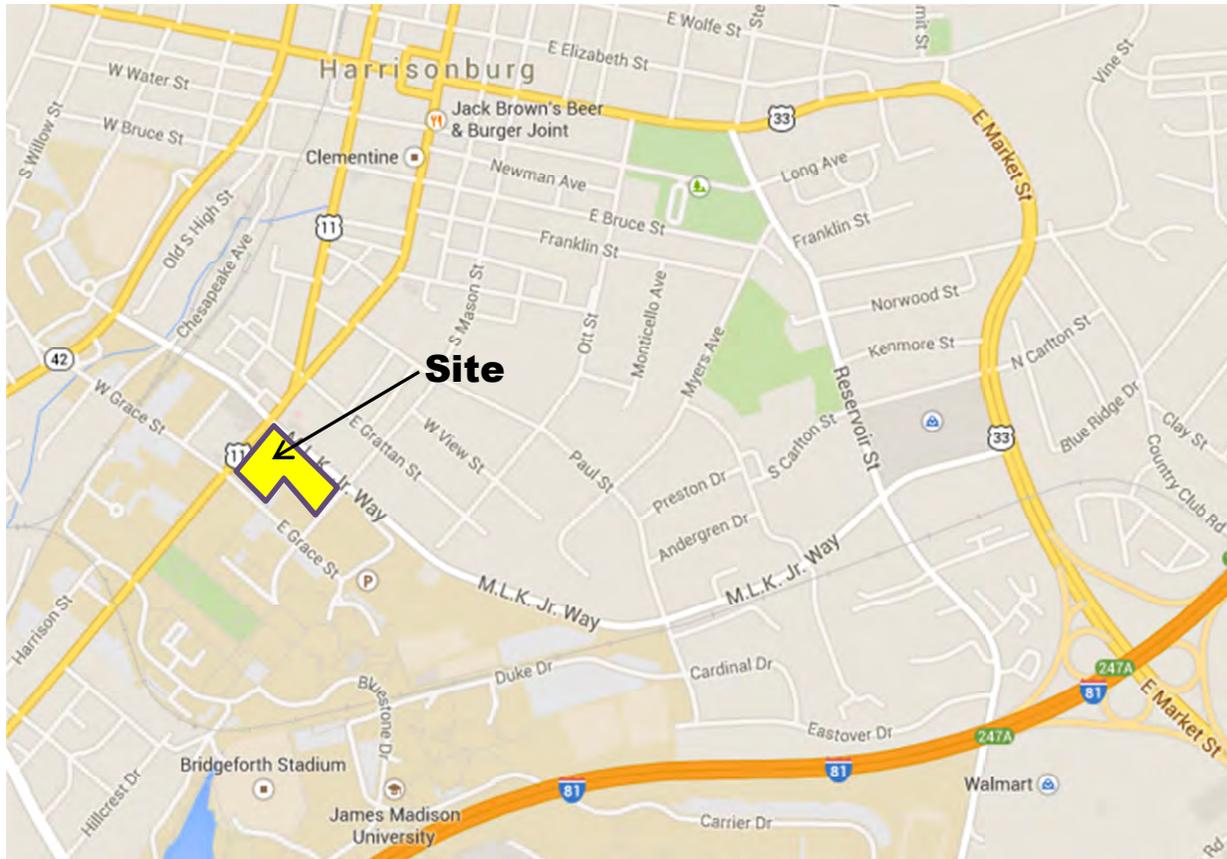


Figure 1 – Vicinity Map (not to scale)

Presently, various buildings slated for demolition house the University’s Office of Public Affairs, other temporary offices, and limited multi-family residential units; all such uses are slated for relocation or removal altogether as part of the redevelopment project. Existing surface parking, aside from that directly associated with Madison Hall, will also be demolished to make room for the new proposed structures. Madison Hall (former RMH Cancer Center) is currently being renovated, and will house admissions programs, international programs, and various graduate school / administrative offices once complete.

The proposed redevelopment project includes the construction of Madison Hotel & Conference Center (by dpM Partners, with participation from the City of Harrisonburg and JMU) and the Mason Street Parking Deck (by JMU). The hotel will reside nearest South Main Street, and is presently slated to include 205 rooms. The nearly 26.5 GSF conference center is planned to house two ballrooms, three meeting rooms, and five conference rooms. Aside from service areas, all parking for the hotel and conference center will be served from the Mason Street Parking Deck. Service access is proposed from

MLK with probable connection through the site to East Grace Street. A patron drop-off loop with two points of access is proposed along South Main Street.

The Mason Street Parking Deck is proposed to house approximately 1,000 spaces. All spaces will be angled and aisles will be marked to promote one-way traffic flow within the structure. Partial access (right-in, right-out) is proposed on MLK, just to the east of the hotel site. This entry-exit will access the parking structure's lowest floor. Additional, full access is proposed on South Mason Street, and will access the structure's third floor.

Current agreements indicate that 300 of the deck's 1,000 spaces will be reserved for the hotel and conference center's usage, and are to be located on the lower floors. As such, a majority of the hotel's patronage is anticipated to utilize the MLK partial access. The remainder of the deck's 700 spaces will serve a combination of JMU's staff and students, though the ratio of which has yet to be determined. As these spaces will occupy the upper floors of the parking structure, a majority of their traffic is anticipated to utilize the full access on South Mason Street.

A preliminary conceptual plan of development for the city block can be found as Figure 2, below.



Figure 2 – Preliminary Conceptual Plan of Development

Scope of Study

Prior to collecting/processing data for the TIA, a pre-analysis meeting was held with the City of Harrisonburg and JMU on November 20, 2014 to determine the scope and basic assumptions for the analysis. Through this scoping meeting, it was determined that the following existing intersections within the immediate vicinity of the proposed development were to be included in the analysis (signalized intersections shown in italics):

- *South Main Street & Martin Luther King, Jr. Way*
- *South Main Street & East Grace Street*
- *Martin Luther King, Jr. Way & South Mason Street*
- South Mason Street & East Grace Street

A crash analysis was also proposed within the study area, to be completed by the City and incorporated in a later section of this report.

Traffic origin-destination splits were discussed during the scoping meeting, and were finalized afterwards by the author. Traffic growth rates were also reviewed at the meeting and established as 1.4% (global), matching projected population growth rates of the City.

An analysis period was set as the year 2016. This was determined to be the absolute soonest a project of this size and nature could be built out to completion, and thus the most conservative, yet rational, period of analysis. A six-year post-buildout analysis year was also required, per local industry standard and City request.

No background roadway improvements were assumed to be completed during the study period, nor were any additional background developments that substantially affect local traffic patterns or growth.

The finalized scoping form, along with attachments, that was used as the basis of this report can be found as Appendix A.

ANALYSIS OF EXISTING CONDITIONS (2014)

Methodology

Intersection movement counts were collected by the City of Harrisonburg Public Works department during weekday AM and PM peak hours. All raw traffic count data for the existing year can be found as Appendix B of this report.

Analyses and Level of Service (LOS) evaluations of all signalized and non-signalized intersections (for all periods of analysis) were performed in accordance with the 2010 Highway Capacity Manual (HCM) utilizing Synchro (v9, *Trafficware*) software.

Area Roadway Network

The study area, as determined at the pre-analysis scoping meetings, includes the four intersections immediately surrounding the redevelopment project's city block. Descriptions of the roadways within this study area are as follows:

South Main Street (Route 11): This four-lane, urban minor arterial traverses the study area in a northeast-southwest direction (*for simplicity, this has been truncated to north-south for the remainder of this report, with connecting streets also referenced by cardinal directions north, south, east and west*), with left-turn lanes at end-of-block intersections, and a two-way left-turn lane (TWLTL) in between intersections. A multitude of private residential entrances exist mid-block. Travel lanes are approximately eleven feet in width and are in good condition. South Main has a posted speed limit of 25 mph throughout the study area.

Martin Luther King, Jr. Way: MLK exists as an east-west, four-lane, urban minor arterial, with the majority of its stretch between South Main and South Mason including a raised median. Left-turn lanes exist at its intersection with South Main, but no other turning movements are currently provided dedicated lanes. The presence of shared left-through lanes on MLK necessitates split phasing and/or "leading lefts" at signalized intersections. A multitude of private entrances exist mid-block. Travel lanes are approximately eleven feet in width and are in good condition. MLK has a posted speed limit of 25 mph throughout the study area.

South Mason Street: This two-lane urban collector (minor arterial to north of MLK) connects MLK to East Grace, and provides access to JMU's North Campus. Its intersection with MLK is signalized with dedicated left-turn lanes, while its intersection with East Grace is all-way stop-controlled (AWSC). Travel lanes are approximately eleven feet in width and are in good condition. South Mason has a posted speed limit of 25 mph.

East Grace Street: This two-lane urban collector connects South Main to South Mason, while also providing access to JMU's North Campus. Its intersection with South Main is signalized with dedicated left-turn lanes, while its intersection with South Mason is AWSC. Travel lanes are approximately eleven feet in width and are in good condition. South Mason has a posted speed limit of 25 mph. Significant pedestrian movements, primarily associated with JMU's student population, are present on East Grace.

Traffic Volumes

Turning movement counts were collected by the City of Harrisonburg at each studied intersection on average weekdays in the Fall of 2014. Intersection movement counts were collected between 7:30-10:00 AM and 3:30-6:00 PM, in fifteen-minute increments. These counts were then analyzed to determine the AM and PM peak hours (four consecutive fifteen-minute counts with the highest traffic totals for the entire study area). The AM Peak Hour was determined to be 8:30-9:30, while the PM Peak Hour was determined to be 4:30-5:30.

Raw counts of existing intersection turning movements can be found in tabular format as Appendix B of this report. Peak hour traffic volumes for existing year 2014 are shown in Figure 3.

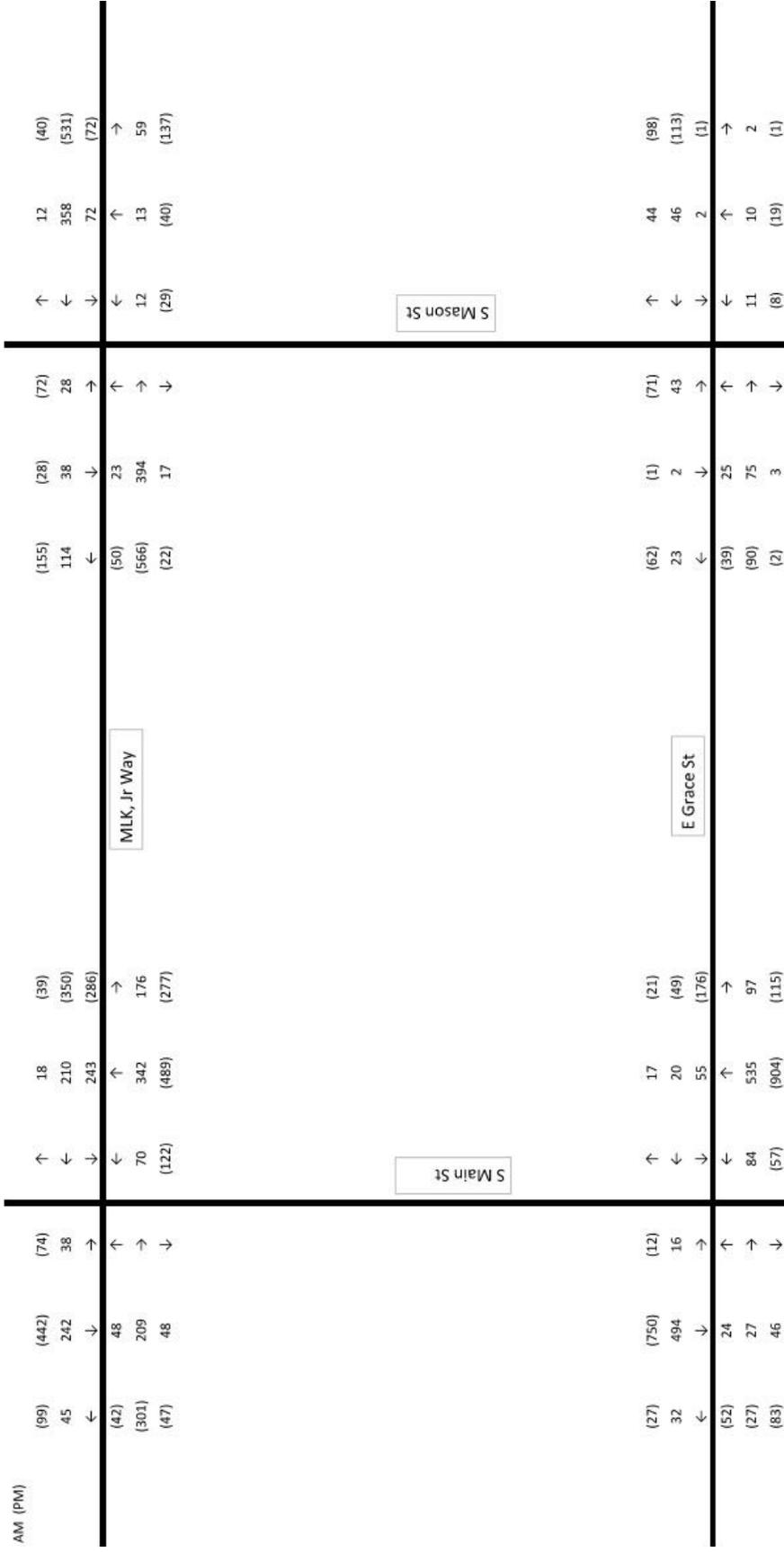


Figure 3 – Existing Peak Hour Traffic Volumes (vehicles per hour)

Capacity and Levels of Service at Critical Points

The traffic volumes mentioned above were loaded into the software program Synchro (Version 9.0, by Trafficware Ltd.) by the City of Harrisonburg, utilizing existing signal timings, to determine existing levels of controlled vehicular delay and associated Levels of Service (LOS), as well as 95th percentile queue lengths. Synchro runs in accordance to the standards set forth in the Highway Capacity Manual (HCM).

Detailed worksheets from this Synchro analysis of existing conditions are presented as Appendix C of this report. Existing AM Peak Hour LOS values for intersections of interest can be found in Figure 4, with Existing AM Queue Analysis found in Figure 5. Existing PM Peak Hour LOS values can be found in Figure 6, with Existing PM Queue Analysis found in Figure 7.

ANALYSIS OF FUTURE “BACKGROUND” CONDITIONS (2016)

Traffic Volumes

In order to project future traffic volumes for the buildout year of 2016, counts were “grown” to the future period of analysis by utilizing growth factors that were established upon analysis of the area’s ADT counts collected over the past five years. Upon consultation with the City, a universal growth rate of 1.4% was determined appropriate for use, as it is the projected population growth rate for the metropolitan area.

Grown traffic was added to the existing traffic volumes to derive a “Background 2016” traffic volume scenario. No additional roadway improvements or diverted traffic routings are included in this scenario. “Background 2016” traffic volumes can be found as Figure 8 of this report.

Capacity and Levels of Service at Critical Points

The grown peak hour volumes described above were then loaded into the Synchro analysis software to determine controlled vehicular delay and LOS values. General parameters (permissions, pedestrian phases, etc.) were not modified. AM cycle lengths were not modified, but PM cycle lengths were changed to better match the maximum natural cycle length found within the coordinated network. Signal phasing splits were optimized using Synchro’s built-in optimizer in order to provide an appropriate point of comparison for future build scenarios; in some cases, manual optimization was also used to better balance delays across multiple approaches.

Detailed worksheets from this Synchro analysis of “Background 2016” conditions are presented as Appendix D of this report, while future conditions LOS values for intersections of interest can be found in Figures 9 (AM) and 11 (PM). Peak Hour Queue Analyses can be found in Figures 10 (AM) and 12 (PM).

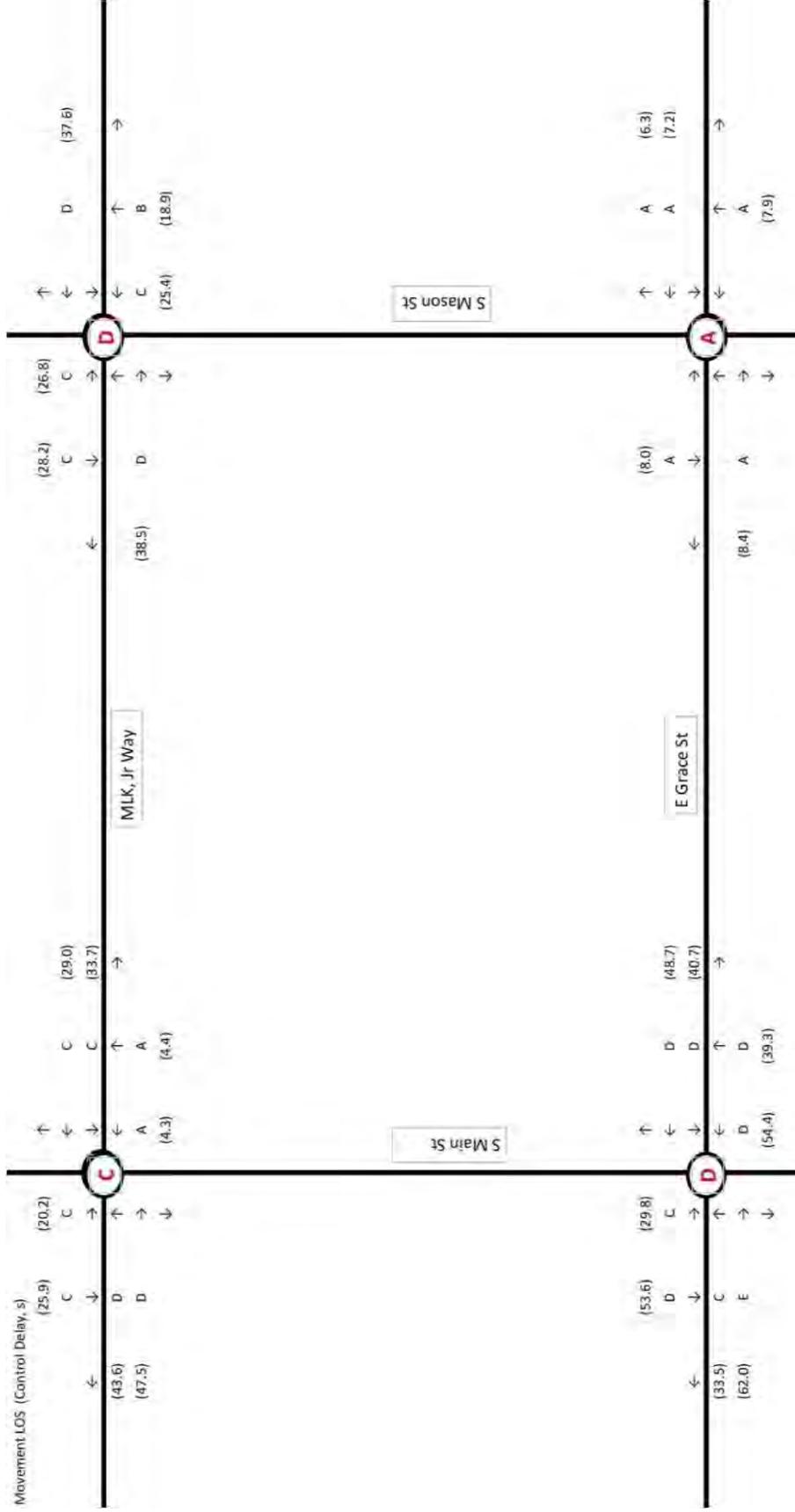


Figure 4 – Existing (2014) AM Levels of Service

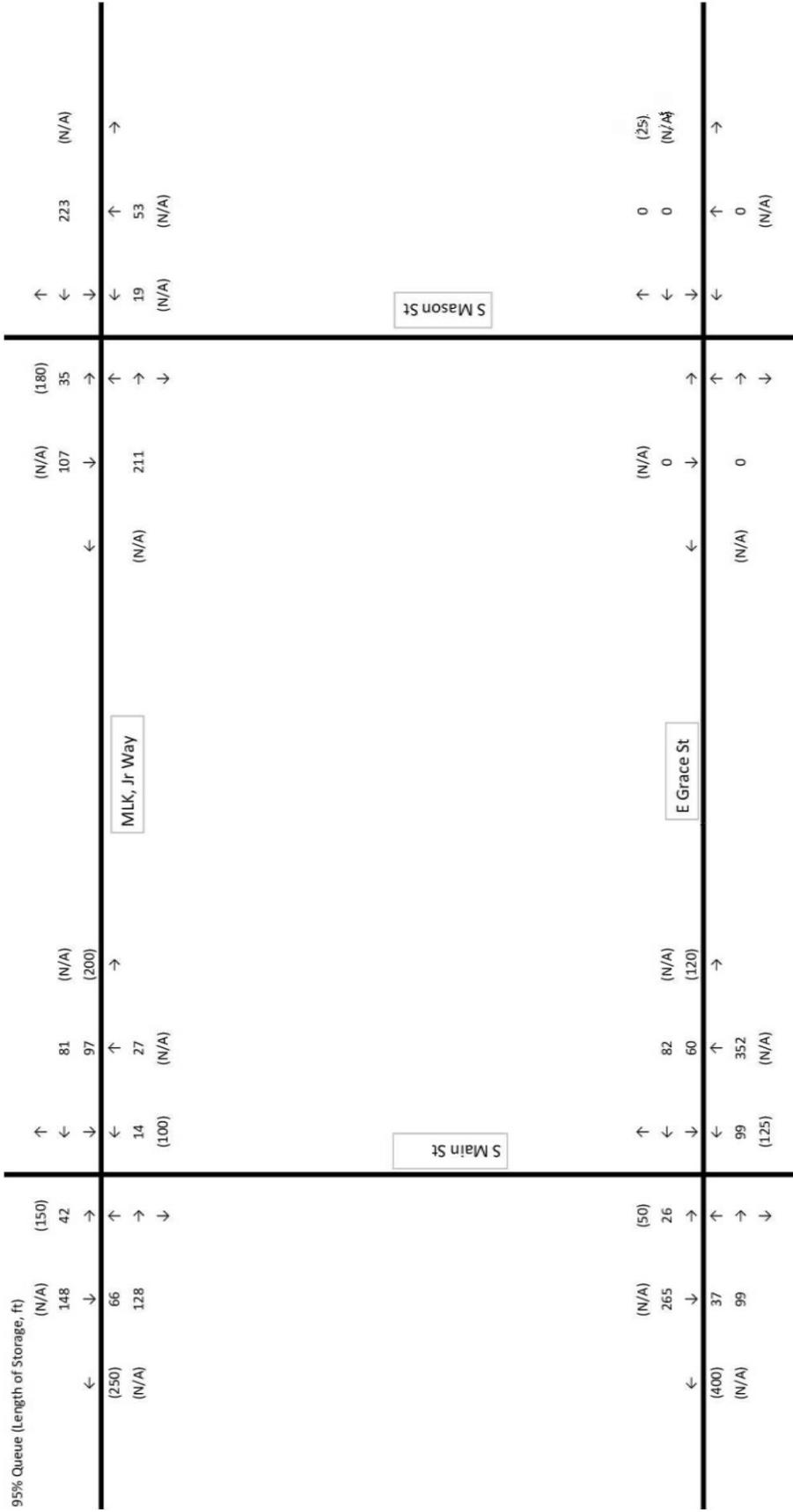


Figure 5 – Existing (2014) AM Queue Analysis

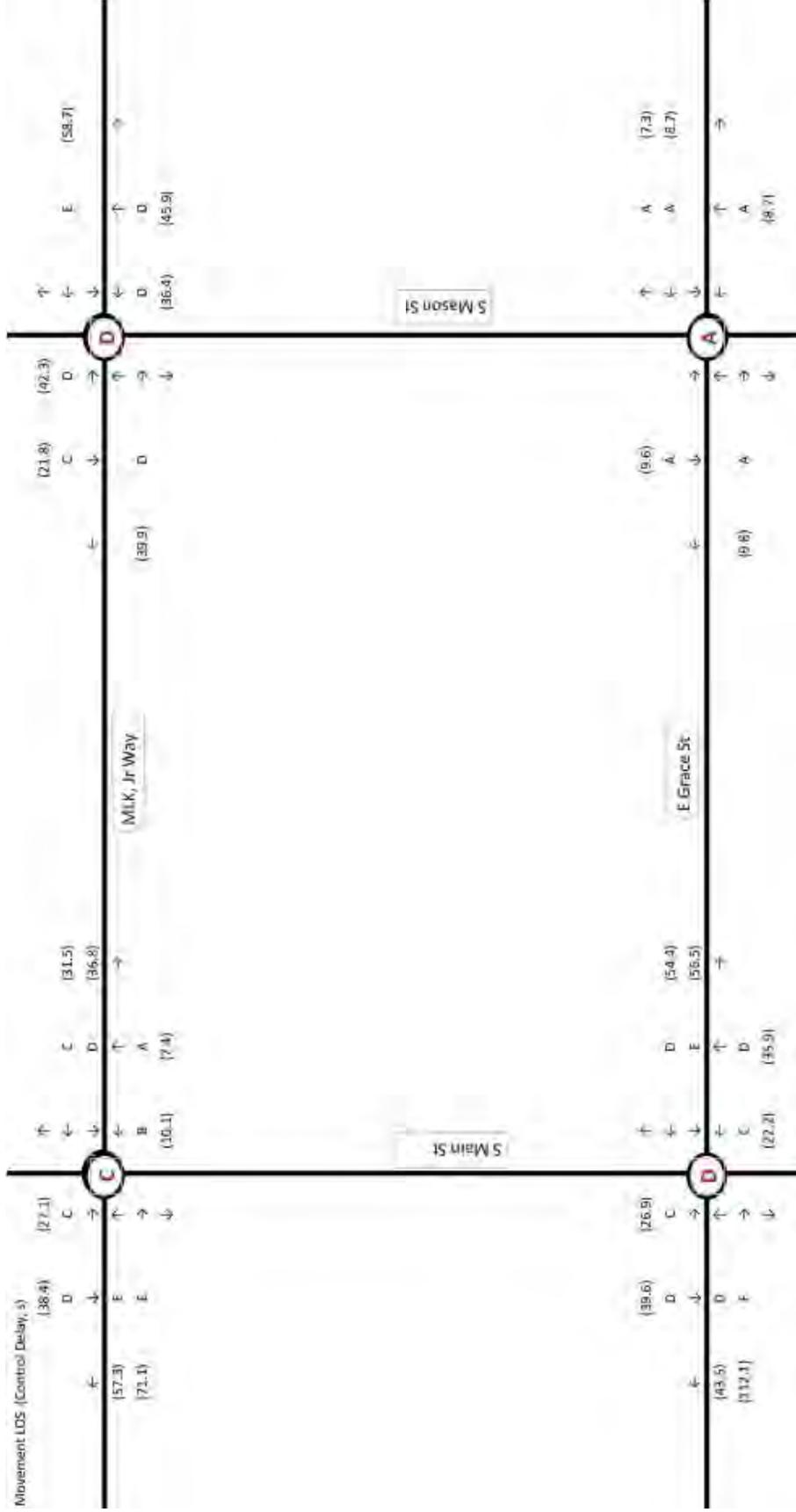


Figure 6 – Existing (2014) PM Levels of Service

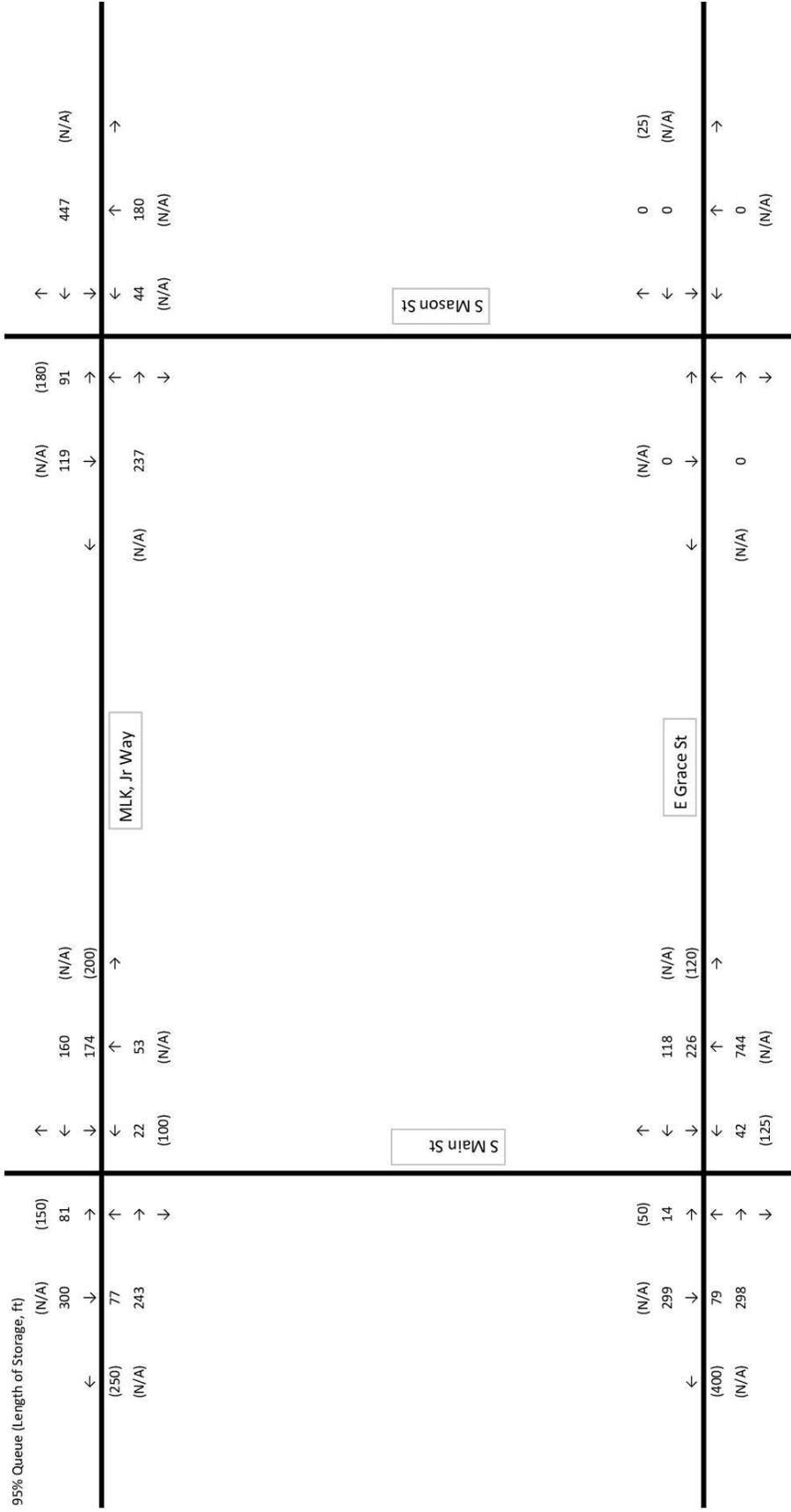


Figure 7 – Existing (2014) PM Queue Analysis

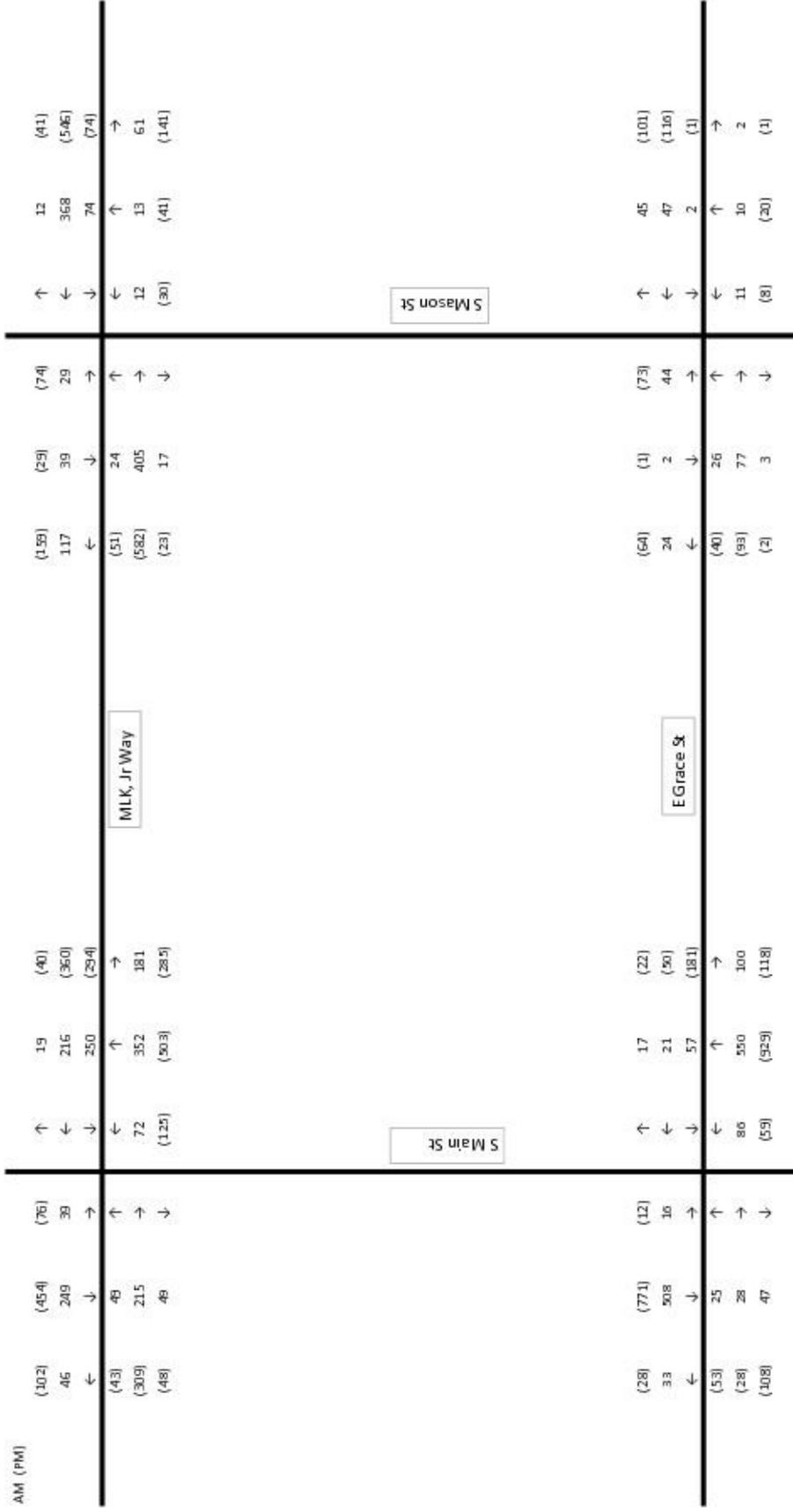


Figure 8 – Background 2016 Peak Hour Turning Movements (vehicles per hour)

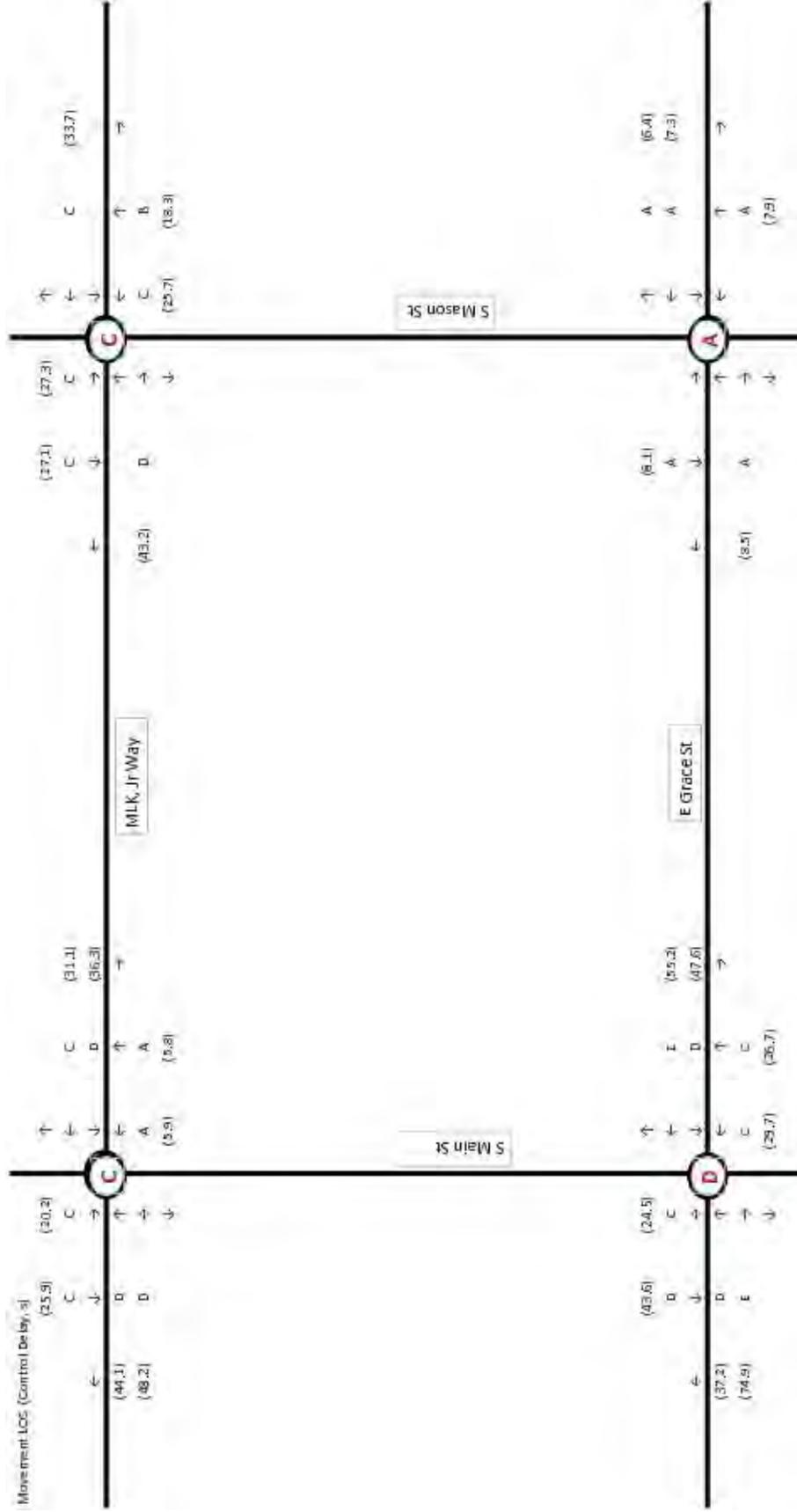


Figure 9 – Background 2016 AM Levels of Service

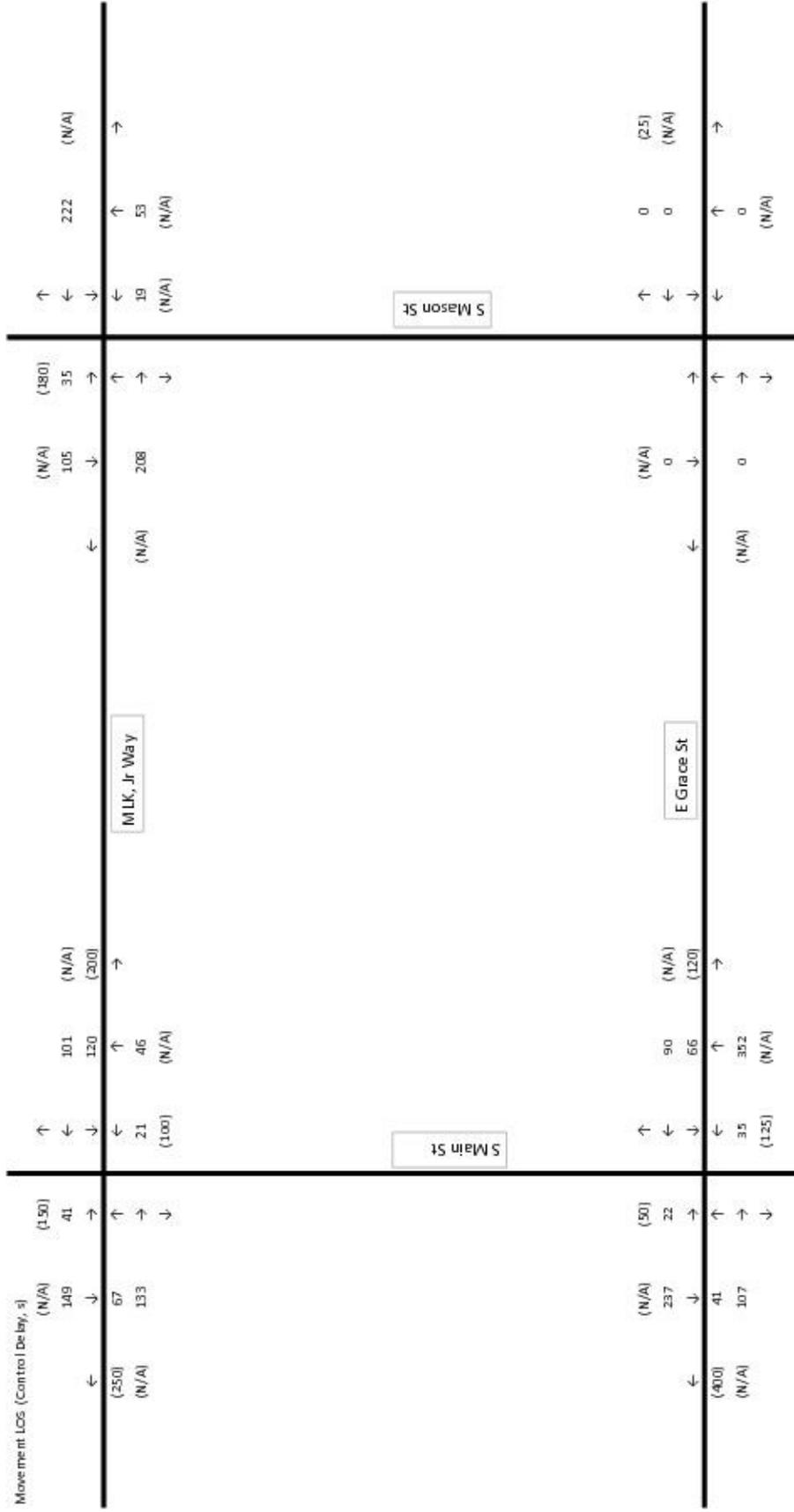


Figure 10 – Background 2016 AM Queue Analysis

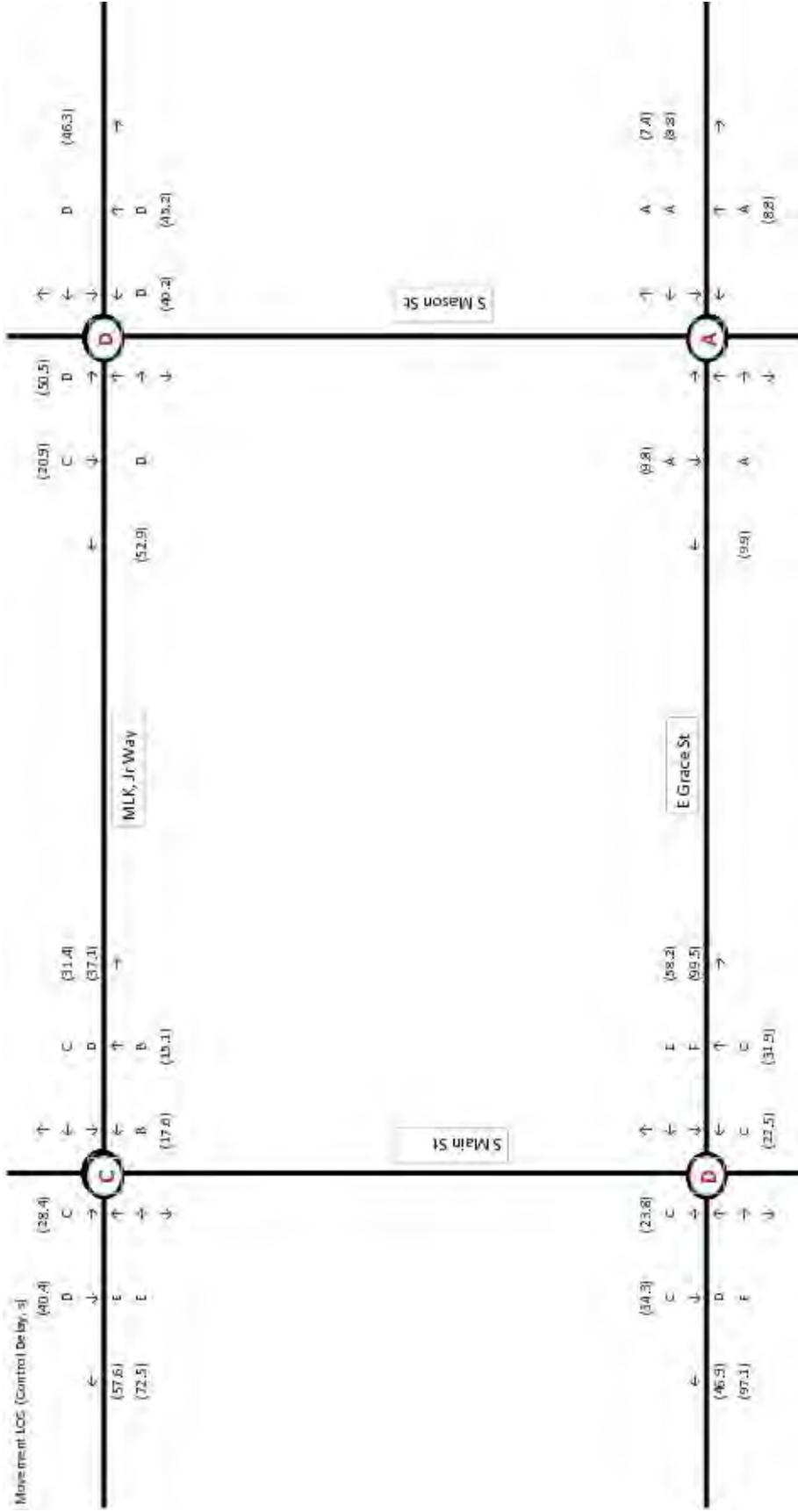


Figure 11 – Background 2016 PM Levels of Service

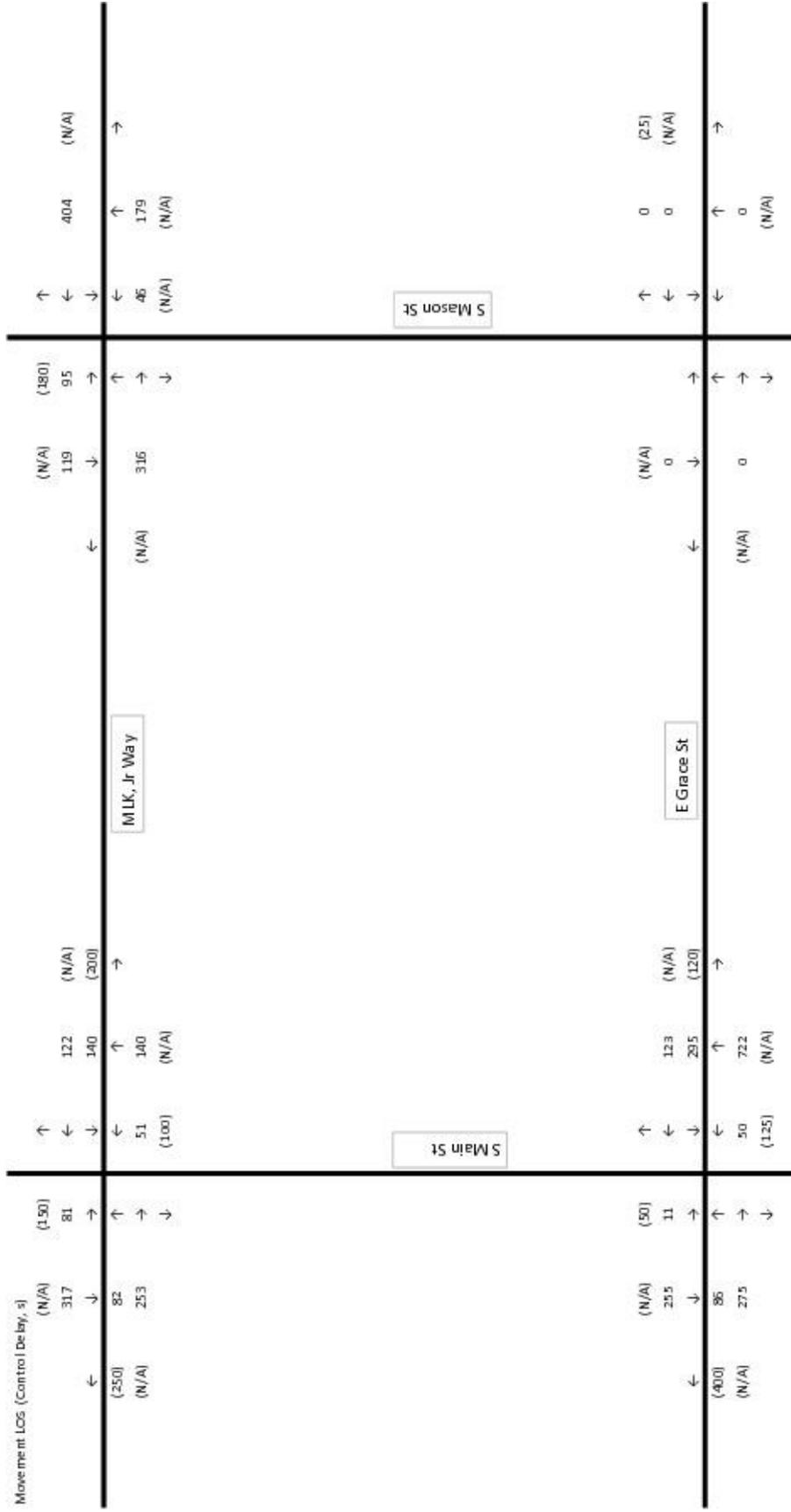


Figure 12 – Background 2016 PM Queue Analysis

PROPOSED SITE DEVELOPMENT

Trip Generation

The ITE Trip Generation Manual (9th Edition) was utilized to project trip generation rates associated with the hotel portion of the city block redevelopment. Average trip generation rates for ITE Use Code 310 (Hotel) were utilized in calculations to determine the number of trips assumed to be generated by this use during AM and PM peak hours of traffic on adjacent streets.

As no ITE Use Code exists to independently model the impact of the conference center, trip generation rates for this use were assumed separately during the TIA scoping meeting. These rates were assumed to be relative to the number of parking spaces allotted for the conference center’s use (100, out of 300 total spaces for hotel and conference center combined). Parking deck rates were based upon an average of witnessed trip generation rates at nearby JMU-owned Warsaw and Grace Street Parking Decks, being of similar use and proximity.

Due to the nature of the proposed development, and the desire for this study to be conservative in nature, no reductions to trip generation estimates were made to account for “pass by” or “internal capture” trips. Calculations and assumptions used in this trip generation process can be found as Appendix E.

Trip Distribution

Upon derivation of trips generated by the proposed development, these trips were then loaded onto the adjacent roadway network using traffic origin-destination (O/D) splits presented below:

Origin / Destination	Hotel/Conf. Center Trips	Parking Deck Trips
S Main Street (south)	15%	40%
S Main Street (north)	25%	15%
MLK (east)	40%	25%
MLK (west)	10%	10%
S Mason Street (north)	5%	10%
E Grace Street (west)	5%	5%

As can be seen, variances between the end users of the development types lead to differences in trip distribution. Hotel / conference center users are more likely to derive from the City’s commercial and office hubs, as well as the nearest interstate ramps. Parking deck users (JMU students and staff) were determined more likely to originate from residential neighborhoods and student housing complexes.

Route modeling assumptions were then made to load the roadway network with generated trips between their O/D and the proposed parking deck. Hotel / conference center traffic was assumed to prefer the deck’s MLK point of access, with JMU traffic preferring the S Mason access (though still under discussion, access management and protected spaces are necessities for the hotel; initial concepts have allowed for dedicated hotel parking on the lowest floors of the deck, with carded access on MLK).

For these initial modeling efforts, South Mason was assumed unmodified. Impacts of partial South Mason closure are discussed later in this report.

Trip distribution calculations and assumptions can be found in Appendix E of this report. “Hotel / Conference Center” and “Parking Deck” generated peak hour traffic volumes are shown loaded onto the road network in Figures 13 and 14, respectively.

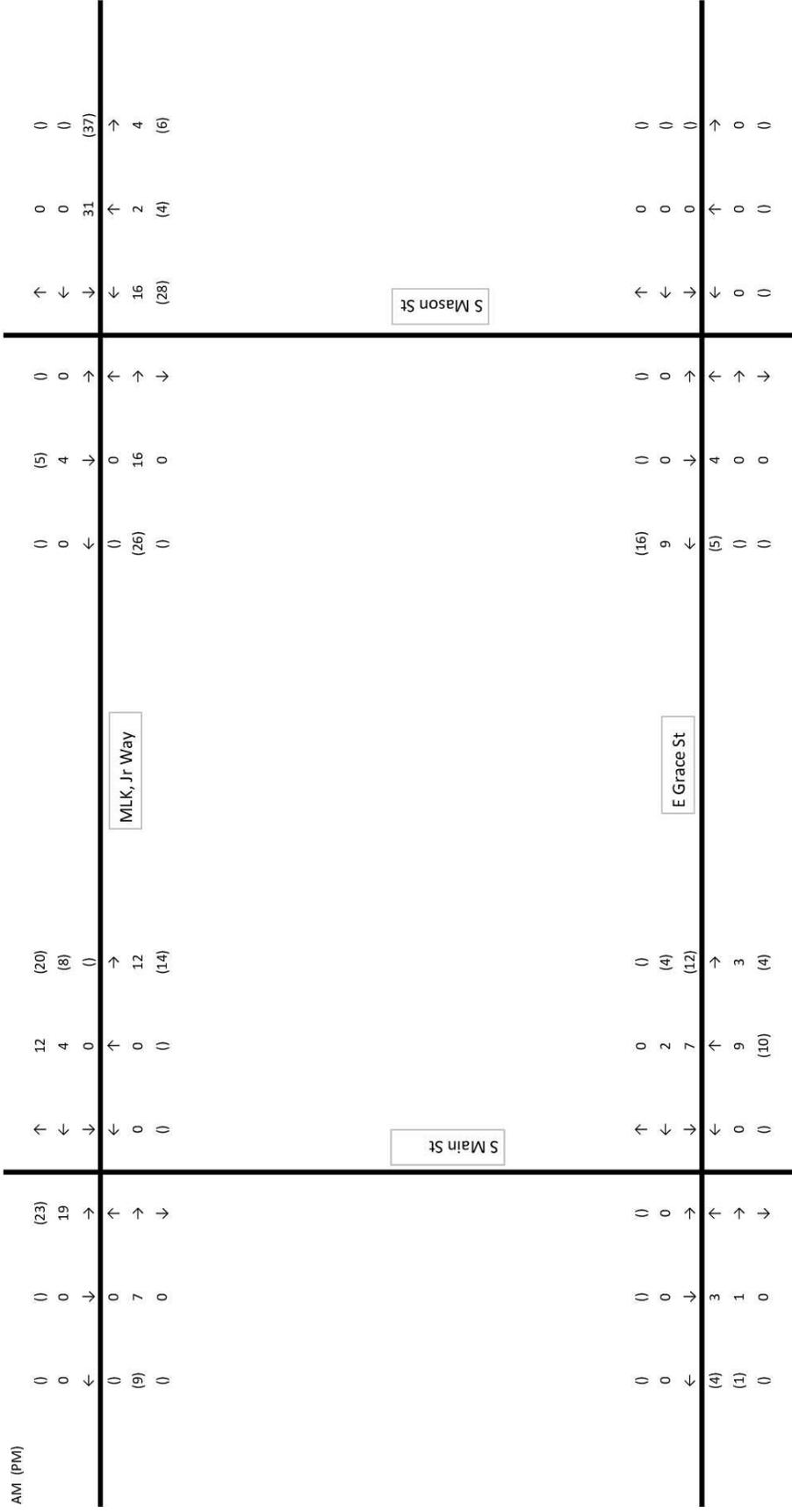


Figure 13 – Hotel / Conference Center Generated Trip Distribution (vehicles per hour)

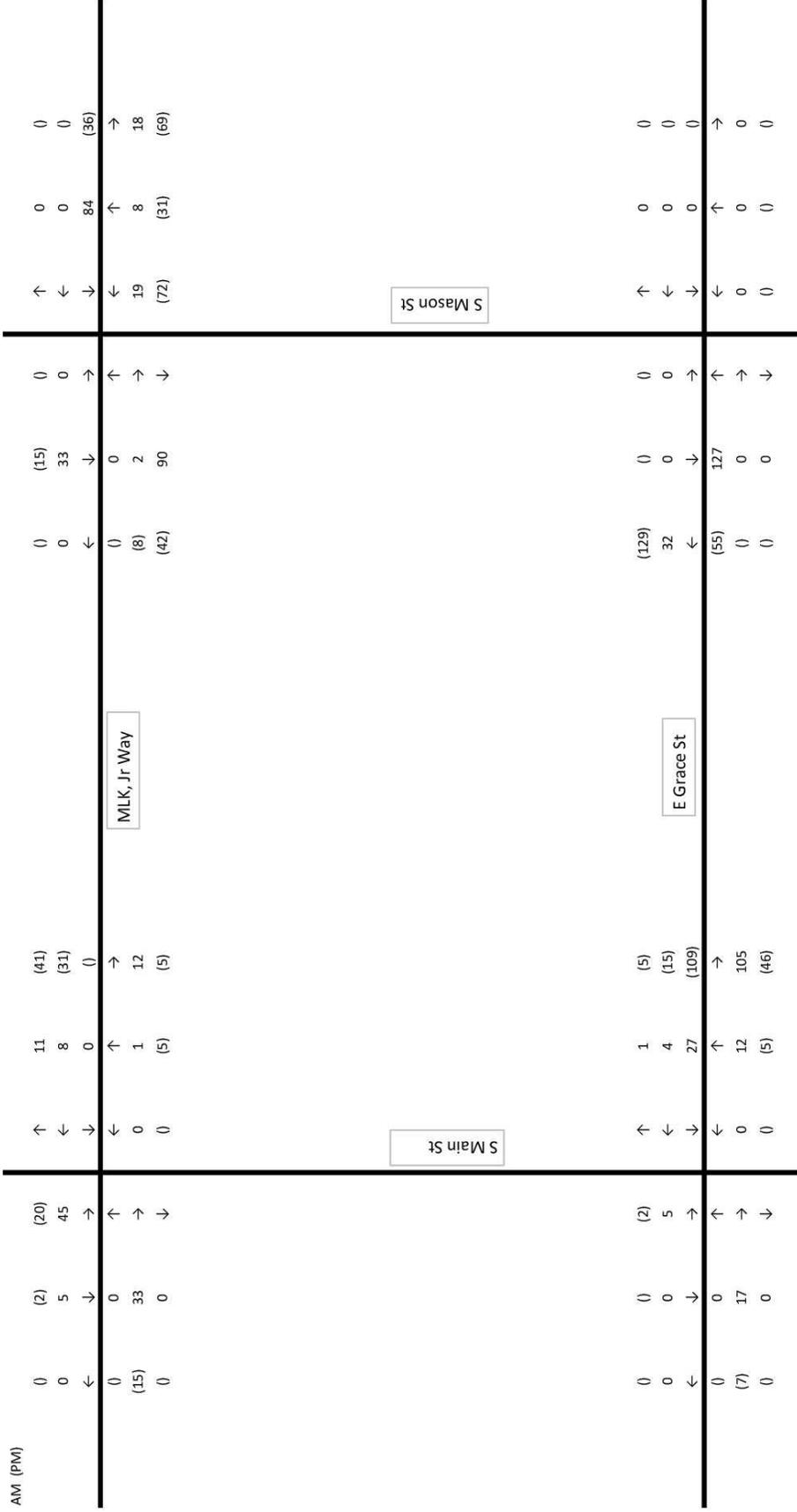


Figure 14 – Parking Deck (PM traffic) Generated Trip Distribution (vehicles per hour)

Trip Reduction

As part of the block redevelopment project includes the demolition of an existing surface parking lot (JMU Lot N6, shown below in Figure 15), a reduction of associated trips was necessary. Trip generation for this lot was based upon existing witnessed and measured trip generation from the Grace Street Parking Deck. Trips were then distributed across the roadway network utilizing the same rates assumed for the proposed development, and subtracted from the overall model. AM and PM Peak Hour Trip Reduction models can be found as Figures 16 and 17 on the following pages.

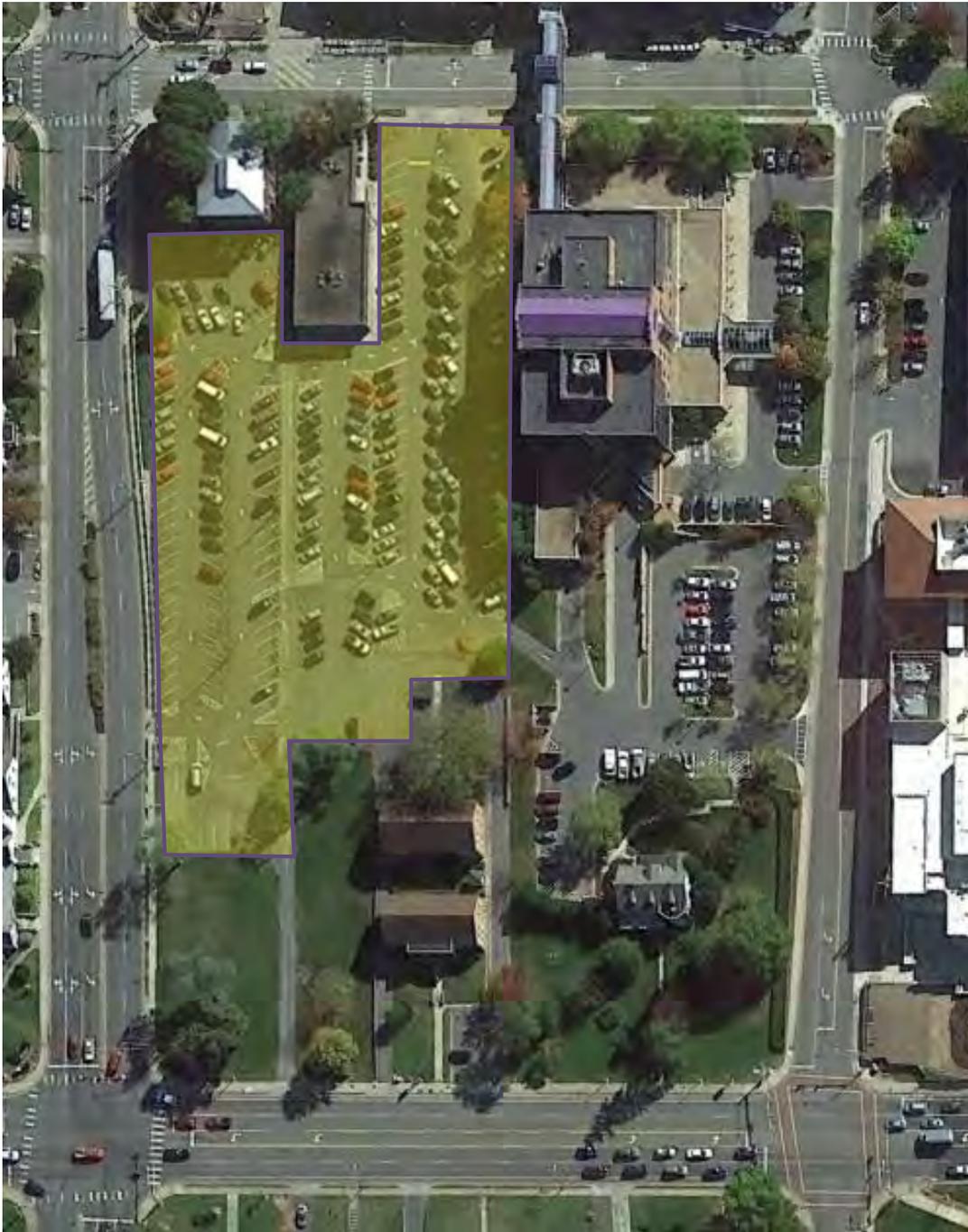


Figure 15 – JMU Surface Parking Lot N6

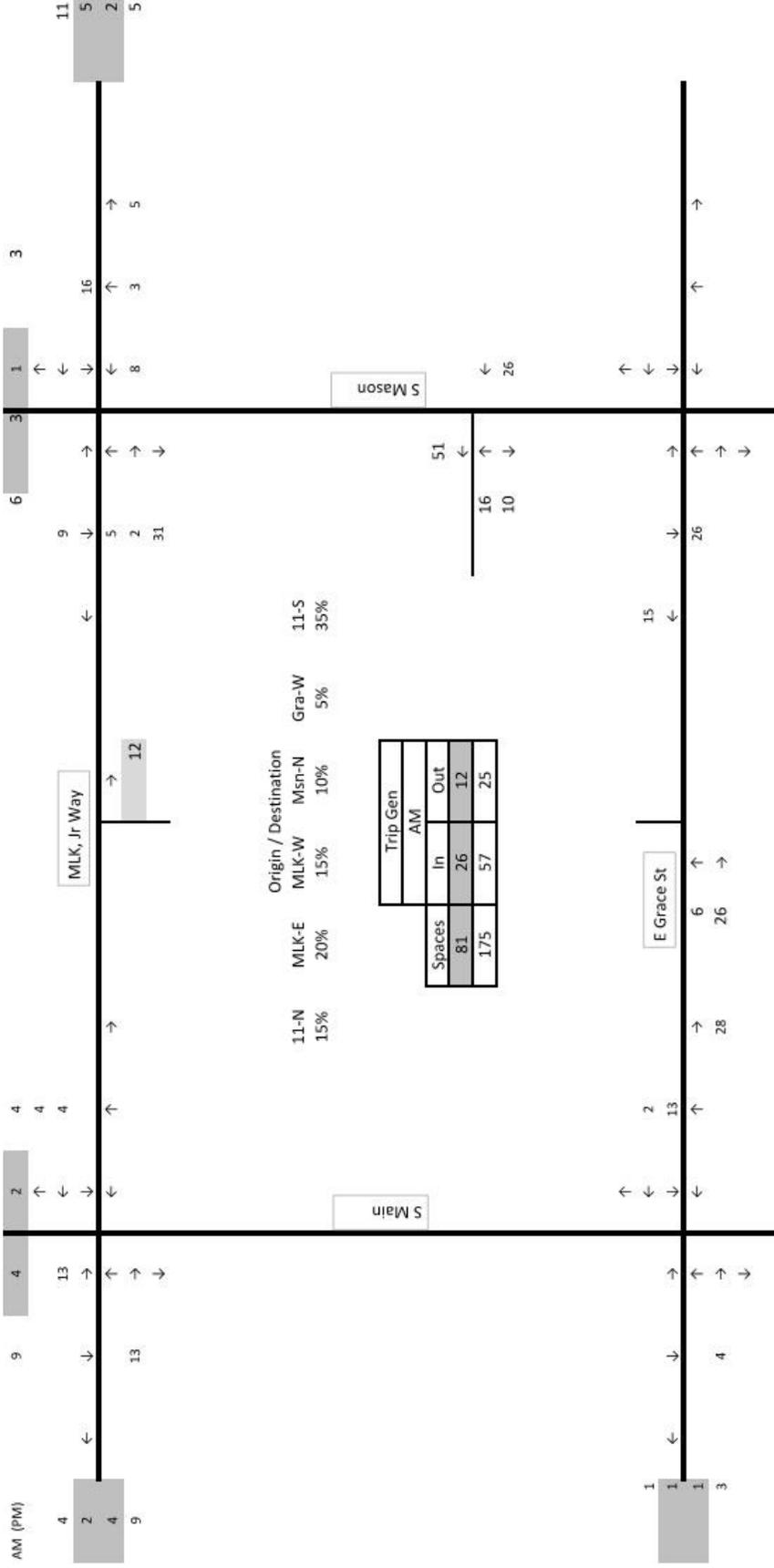


Figure 16 – JMU Lot N6 Trip Reduction (AM)

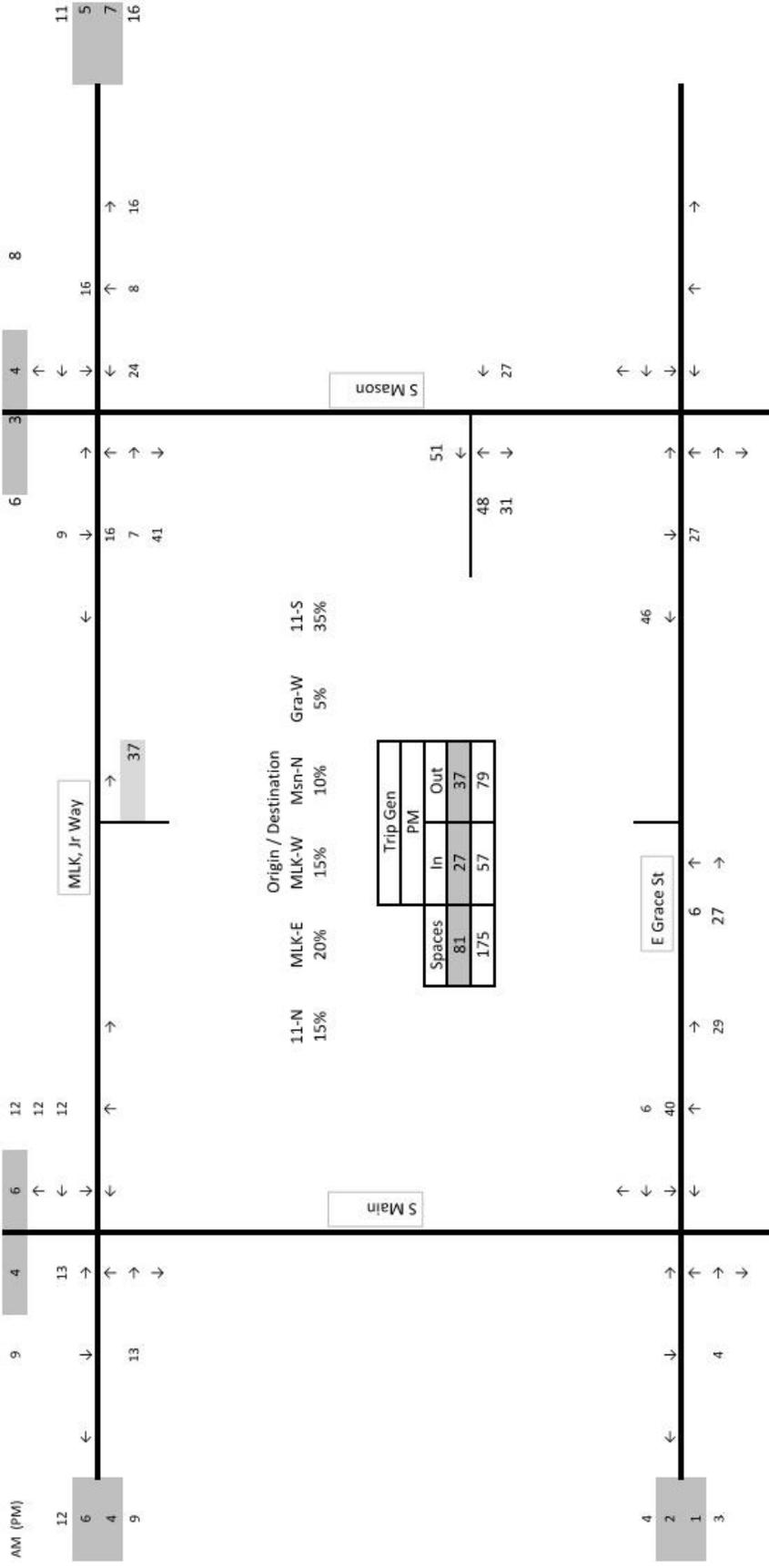


Figure 17 – JMU Lot N6 Trip Reduction (PM)

ANALYSIS OF FUTURE “TOTAL” CONDITIONS (2016)

Traffic Volumes

The site-generated trips were combined with the “Background 2016” scenario, with Lot N6 trips removed, to derive a “Total 2016” scenario. The “Total 2016” scenario is a projection of what traffic levels can be reasonably expected to occur, should the development be completed as proposed.

“Total 2016” peak hour traffic volumes can be found on the following page as Figure 18.

Roadway Improvements

During the modeling process, it was determined that certain new roadway improvements would be necessary to mitigate the added traffic. The initially assumed improvements mirrored those previously suggested by the City of Harrisonburg in their schematic entitled “Cantrell Avenue Conceptual Design” dated June 1, 2011. These improvements are as follows:

- 1) Addition of 150’ right-turn lane with 100’ taper to northbound approach of S Main & MLK
- 2) Addition of 200’ left-turn lane with 100’ taper to eastbound approach of MLK & S Mason
- 3) Addition of 200’ left-turn lane with 100’ taper to westbound approach of MLK & S Mason

These improvements by themselves, however, were not adequate in providing suitable levels of service at the intersection of South Main & Grace. The difficulty in achieving an acceptable level of service at this intersection is primarily due to the 30-second pedestrian-only phase that is incorporated into the signal phasing. This “pedestrian scramble”, as it is commonly known, was incorporated into the phasing scheme to alleviate concerns over pedestrian safety, due to the reasonably high number of pedestrian movements experienced per hour (134 measured in 2014, a significant number of which are diagonal movements). The pedestrian scramble phase allows for pedestrians to move unimpeded by vehicles for a singular 30-second window per signal cycle. The benefit of such a phase is safety; the downside is, obviously, a decrease in experienced vehicular delay.

Though existing pedestrian movements are not high enough to overtly warrant the inclusion of a pedestrian scramble phase (which are generally reserved for a minimum of 10 pedestrian movements per cycle, or 240 per hour based upon a 150-second cycle), the existence of a large number of diagonal movements makes the scramble desirable. Restricting these diagonal movements with signage may not be entirely effective, as the large majority of this intersection’s pedestrians are students, who tend to be more cavalier in their movements. Additionally, the fact that an additional 507-bed student residence facility is to be opened in May of 2015 on West Grace Street would indicate that pedestrian movements are only likely to grow. Replacements for the scramble phase, such as overhead pedestrian walkways, do not appear to be feasible alternatives (again, due to the cavalier movements of the pedestrians). As such, it is not the opinion of this report that the pedestrian scramble phase should be removed.

Without being able to remove the scramble phase, more significant modifications to the intersection may be necessary to provide moderately acceptable levels of service and queue lengths. Through trial and error, the following additional improvements are recommended for this scenario:

- 4) Channelize eastbound right-turns from West Grace to allow right-turns on red (RTOR)
- 5) Provide dual westbound left-turn lanes on East Grace with 200’ storage, 200’ taper

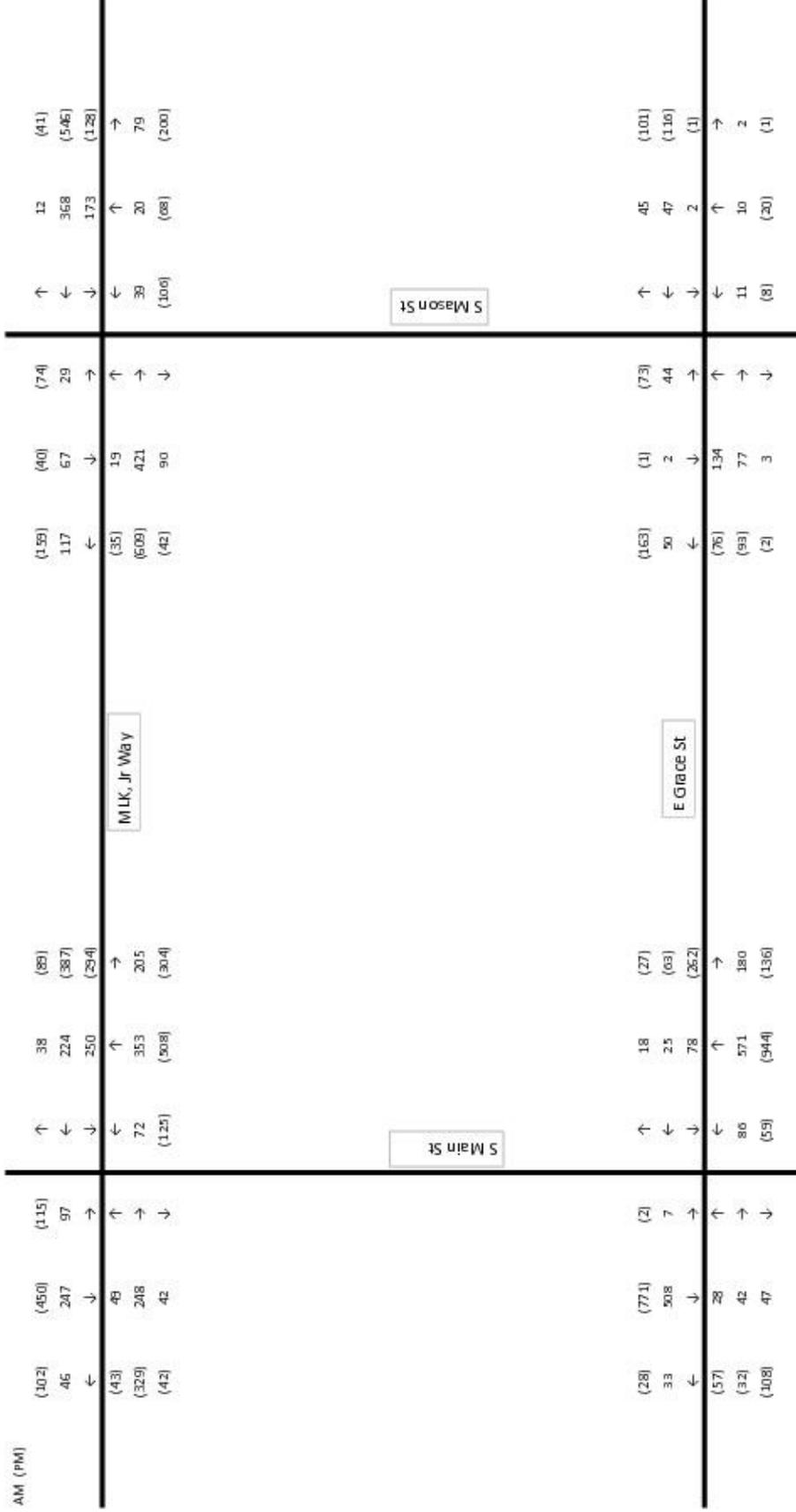


Figure 18 – Total 2016 Peak Hour Turning Movements (vehicles per hour)

Channelization of the eastbound right-turning movements leaving West Grace for South Main removes the turning vehicles from the through-movement queue, reducing queue length and the length of the dedicated signal phase necessary to serve this approach. Currently, right-turns on red are not allowed, due to the pedestrian scramble phase. Channelizing the turns would allow the RTOR movements to exist without significant pedestrian conflict. The channelization would need to incorporate a large enough radius (150'+, preferably) to create a pedestrian refuge of adequate size. Significant open space presently exists at the intersection corner, which should make the channelization feasible. Consultation with JMU to determine this size should be performed prior to design of the channelization. Additionally, pedestrian crossing(s) of the channelized lane should be designed to appropriately alert motorists; flashing signs and textured/colored crosswalks should be considered.

The additional left-turn lane for the westbound East Grace approach is recommended despite traffic volumes being lower than the typical 300 vph threshold that is usually reserved for such measures. The extra lane is deemed warranted due to the ability it provides in removing the approach queue in the limited amount of time the pedestrian scramble phase allows. Without the additional left-turn lane, queues were found to extend to the upstream East Grace intersection with South Mason.

Additionally, due to City recommendations, a 10-second leading pedestrian phase was added for north-south pedestrian movements at the intersection of MLK & Main, in order to accommodate existing and future pedestrian levels.

With these improvements in place, the intersection of South Main & East/West Grace can be expected to operate at more reasonably acceptable levels of service, with a priority on north-south through movements.

It should be noted that the westbound left-turn lane on MLK at the intersection with South Main was found to have a measurable queue that greatly exceeds the available storage length. As this queue is short-lived due to signal coordination, however, the City does not believe that extension of the existing turn lane is necessary or sufficiently beneficial to warrant recommendation.

Capacity and Levels of Service at Critical Points

The “Total 2016” scenario was analyzed, with improvements stated, through Synchro to determine the impacts to controlled vehicular delay, associated levels of service, and queue lengths at intersections of interest. The improvements assumed above were analyzed for their effectiveness in mitigating the impact to acceptable levels of service and queue lengths.

Cycle lengths were modified in the PM Peak Hour to meet the longest natural cycle length within the network. Intersection signal timing splits were optimized for both peak hours, either through Synchro optimization or manual modifications for balancing of delay across multiple approaches.

Detailed worksheets from this Synchro analysis of “Total 2016” conditions are presented as Appendix F of this report, while future LOS values for intersections of interest can be found in Figures 19 (AM) and 21 (PM). Peak Hour Queue Analyses can be found in Figures 20 (AM) and 22 (PM).

As can be seen through this analysis, the recommended improvements have the desirable effect of providing adequate levels of service. The westbound approach of East Grace still operates at no better than a level of service ‘E’ for each lane group, but the queues are manageable and vehicles were not found to need more than one cycle to be served.

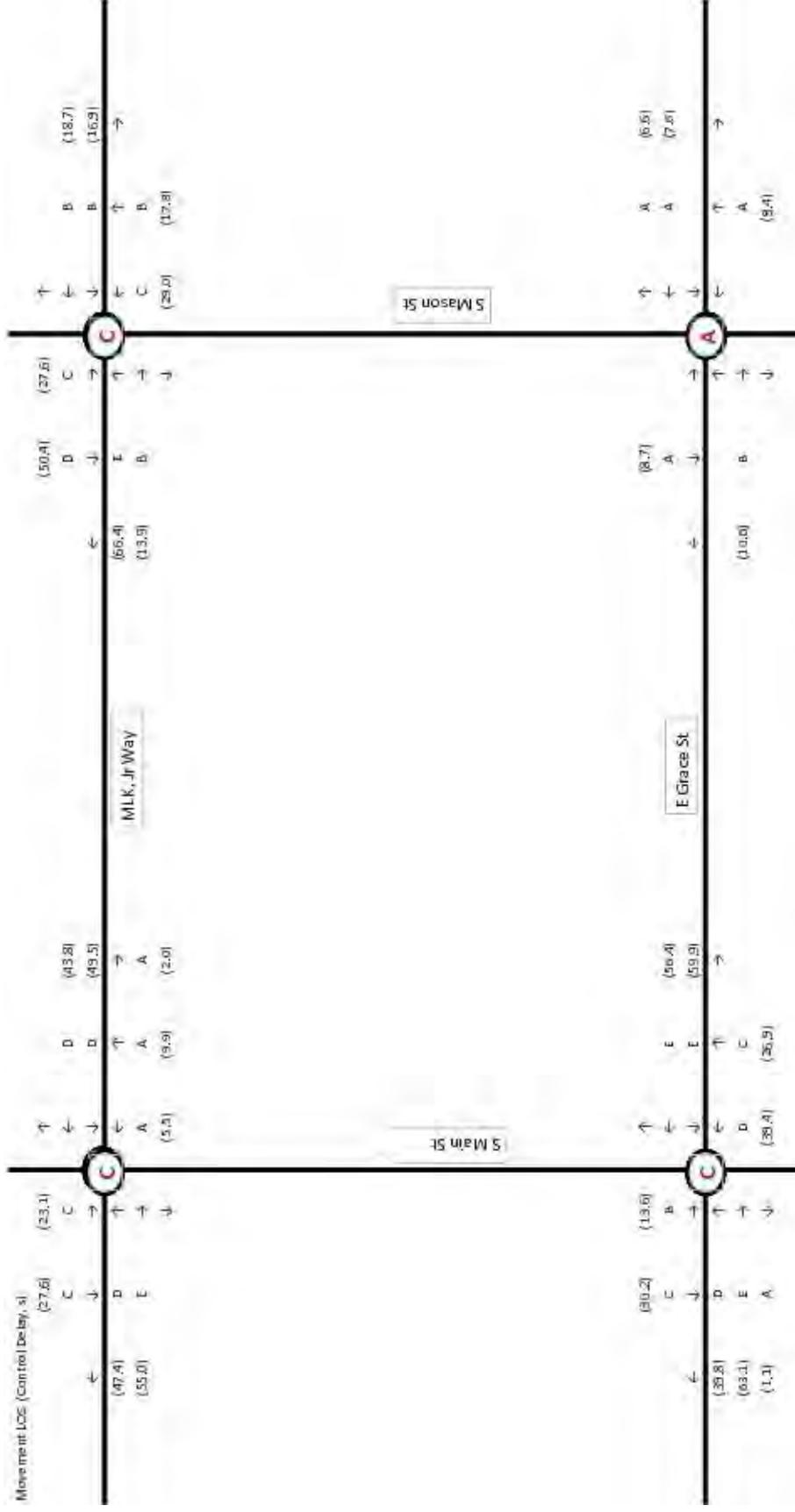


Figure 19 – Total 2016 AM Levels of Service

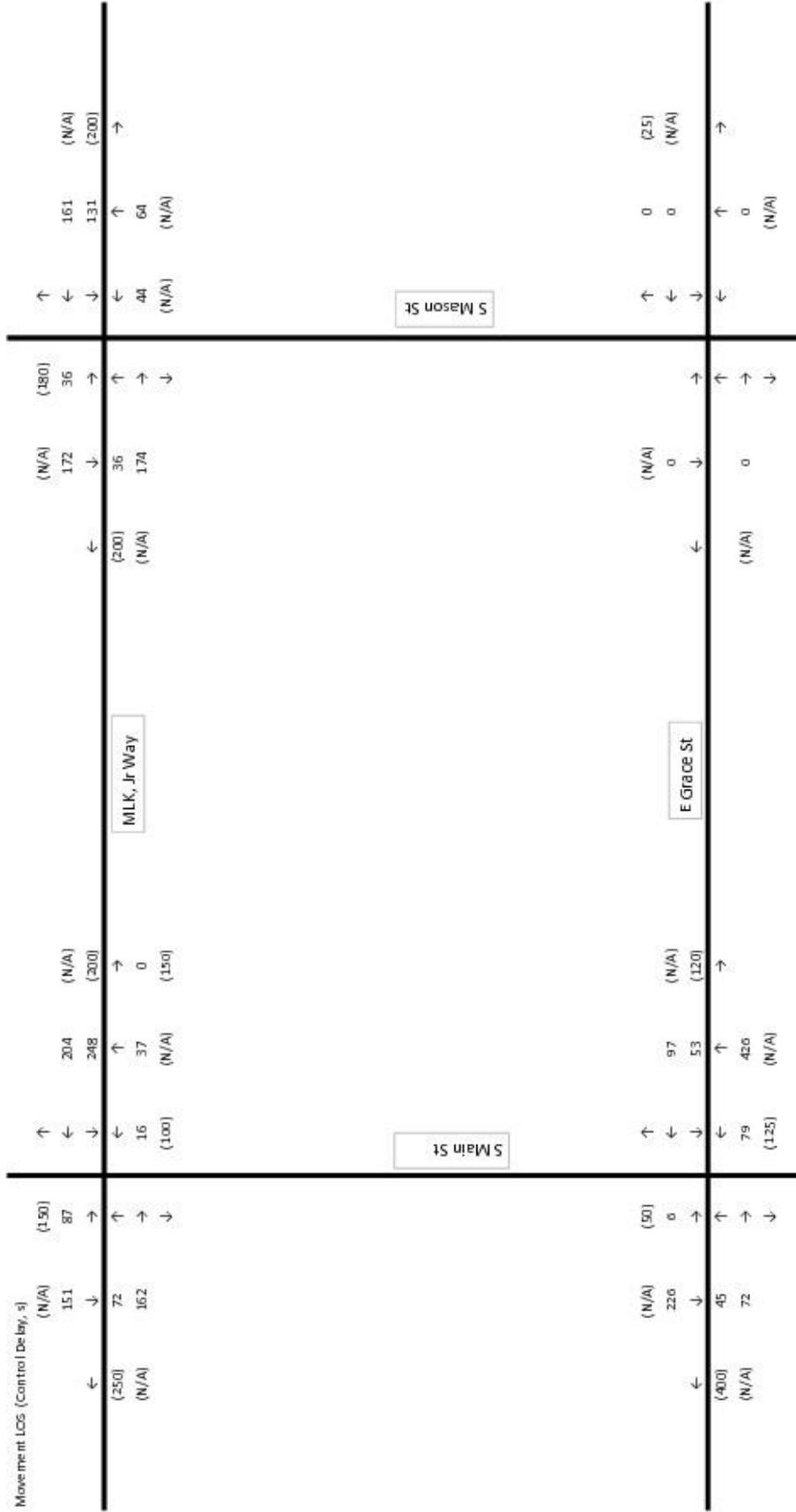


Figure 20 – Total 2016 AM Queue Analysis

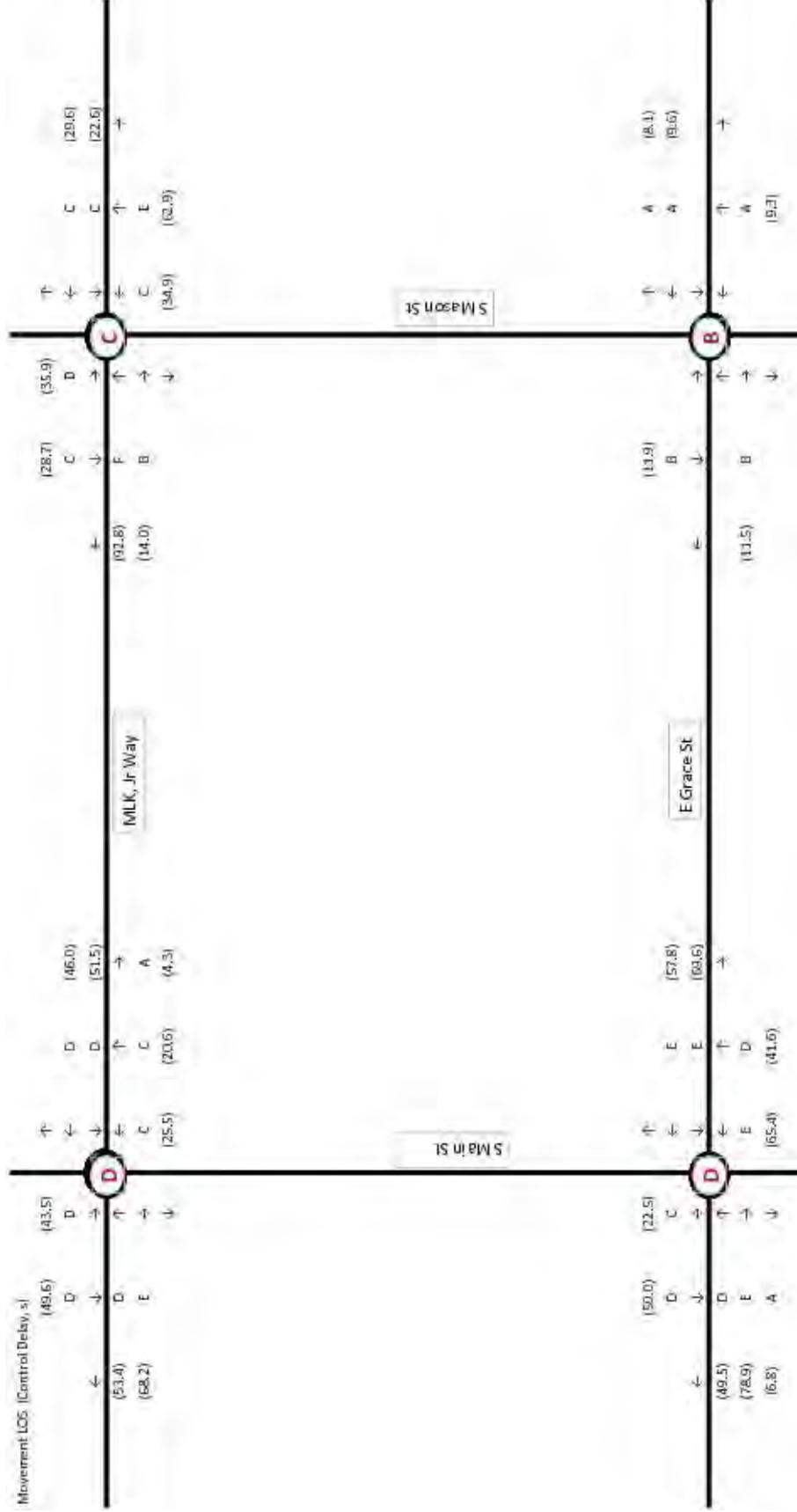


Figure 21 – Total 2016 PM Levels of Service

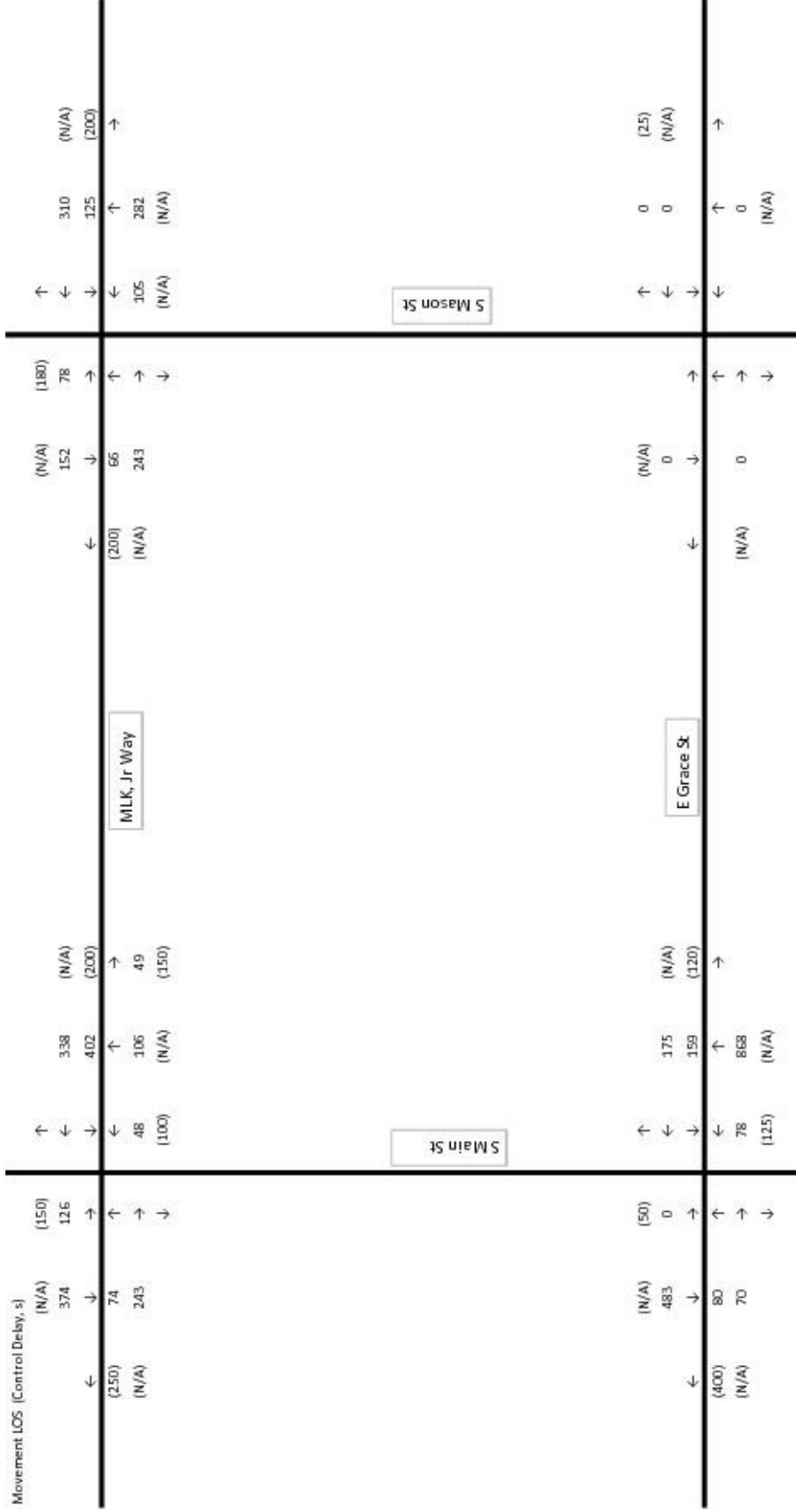


Figure 22 – Total 2016 PM Queue Analysis

ANALYSIS OF POST-BUILD CONDITIONS (2022)

Background Conditions

A six-year post-build analysis was also performed as part of this study, to better understand the lasting effects of the recommended improvements. In order to project future traffic volumes for the post-buildout year of 2022, counts were “grown” to the future period of analysis by utilizing the universal growth factor of 1.4%. “Background 2022” traffic volumes can be found as Figure 23 of this report.

The “Background 2022” scenario was then analyzed with Synchro to determine anticipated levels of service and queueing lengths. LOS values for intersections of interest can be found in Figures 24 (AM) and 26 (PM). Peak Hour Queue Analyses can be found in Figures 25 (AM) and 27 (PM). Detailed worksheets from this Synchro analysis are presented as Appendix G.

Proposed Conditions (with Improvements)

The grown peak hour volumes described above were then combined with site generated traffic (with deductions for demolished parking lot taken into account) in order to derive the “Total 2024” scenario. Traffic volumes associated with this scenario are presented as Figure 28 of this report.

This scenario was then loaded into Synchro to determine controlled vehicular delay and LOS values, utilizing the improvements that were described in the 2016 analysis (both as originally recommended by the City, and those additional improvements recommended by this report). Signalization splits were again optimized at each signalized intersection, and coordinated signal offsets were adjusted to best serve the model as a whole.

Detailed worksheets from this Synchro analysis of “Total 2022” conditions are presented as Appendix H of this report, while future conditions LOS values for intersections of interest can be found in Figures 29 (AM) and 31 (PM). Peak Hour Queue Analyses can be found in Figures 30 (AM) and 32 (PM).

As can be seen in the “Total 2022” summary figures, the study area can be expected to continue to operate in a reasonable fashion, with intersection LOS and queueing within reasonable expectations. The intersection of South Main & East/West Grace continues to be the poorest functioning intersection, but no other reasonable improvements to the intersection were found to be overly beneficial. Lower levels of traffic service at this intersection will have to be acceptable if the pedestrian scramble is to be preserved.

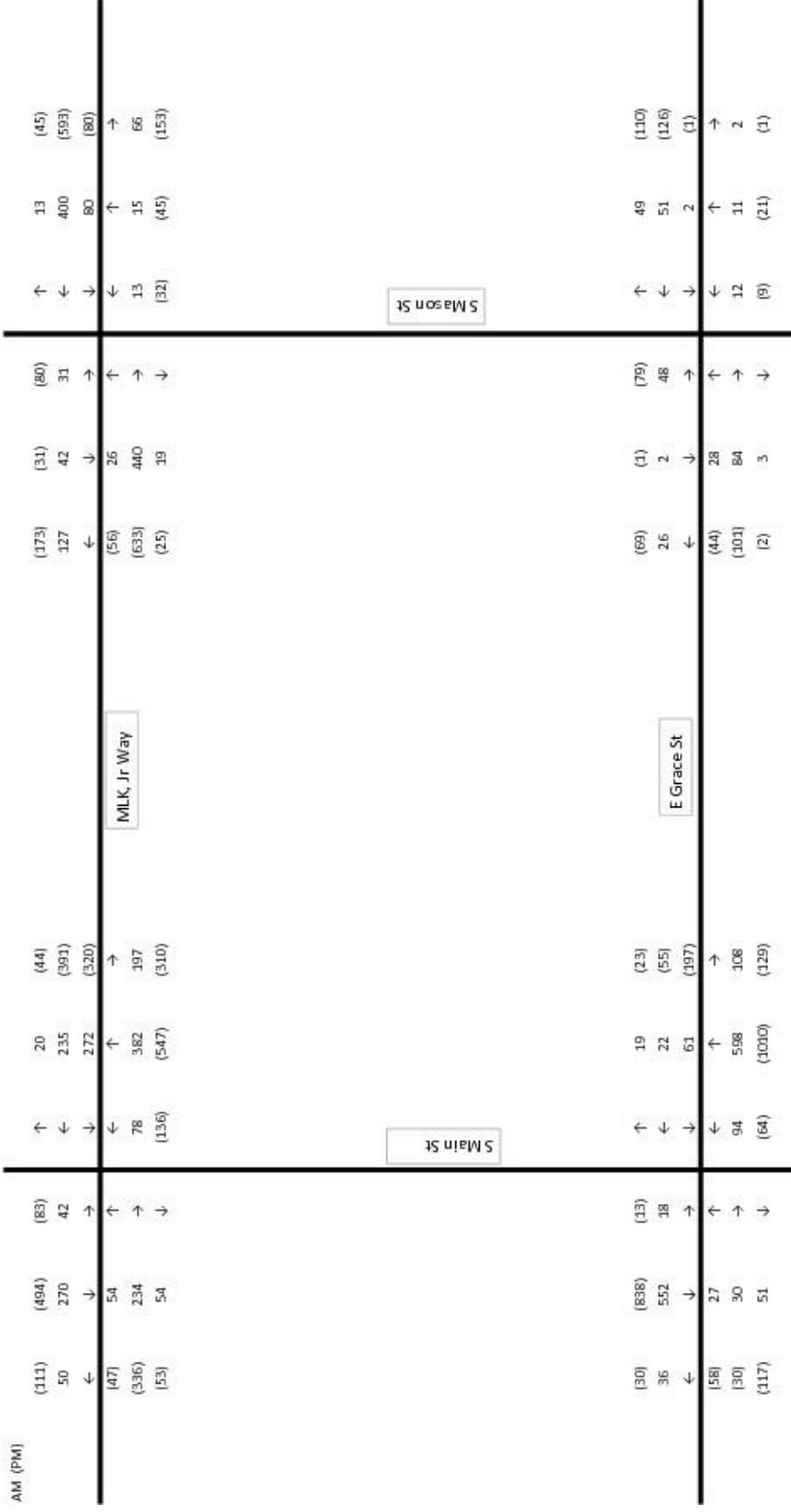


Figure 23 – Background 2022 Peak Hour Turning Movements (vehicles per hour)

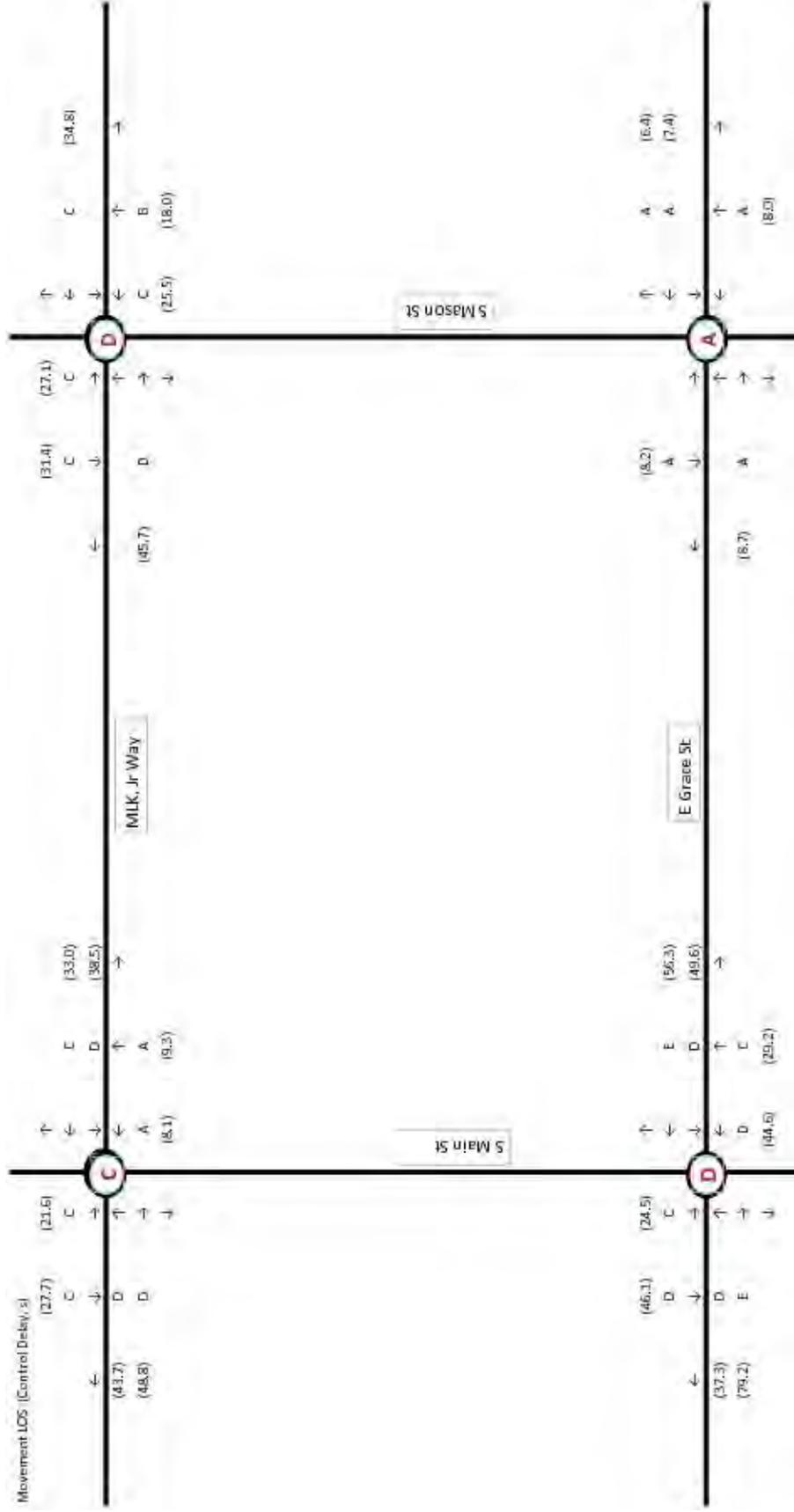


Figure 24 – Background 2022 AM Levels of Service

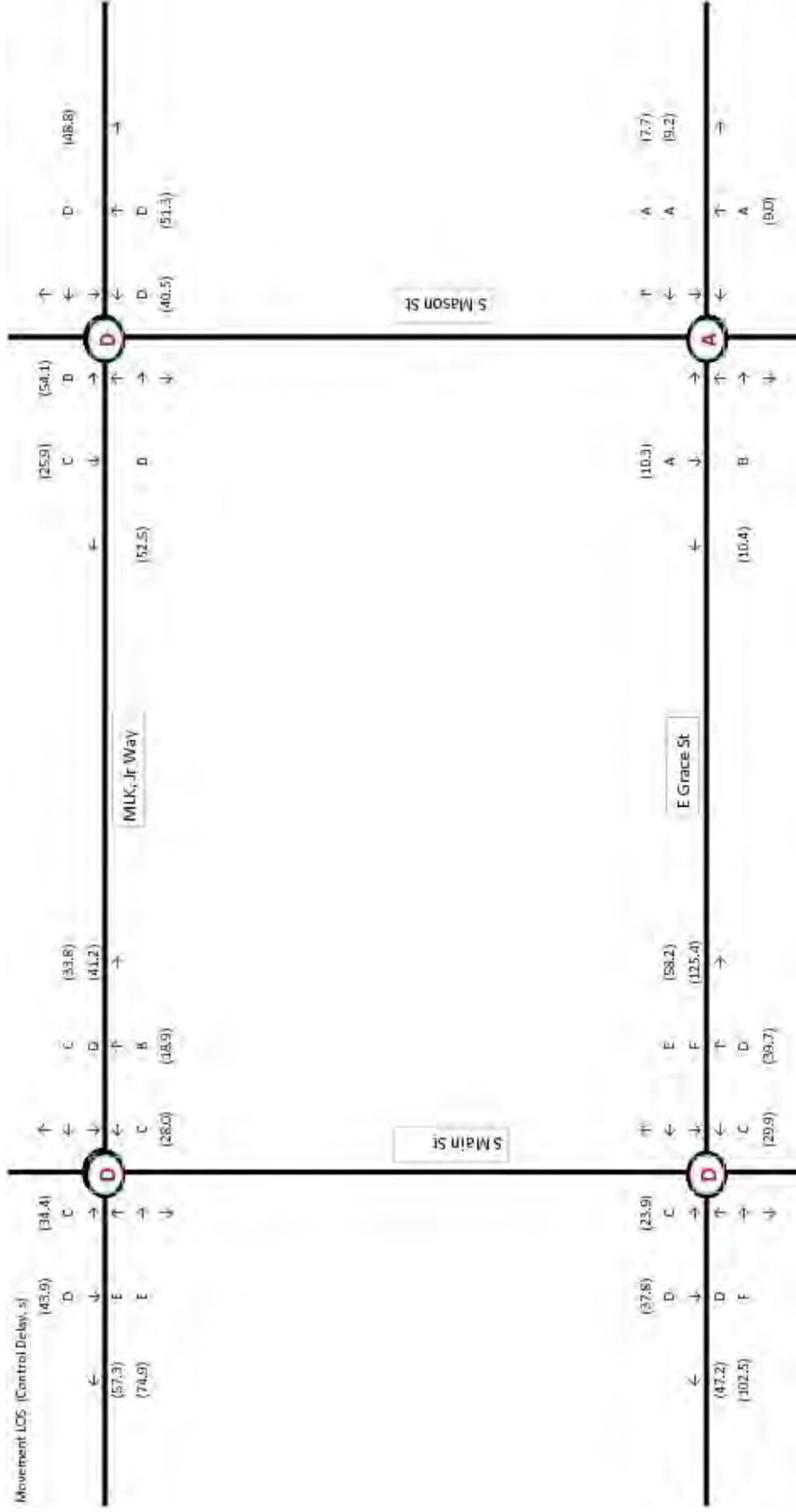


Figure 26 – Background 2022 PM Levels of Service

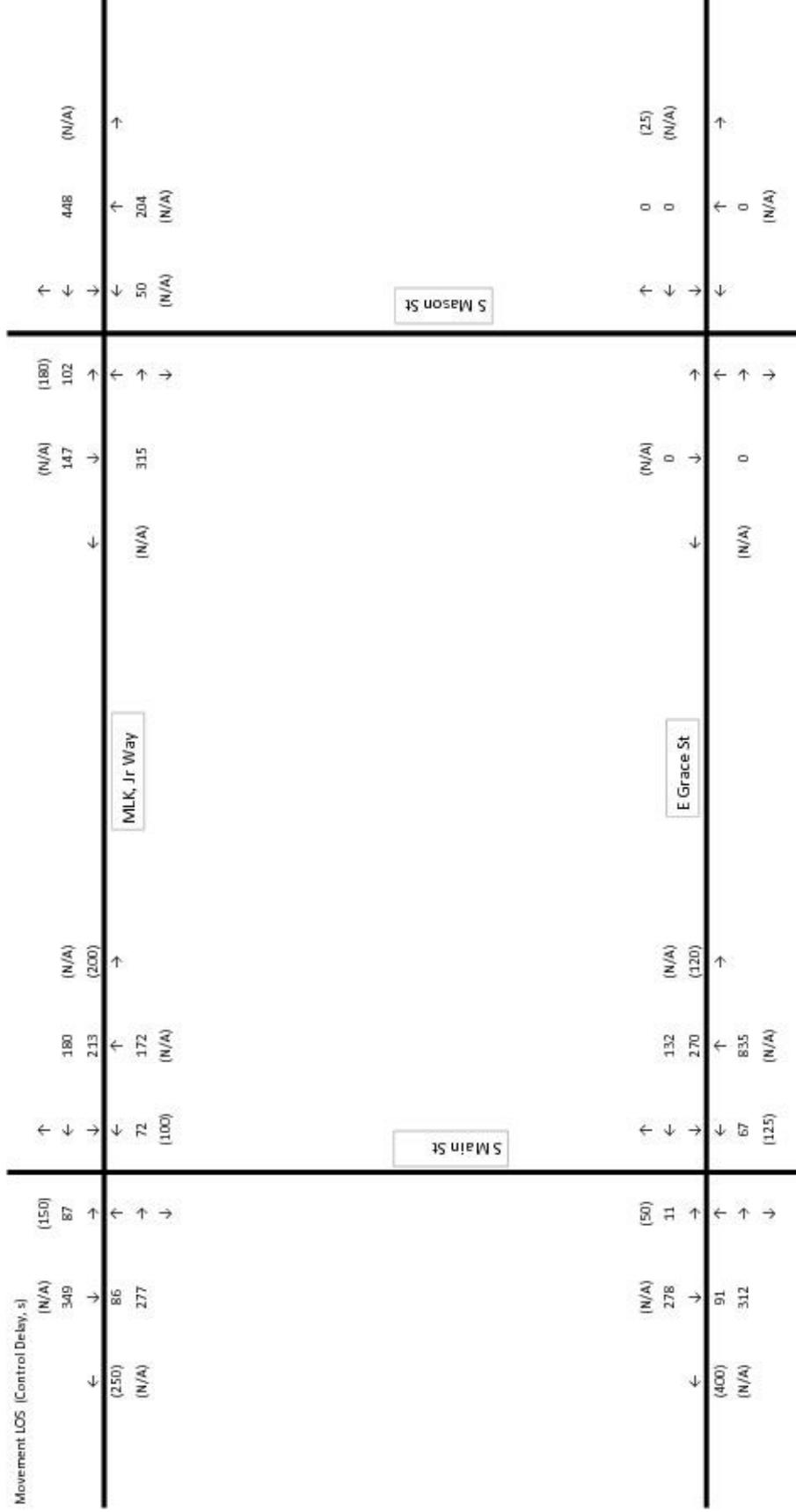


Figure 27 – Background 2022 PM Queue Analysis

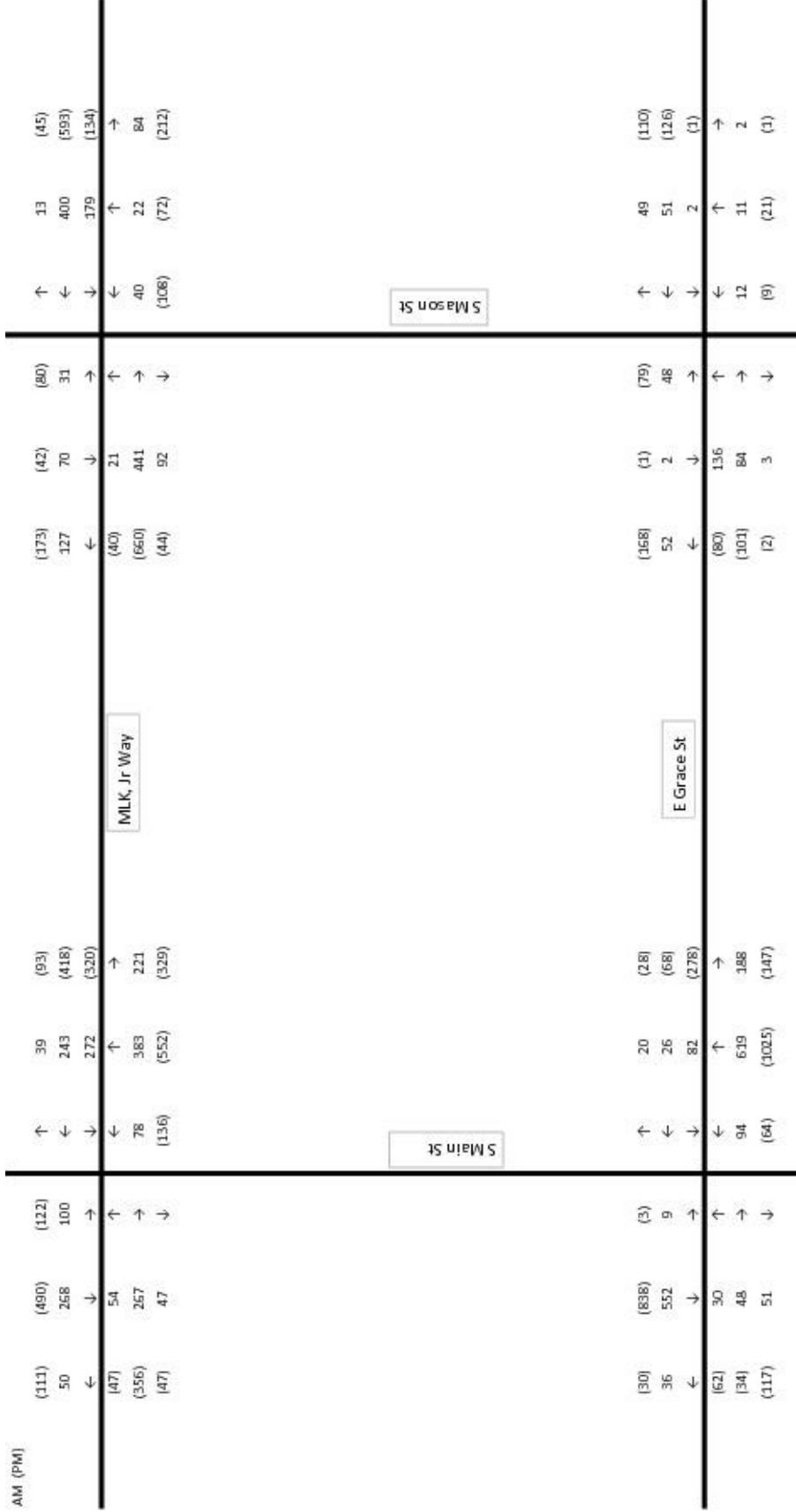


Figure 28 – Total 2022 Peak Hour Turning Movements
(vehicles per hour)

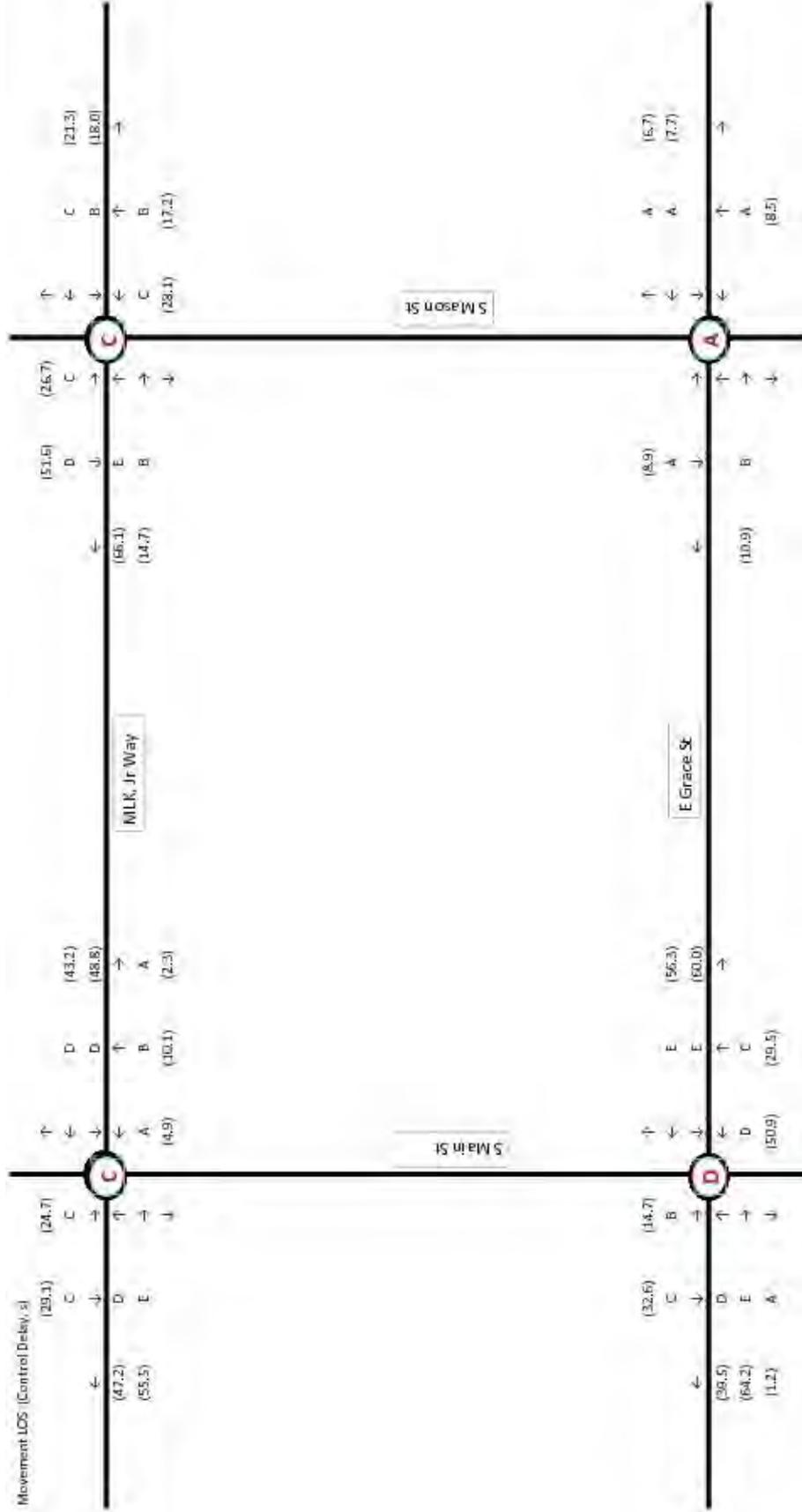


Figure 29 – Total 2022 AM Levels of Service

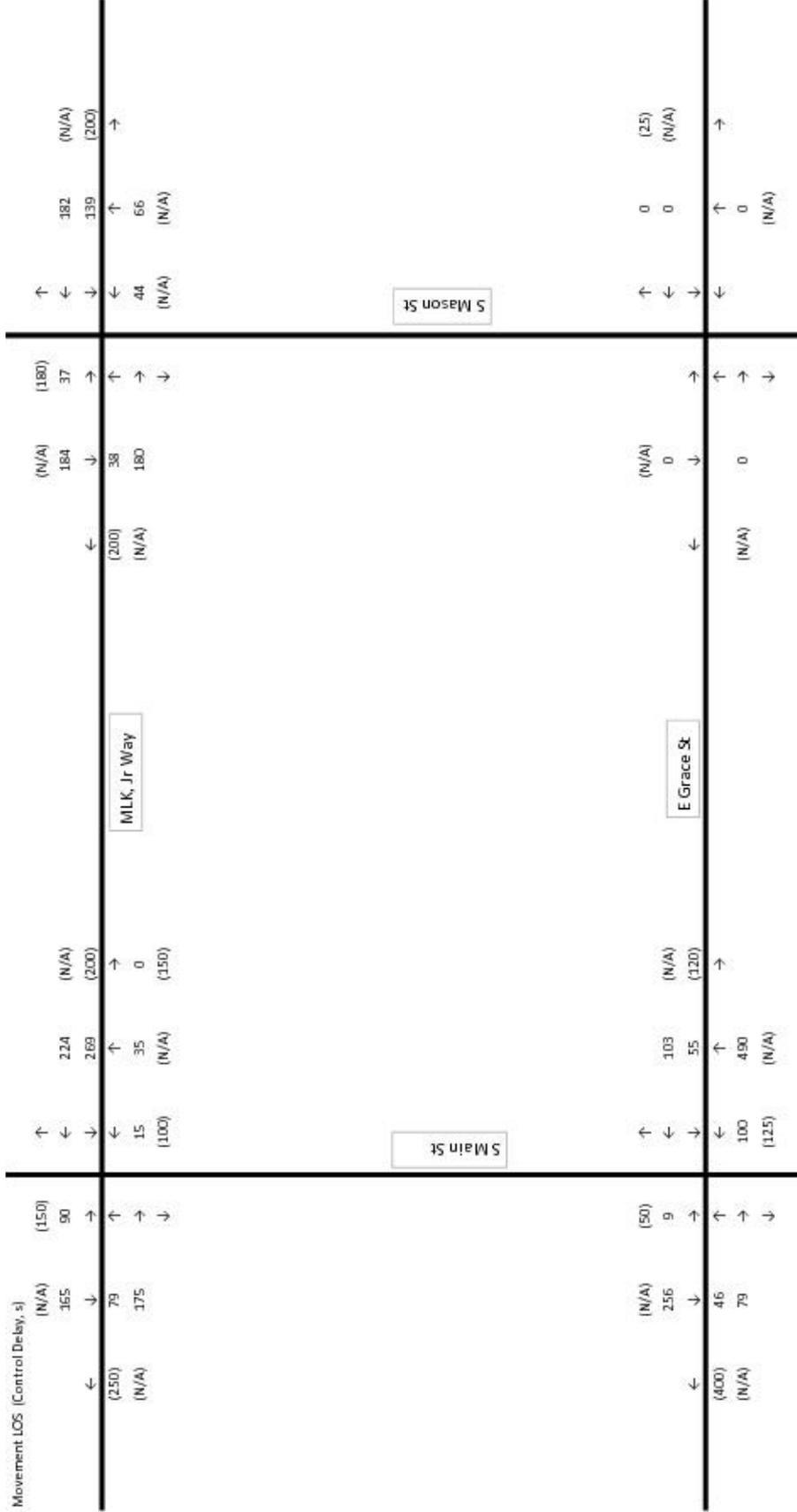


Figure 30 – Total 2022 AM Queue Analysis

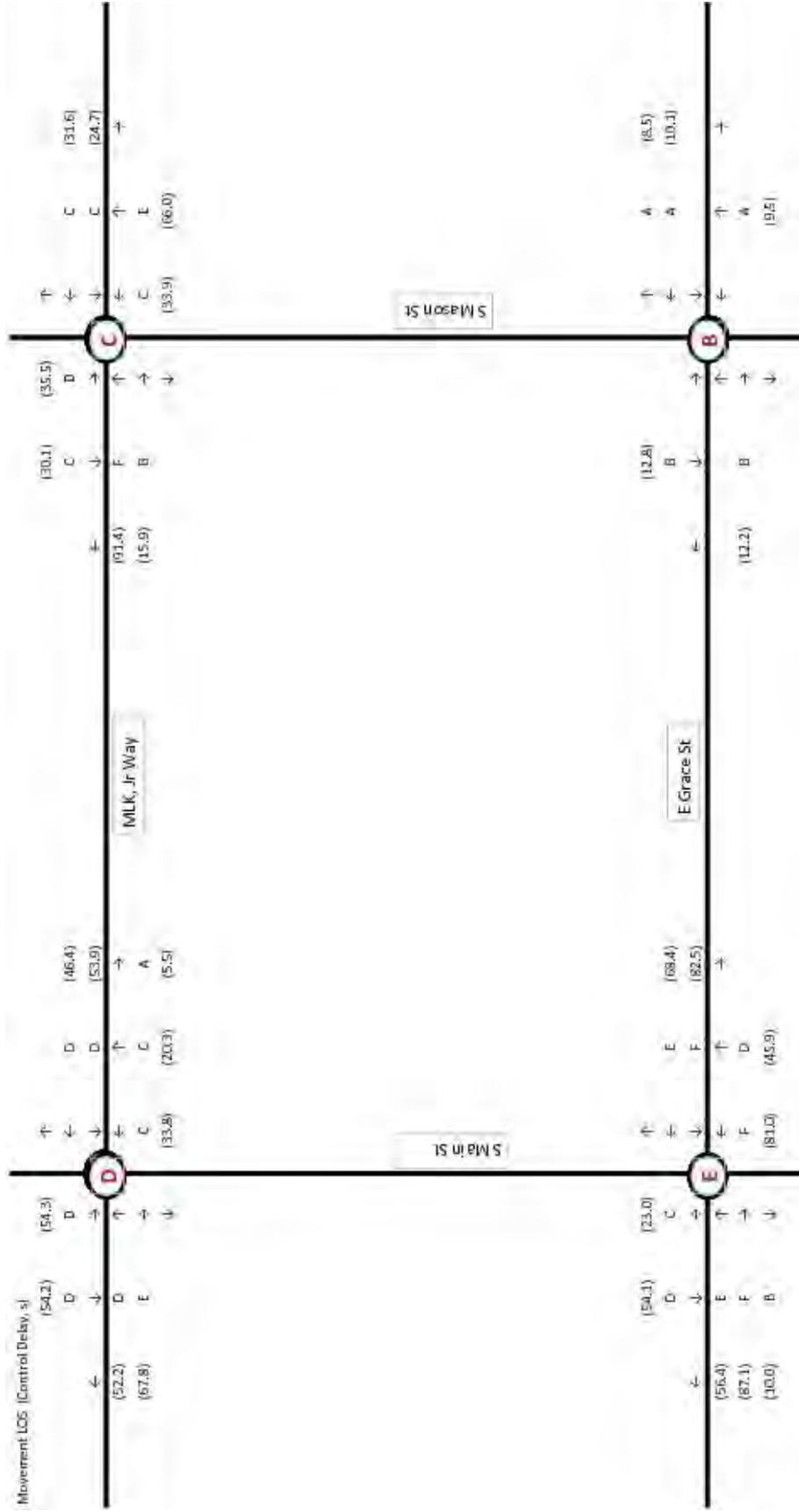


Figure 31 – Total 2022 PM Levels of Service

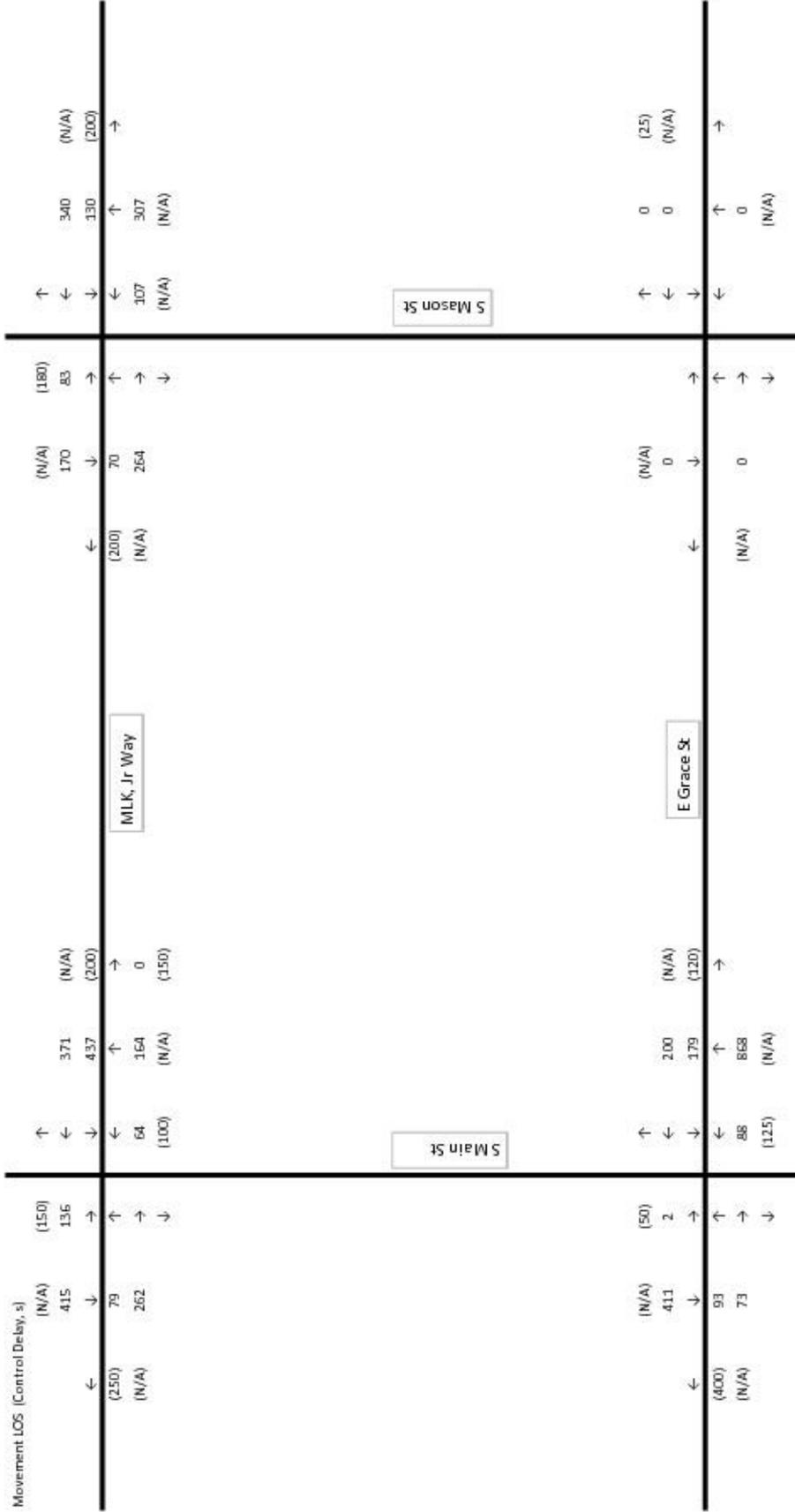


Figure 32 – Total 2022 PM Queue Analysis

PARTIAL CLOSURE OF SOUTH MASON

It is understood that JMU is presently considering the partial closure of South Mason Street, between the parking deck points of access and East Grace Street, in order to more safely accommodate pedestrian traffic. At the time this report was produced, the precise nature of this closure was unknown. For the purpose of this analysis, a scenario was developed that would create full closure of South Mason between the points indicated; however, it is understood that partial closure options are also being considered.

Closure of South Mason between the points indicated was analyzed in both 2016 and 2022 scenarios to determine its effect on the adjacent roadway network.

Traffic Volumes

To begin, background traffic that was “grown” to the year 2016 per the assumed universal growth rate of 1.4% was re-routed based upon the inability to traverse the closed section of South Mason. The background 2016 peak hour traffic volumes associated with this scenario are presented in Figure 33.

The site-generated trips were then also re-routed through the system under the same assumptions. These re-routed trip distributions for both the hotel / conference center and the parking deck can be found on the following pages as Figures 34 & 35, respectively.

The re-routed background and site-generated trips were then combined, minus trips that are associated with the to-be-demolished surface parking, to derive the Total 2016 with South Mason Closure peak hour traffic projections. The AM and PM peak hour scenarios for 2016 can be found as Figure 36.

Roadway Improvements

The previously assumed improvements to the intersections of South Main & MLK and MLK & South Mason were again implemented in the modeling of the South Mason Closure option. These improvements are enumerated below for reference:

- 1) Addition of 150' right-turn lane with 100' taper to northbound approach of S Main & MLK
- 2) Addition of 200' left-turn lane with 100' taper to eastbound approach of MLK & S Mason
- 3) Addition of 200' left-turn lane with 100' taper to westbound approach of MLK & S Mason

These improvements, by themselves, were ineffective in mitigating the impact that closing South Mason has on the overall roadway network. As such, additional improvements were evaluated, with the following providing the most benefit:

- 4) Channelize eastbound right-turns from West Grace to allow right-turns on red (RTOR)

Unlike in the previous scenarios, with South Mason left open, the provision of an additional left-turn lane for the westbound approach of East Grace was not found to be particularly effective in reducing delay at the intersection. As such, the improvement was not found warranted for this scenario.

As with the previous scenario, with S Mason left open to traffic, significant left-turning movements on the westbound MLK approach to S Main create a lengthy queue. Again, this queue is quickly served due to signal coordination, and lengthening of the left-turn lane storage area is not likely necessary for safe traffic movements.

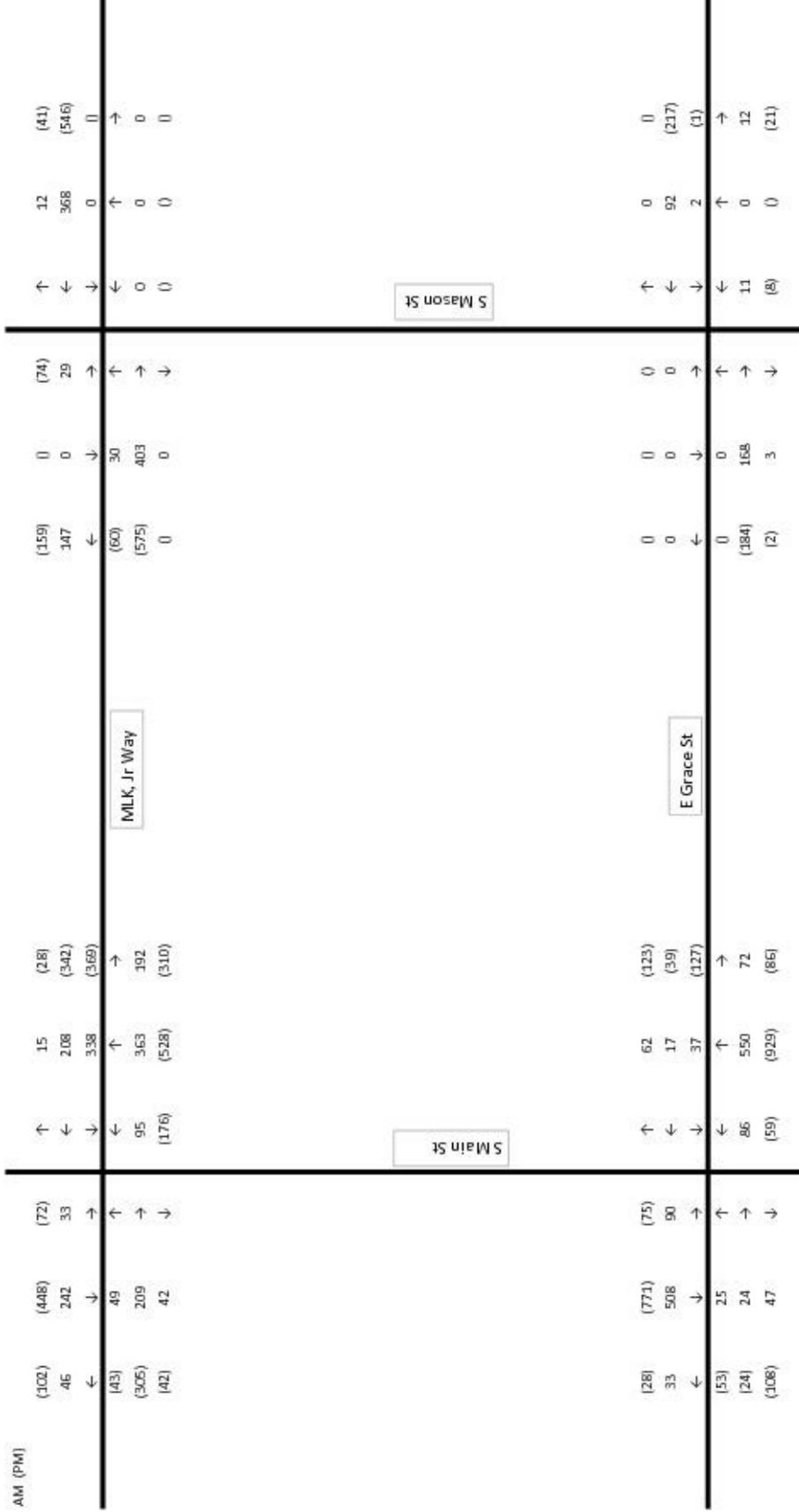


Figure 33 – 2016 Background Peak Hour Turning Movements – Closed S Mason
(vehicles per hour)

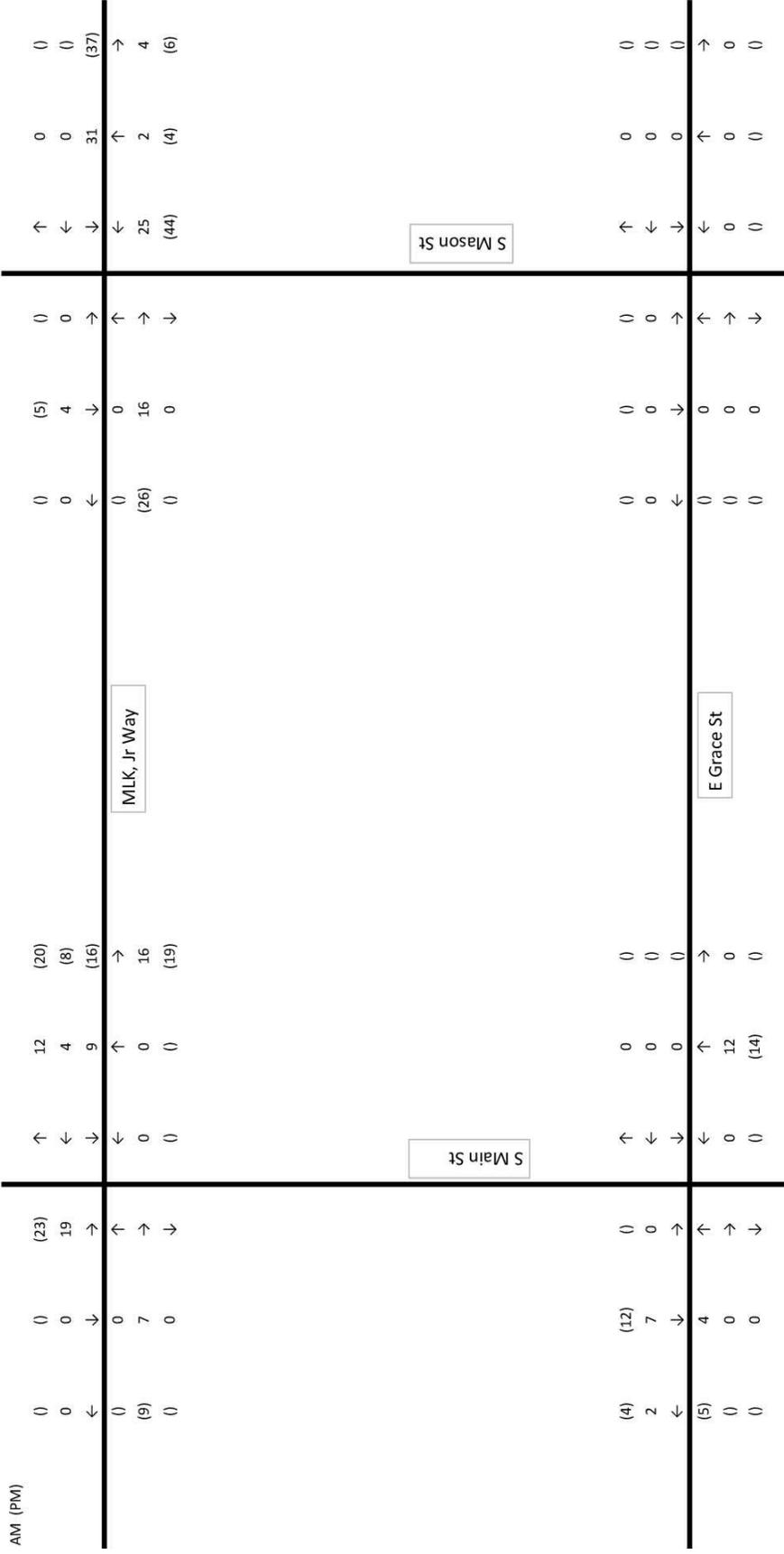


Figure 34 – Hotel / Conference Center Generated Trip Distribution – Closed S Mason
(vehicles per hour)

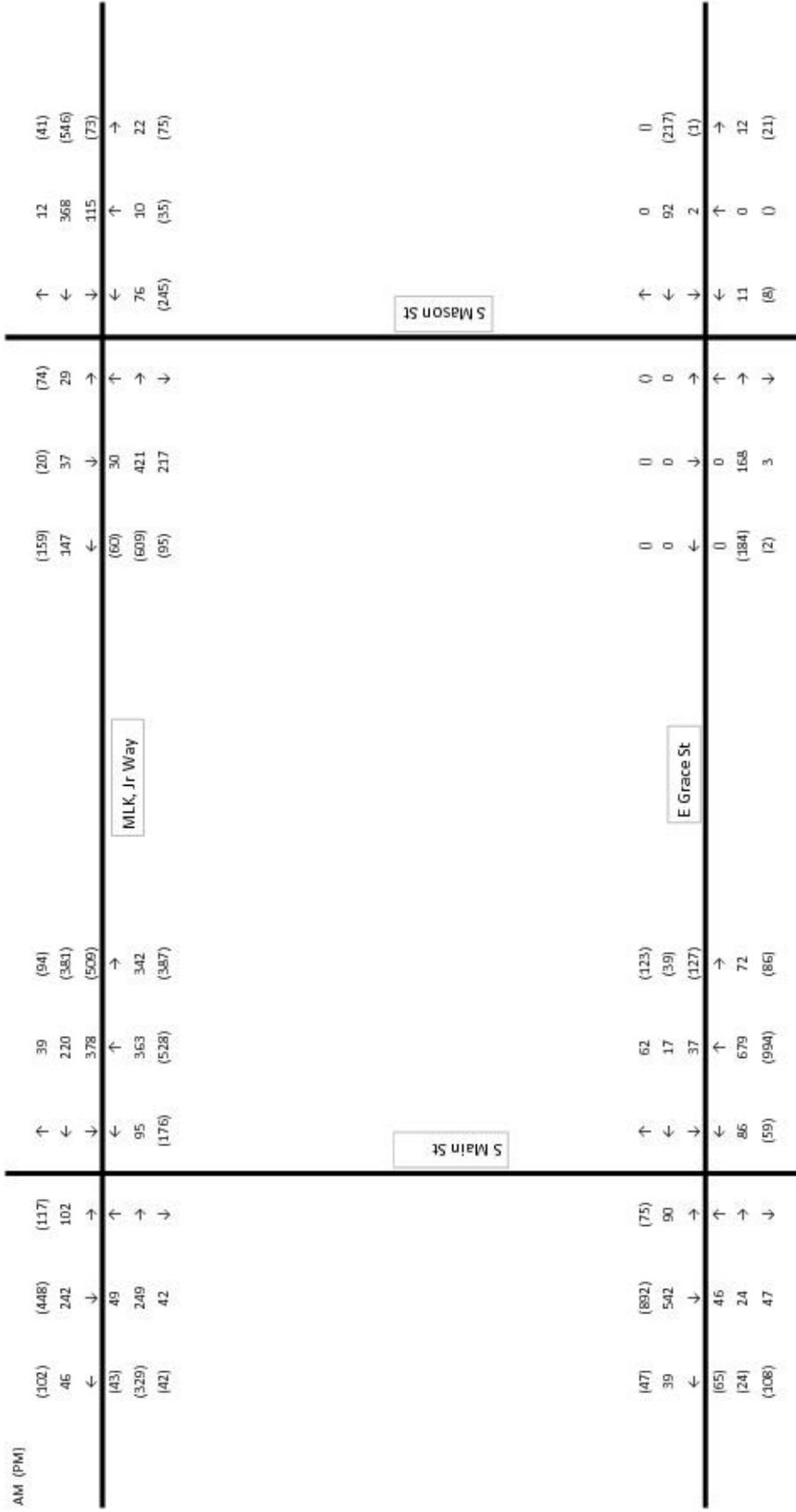


Figure 36 – Total 2016 Peak Hour Turning Movements – Closed S Mason
(vehicles per hour)

Capacity and Levels of Service at Critical Points

The “Total 2016 – Closed S Mason” scenario was analyzed through Synchro to determine the impacts to controlled vehicular delay, associated levels of service, and queue lengths at intersections of interest. The improvements assumed above were analyzed for their effectiveness in mitigating the impact to acceptable levels of service and queue lengths.

Cycle lengths were modified in the PM Peak Hour to meet the longest natural cycle length within the network, and intersection signal timing splits were optimized for both peak hours.

Detailed worksheets from this Synchro analysis of “Total (Closed S Mason) 2016” conditions are presented as Appendix I of this report, while future LOS values for intersections of interest can be found in Figures 37 (AM) and 39 (PM). Peak Hour Queue Analyses can be found in Figures 38 (AM) and 40 (PM).

As can be seen through this analysis, reasonably acceptable levels of service can be reached during morning hours, with only the Grace St approach to the intersection of South Main projected to witness failing levels of service. During the PM peak, however, the entire intersection of Main & Grace fails, and MLK & Main is near failure, as well, with multiple lane groups experiencing failing levels of service. Queue lengths at both of these intersections begin to reach unmanageable levels during the PM peak, as well.

As previously stated, additional improvements have little effect on witnessed delay, and are thus not deemed warranted by this report, despite the failing grades and lengthy queues.

Note: The intersection of MLK & Main could be aided significantly with the addition of an extra dedicated left-turn lane on the westbound approach (presently shared with through movements), as this would allow for the incorporation of standard signal phasing (presently split-phased). Sufficient right-of-way does not exist in this location, however, to construct such a lane without resorting to excessively narrow lanes (10.5'-wide), a loss of raised median, and a loss of bike lane capability. As such, no such modification was included in this report. Should additional right-of-way be possible in the future, it is recommended that such improvements be analyzed at that time.

Post-Build Conditions

Similar efforts were made for the post-buildout year of 2022, whose background re-routed peak hour traffic volumes are presented in Figure 41, and whose total peak hour traffic volumes are presented in Figure 42.

Again, these traffic volumes were loaded into Synchro for peak hour analyses. Detailed worksheets from these analyses are presented in Appendix J. Future LOS values found throughout the study area are presented in Figures 43 (AM) and 45 (PM). Peak Hour Queue Analyses can be found in Figures 44 (AM) and 46 (PM).

As seen in this post-build analysis, conditions can be expected to worsen significantly with the passing years. As background traffic grows, the re-routed traffic from the parking deck that has origin-destination points south of the site (or via Port Rd) now overwhelm the system, affecting multiple intersections that cannot reasonably be improved to accommodate.

In particular, the intersection of S Main & Grace cannot manage due to the additional through movements. Both Grace St approaches fail to reach acceptable levels of service. The intersection of MLK & Main is also very near failure, with many lane groups experiencing levels of service rated at ‘F’.

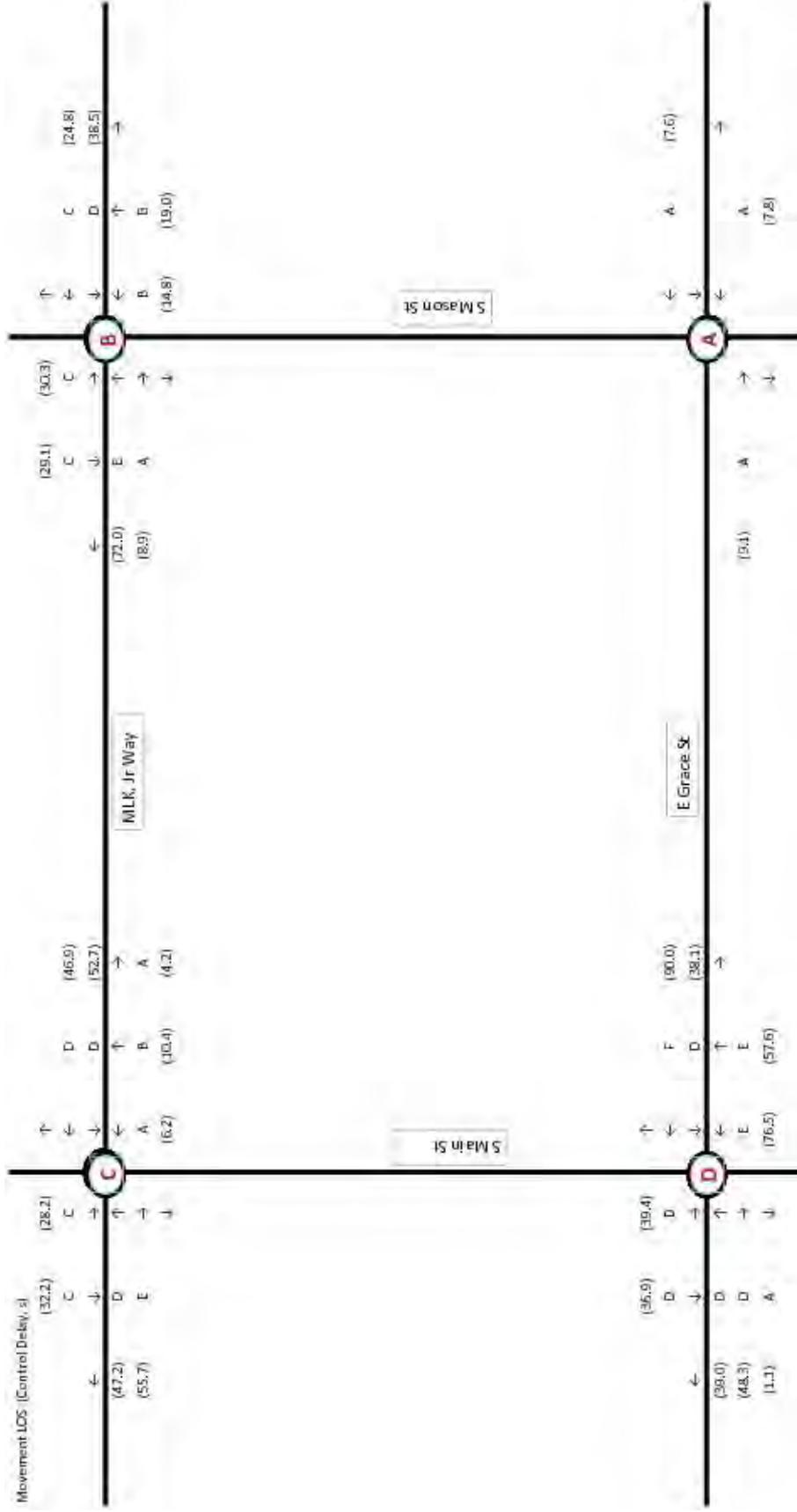


Figure 37 - Total 2016 AM Levels of Service – Closed S Mason

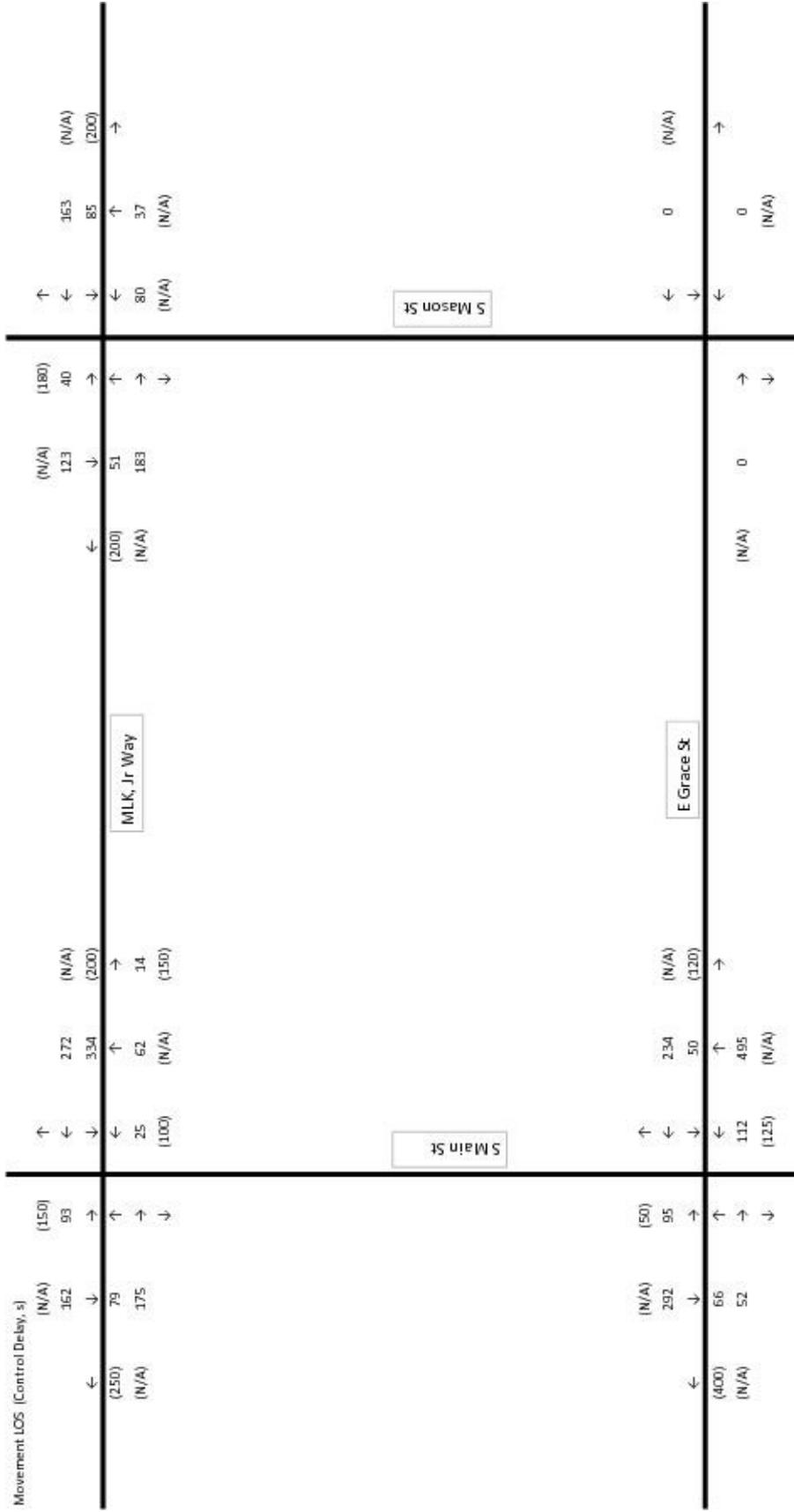


Figure 38 – Total 2016 AM Queue Analysis – Closed S Mason

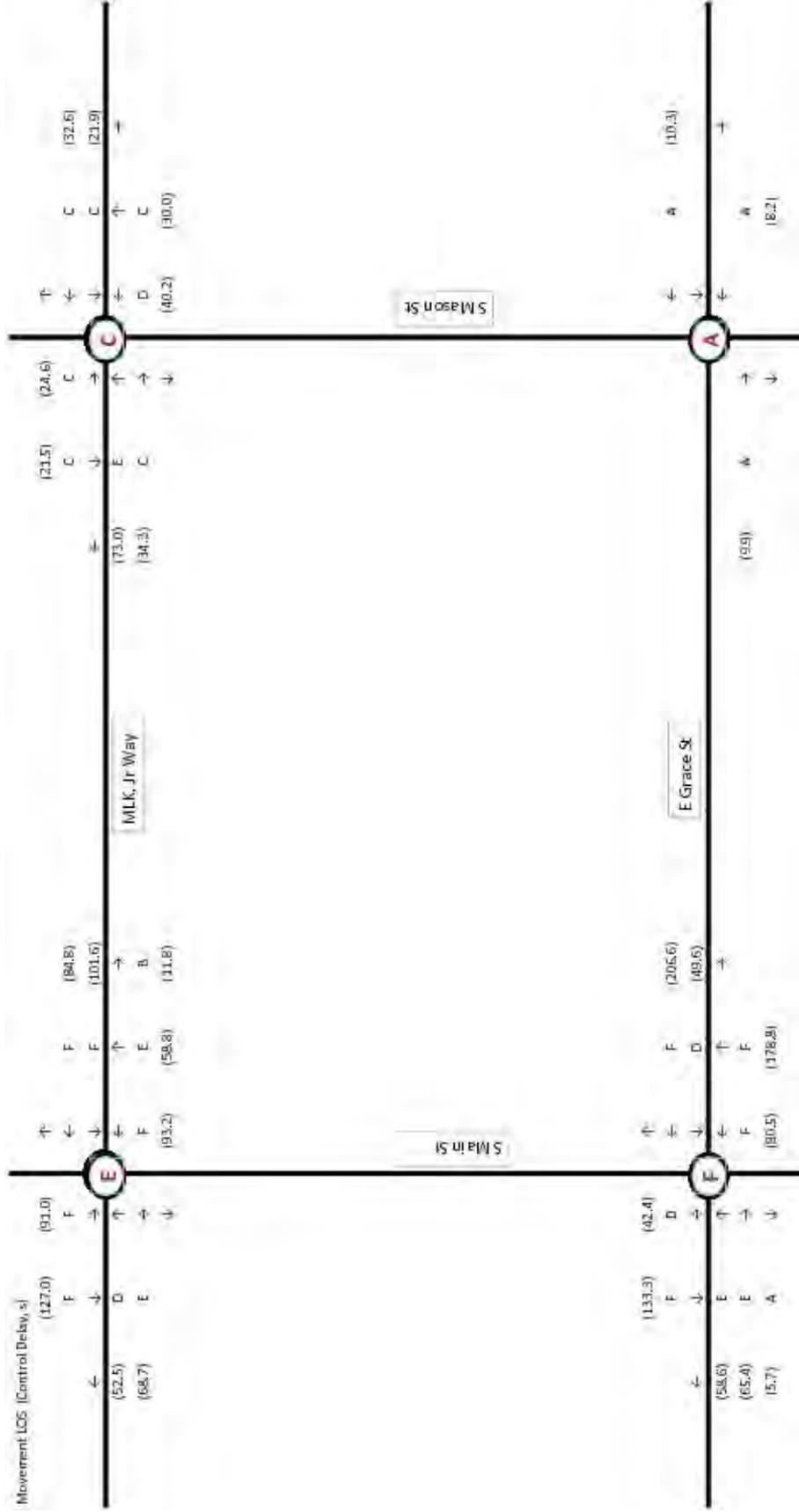


Figure 39 - Total 2016 PM Levels of Service – Closed S Mason

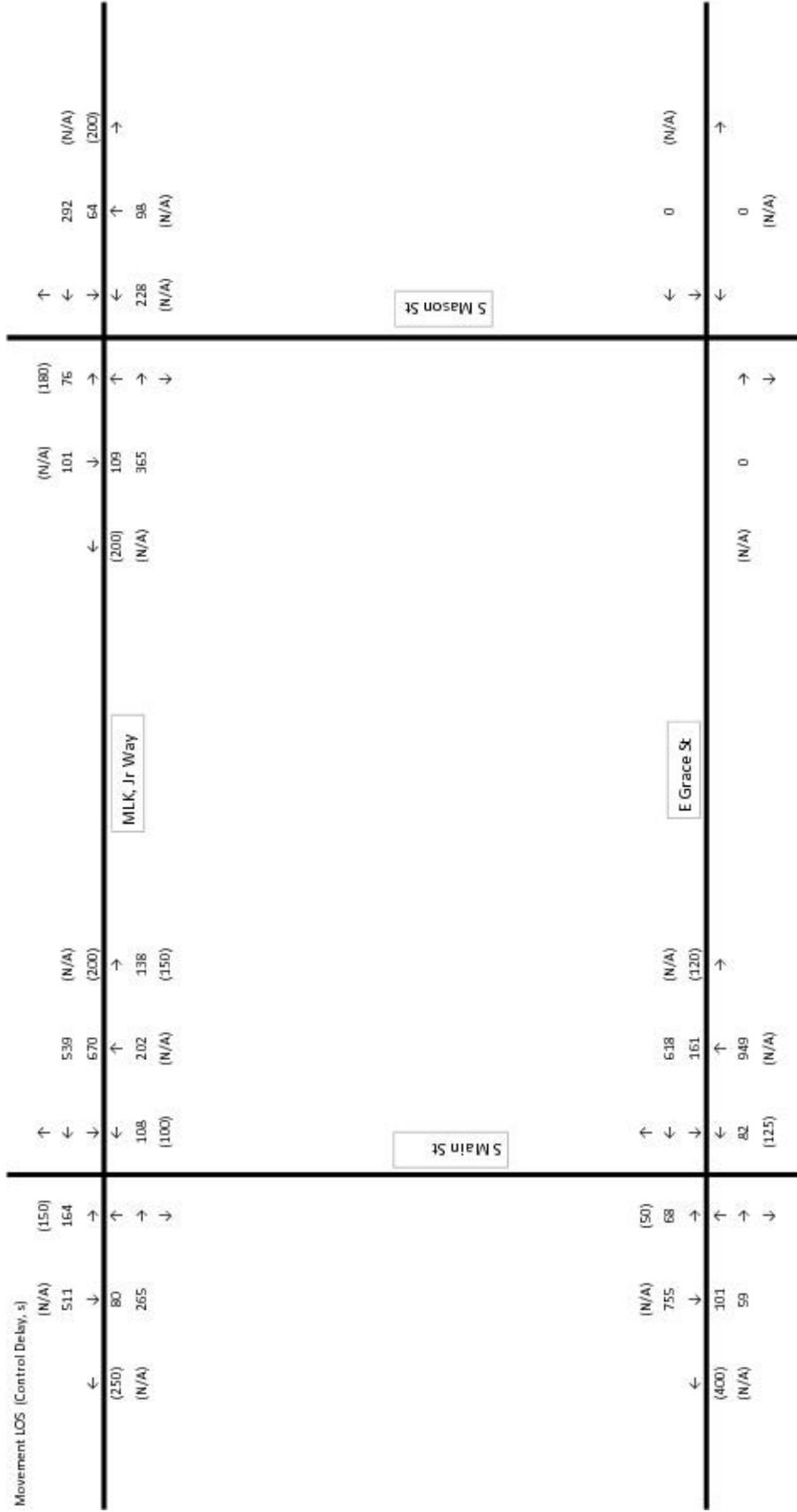


Figure 40 – Total 2016 PM Queue Analysis – Closed S Mason

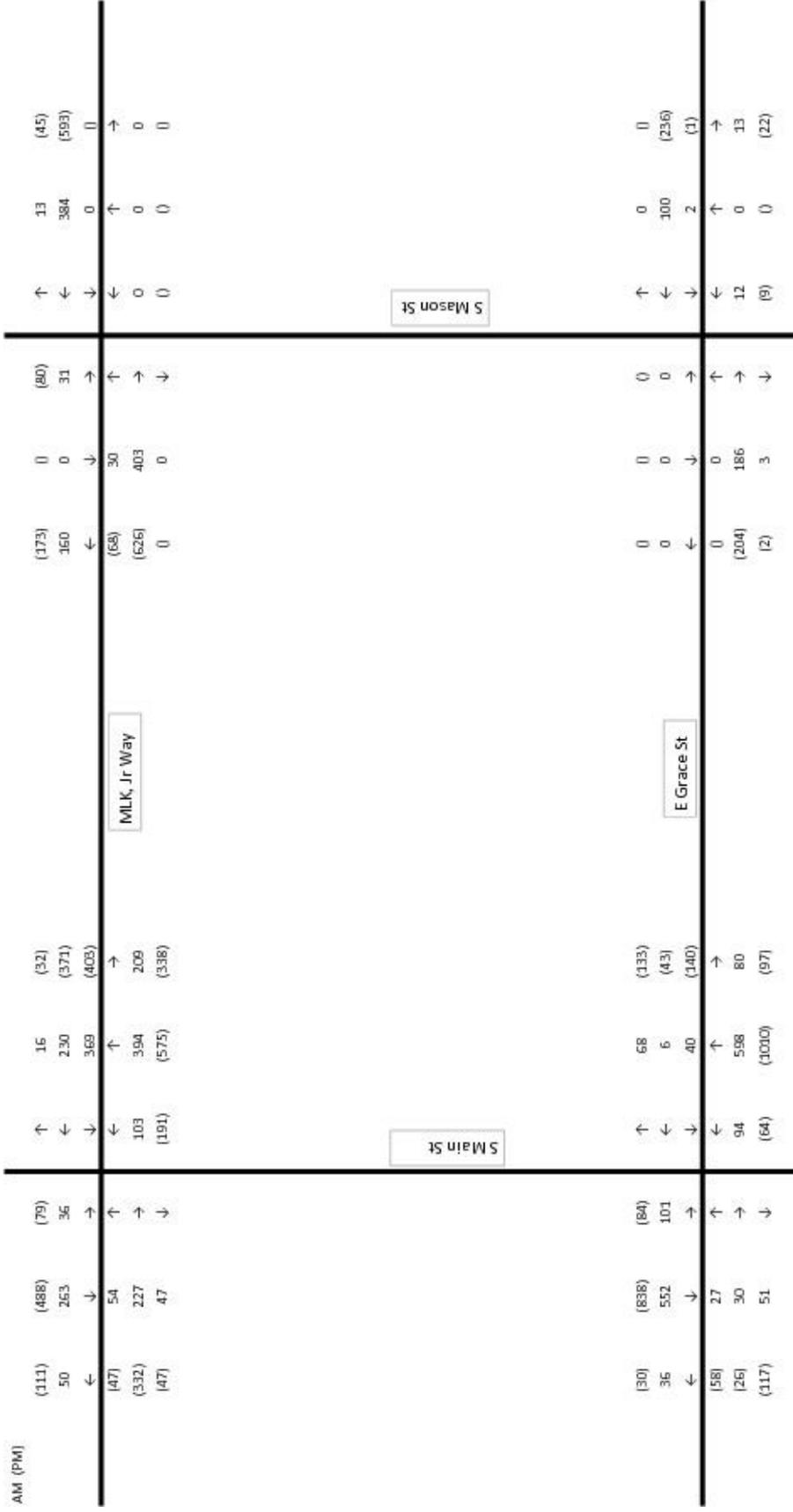


Figure 41 – 2022 Background Peak Hour Turning Movements – Closed S Mason (vehicles per hour)

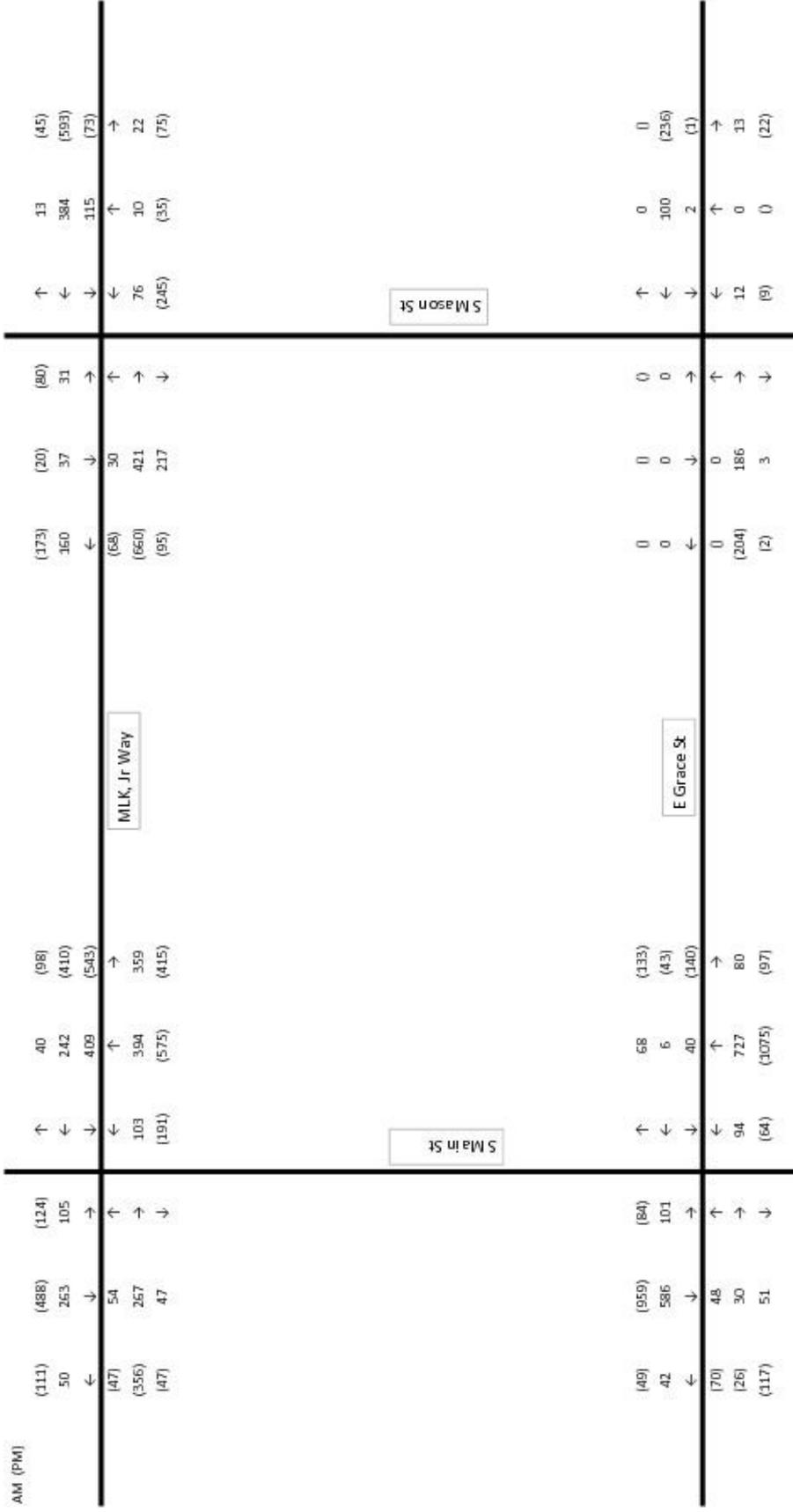


Figure 42 – 2022 Total Peak Hour Turning Movements – Closed S Mason (vehicles per hour)

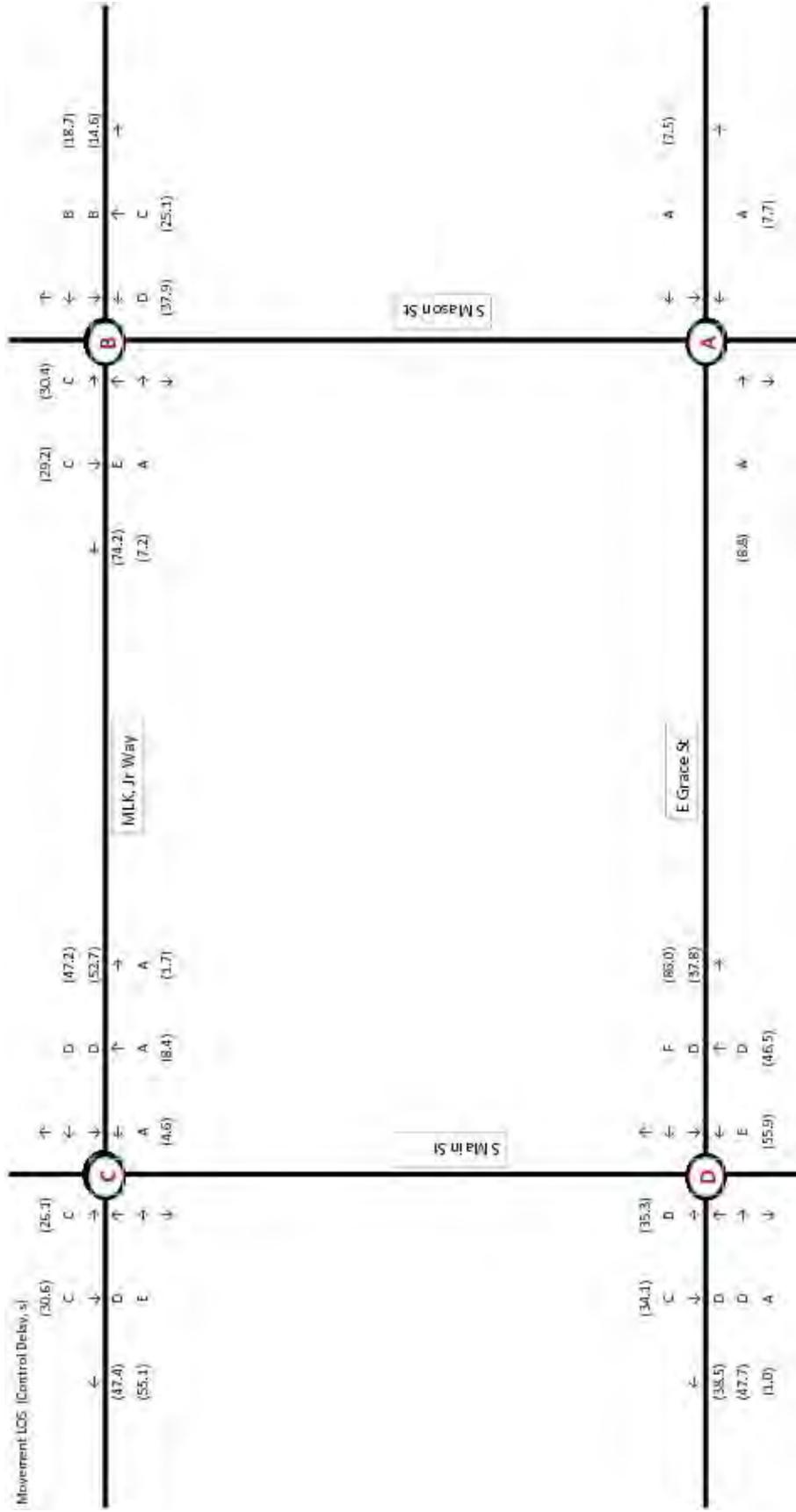


Figure 43 – Total 2022 AM Levels of Service – Closed S Mason

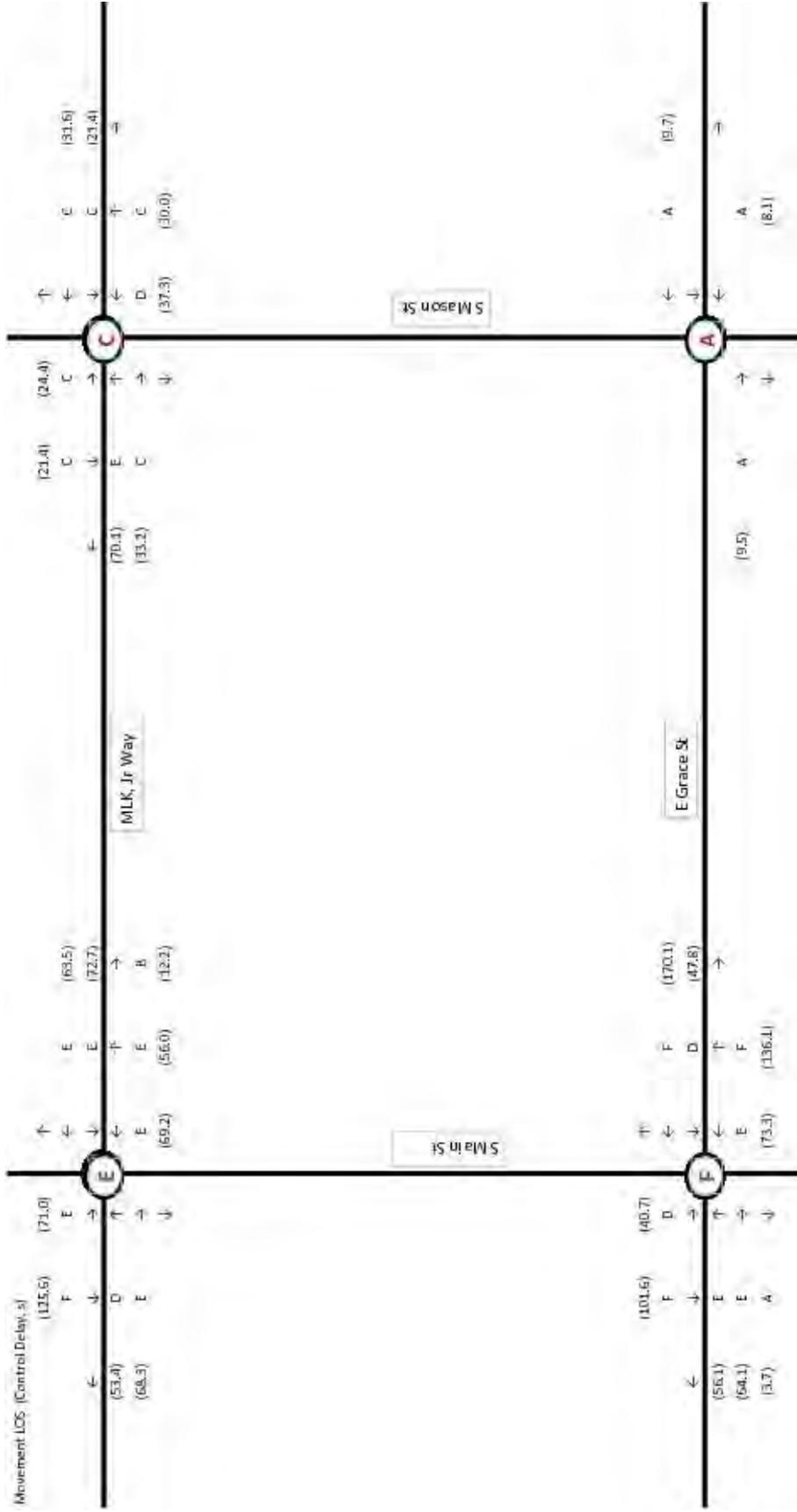


Figure 45 – Total 2022 PM Levels of Service – Closed S Mason

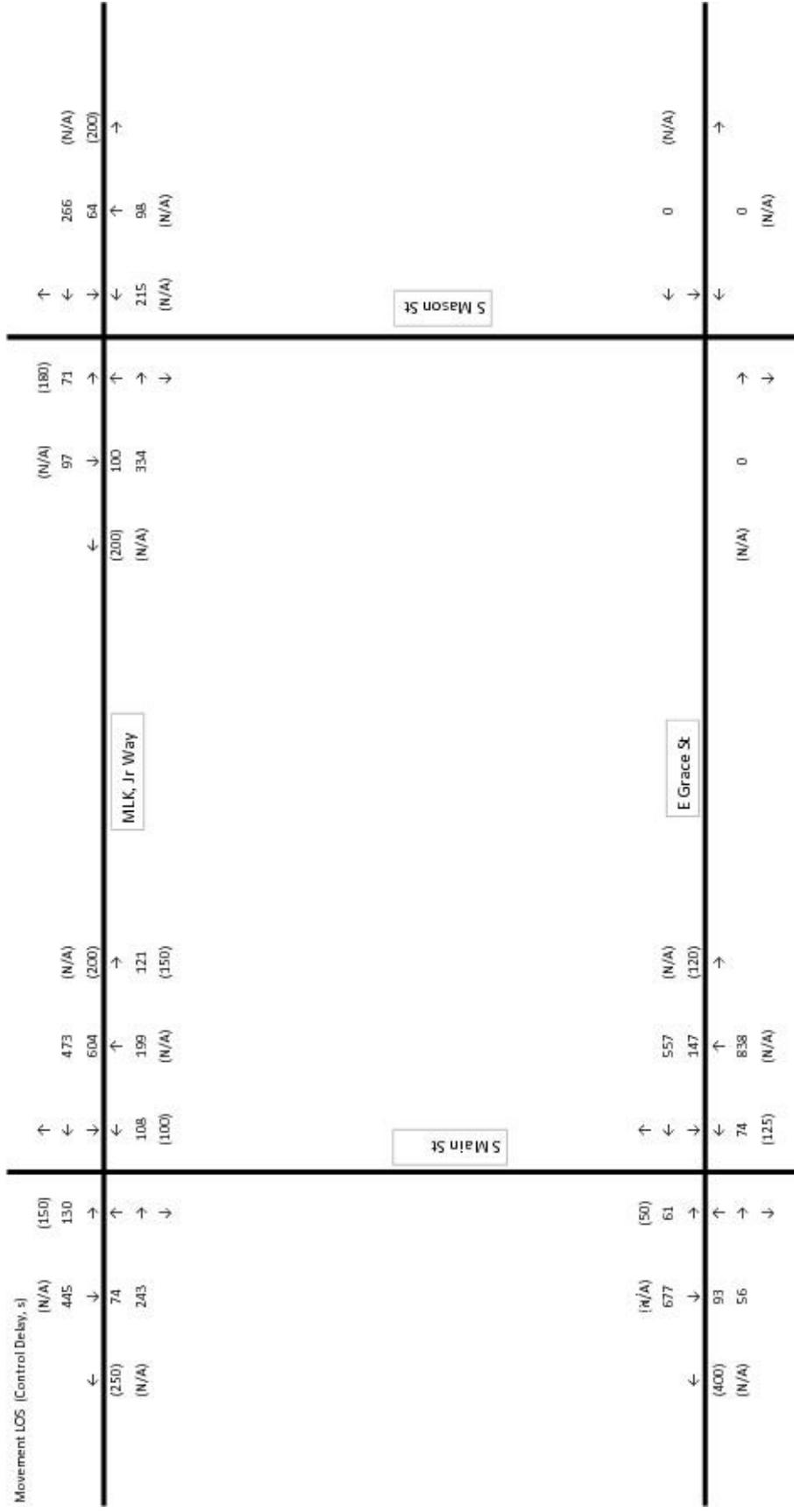


Figure 46 – Total 2022 PM Queue Analysis – Closed S Mason

CRASH ANALYSIS *(performed and provided by City)*

Crash analysis was performed for a one year period from December 2013 to December 2014 for the study area. The analysis only includes incidents for which reports were completed by the Harrisonburg Police Department, which generally reports incidents when there is over \$1,800 worth of estimated damage and/or an injury. The reported incidents are summarized in the table below, with more detail being found in the collision diagrams.

Location	Rear End Collisions	Other Collision Types	Intersection Total
S Main St & Grace St	4	2	6
S Main St & MLK Jr. Way	4	4	8
S Mason St & MLK Jr. Way	3	0	3
MLK Jr. Way & Ott St	1	0	1
TOTAL	12	6	18

It was determined that the majority of incidents were rear end collisions caused by inattention during heavy traffic periods when vehicle queue lengths are longer than average. No fault for these incidents was found on the part of road design, signal timing design, or traffic control devices. Given these findings, this study does not recommend any improvements or design changes to specifically address the reduction of historic, common crash types.

It is, however, recommended that any new entrances be designed in such a way as to minimize the potential for left turn collisions in street segments where long queue lengths are typical. This will be accomplished by restricting left turns from the site onto Martin Luther King, Jr. Way using a concrete median. The entrance from the parking deck onto S Mason St will be placed as far south as possible to minimize conflicts with northbound queues, which are expected to be extensive during evening peak periods and at the conclusion of events. No left turns from the site will be allowed onto S Main St.

Collision reports utilized for the purpose of this crash analysis can be found in Appendix K of this report.

MASS TRANSIT CONSIDERATIONS

Presently, there are five separate bus routes that utilize South Mason for regular service. Closure of a portion of South Mason, as currently being explored by the University, would cause a re-routing of these services unless otherwise mitigated.

In order to continue the encouragement of mass transit ridership, it is recommended that these bus routes continue their current drop-off points at or near the intersection of South Mason & East Grace. If South Mason is closed, gating of pedestrian area could be performed to allow bus-only access. Alternatively, a single one-way lane of traffic may be preserved; though current bus routes travel north on South Mason, these movements could be reversed, if deemed appropriate, and still maintain the pertinent points of service.

PEDESTRIAN ANALYSIS

Pedestrian movements are significant in the study area, and are only expected to increase with the parking deck addition and the construction of a new student residence on West Grace. Allowances are already in place at the intersection of Main & Grace, with the 30-second pedestrian scramble phase, and at the intersection of MLK & Mason, with a 10-second leading pedestrian phase for north-south movements. As previously stated, this report includes a City recommendation for an additional 10-second leading pedestrian phase for north-south movements at the intersection of MLK & Main. Further allowances will likely be necessary, though, along South Mason between MLK and Grace.

The new Mason Street parking deck is expected to serve a variety of uses within JMU's North Campus and Bluestone Area. As such, heavy foot traffic can be expected from the parking deck to uses both east and south. While traffic moving to/from the south will have a defined crossing point that coincides with pedestrian origin-destination lines (across Grace at the existing crosswalk near its intersection with Mason), pedestrians moving to/from destinations to the north will be tempted to cross South Mason at varied points. As this creates an obvious safety concern, it is recommended that additional steps be taken to prevent such uncontrolled pedestrian movements.

Though design specifics for the parking deck have not been finalized, it is understood that an elevator / stair well will be placed at the southeast corner. As this corner will have an exterior pedestrian entrance, it is recommended that design features be incorporated to direct pedestrians to this point (prominent, conspicuous entrance, leading paths lined with vegetation, etc.), in the hopes that they will not utilize the vehicular points of access placed elsewhere along the northern face.

Further, a physical barrier is recommended to prevent pedestrians from crossing South Mason at unintended locations. A semi-transparent decorative fence placed between the sidewalk and curb, measuring a minimum of 36" in height, is preferred, as it would prevent crossings while not posing a criminal ambush point or inhibit sight lines.

Crossings (allowed by openings in the barrier) should be limited to each intersection and one mid-block crossing located under the pedestrian bridge (shown approximately in Figure 47). This mid-block crossing should be well marked, possibly through the incorporation of a speed tray, or a combination of inlaid flashing lights and signage. The second mid-block crossing should be eliminated, due to conflicts with proposed deck access points for vehicular traffic and queuing traffic at the intersection with MLK.



Figure 47 Pedestrian Crossings – South Mason

CONCLUSION

This analysis has shown that significant physical roadway improvements are necessary to mitigate the impact of the proposed hotel / conference center and JMU parking deck at the location specified.

Previously planned and recommended (by the City) turn lanes on South Main and MLK have tremendous benefit to the intersections of South Main & MLK and MLK & South Mason. And while some of the recommended storage lengths appear more than necessary to handle anticipated queues, the stated lengths are beneficial to levels of service (removing turning vehicles from through-stream earlier) and provide future capacity.

The City-recommended improvements do nothing, however, to mitigate the anticipated impact on South Main & Grace. Additional improvements, in the form of dual westbound left-turn lanes and a channelized eastbound right-turn lane on Grace, are deemed warranted due to the increase of witnessed traffic.

In sum, the improvements recommended by this report are as follows:

- 1) Addition of 150' right-turn lane with 100' taper to northbound approach of S Main & MLK
- 2) Addition of 200' left-turn lane with 100' taper to eastbound approach of MLK & S Mason
- 3) Addition of 200' left-turn lane with 100' taper to westbound approach of MLK & S Mason
- 4) Channelize eastbound right-turns from West Grace to allow right-turns on red (RTOR)
- 5) Provide dual westbound left-turn lanes on East Grace with 200' storage, 200' taper
- 6) Incorporate 10-second leading pedestrian phase for north-south movements at MLK & Main

Regarding the potential closure of a portion of South Mason, this analysis has shown that doing so would have a significant impact on multiple intersections that is not easily mitigated to desirable levels of service. In particular, the intersections Main & Grace and MLK & Main can be expected to struggle mightily under the re-routed traffic. The improvements recommended above do not have the same mitigating effect in this scenario. As such, it is strongly recommended that a full closure of a portion of South Mason is *not* incorporated into the overall design. Alternative measures for assisting pedestrian movements near the intersection of South Mason & East Grace should be explored instead.

It is further recommended that significant measures be incorporated along South Mason to properly channel pedestrian flows to designated crossings. The southeast pedestrian entrance to the parking deck should be well marked to deter pedestrians from entering at vehicular entrances, a physical barrier (semi-transparent fence, preferably) should be installed between sidewalk and curb to prevent uncontrolled crossings, and mid-block crossing points should be limited to one to avoid conflicts with entering / exiting / queueing vehicles in the vicinity. The mid-block crosswalk should be well marked, possibly with a speed tray or inlaid flashing markers and signage.

In sum, it is the opinion of this TIA that the impacts of the proposed development can satisfactorily be mitigated by the measures stated. Various comparisons between the multiple scenarios have been provided as Figure 48 of this report, found on the following page.

Rosser Intersection	Existing 2014			Background 2016			Total 2016			Total 2016 - Closed S/Mason			Background 2022			Total 2022			Total 2022 - Closed S/Mason							
	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay	AM Delay	LOS	PM Delay					
S Main & MLK	23.5	C	30.7	C	24.7	C	30.2	C	40.1	D	30.6	C	78.4	E	26.9	C	37.6	D	30.5	C	42.1	D	30.0	C	68.3	E
	46.9	D	68.6	E	47.6	D	70.8	E	54.0	D	66.7	E	67.0	E	48.0	D	73.0	E	54.3	D	66.2	E	54.1	D	66.8	E
	30.5	C	33.2	C	32.8	C	33.3	C	45.7	D	47.8	D	50.3	F	34.8	C	36.3	D	45.0	D	48.9	D	49.0	D	66.6	E
	4.4	A	7.8	A	5.8	A	15.5	B	6.8	A	15.5	B	7.0	A	9.2	A	20.2	C	7.0	A	16.7	B	5.0	A	41.2	D
SB Approach	25.2	C	37.1	D	25.1	C	39.0	D	26.4	C	31.1	C	120.2	F	26.9	C	42.8	D	28.0	C	54.2	D	29.3	C	115.1	F
S Main & Grace	47.1	D	44.0	D	37.9	D	43.3	D	32.7	C	49.1	D	141.0	F	41.3	D	50.6	D	35.4	D	55.2	E	44.3	D	110.5	F
	55.5	E	94.3	F	66.3	E	84.1	F	32.8	C	30.6	C	29.5	C	69.8	E	88.2	F	33.8	C	35.3	D	24.8	C	27.6	C
	44.0	D	55.9	E	50.8	D	88.3	F	58.7	E	66.8	E	146.3	F	52.3	D	107.2	F	58.7	E	79.2	E	73.2	E	123.6	F
	41.7	D	35.2	D	27.2	C	31.4	C	28.6	C	43.3	D	171.8	F	31.7	C	39.2	D	32.6	C	48.4	D	47.8	D	131.6	F
SB Approach	53.0	D	39.4	D	43.1	D	34.2	C	30.1	C	50.0	D	127.4	F	45.6	D	37.5	D	32.4	C	54.1	D	34.2	C	97.8	F
MLK & S Mason	35.1	D	45.3	D	35.3	D	45.6	D	21.9	C	30.0	C	33.5	C	37.2	D	47.8	D	23.1	C	31.8	C	17.2	B	32.4	C
	38.5	D	39.9	D	43.2	D	52.9	D	15.7	B	18.0	B	37.5	D	45.7	D	52.5	D	16.6	B	19.9	B	10.2	B	36.1	D
	37.6	D	58.7	E	33.7	C	46.3	D	19.2	B	28.3	C	31.5	C	34.8	C	48.8	D	20.3	C	30.4	C	17.7	B	30.5	C
	19.8	B	44.6	D	19.4	B	44.5	D	21.0	C	54.9	D	34.4	C	19.0	B	49.8	D	20.2	C	57.2	D	34.0	C	35.1	D
SB Approach	28.0	C	27.1	C	27.1	C	28.6	C	47.3	D	30.7	C	22.4	C	30.7	C	33.3	C	48.4	D	31.5	C	29.4	C	22.3	C
S Mason & Grace	7.8	A	9.0	A	7.8	A	9.1	A	9.3	A	10.7	B	10.0	A	8.0	A	9.5	A	9.5	A	11.3	B	8.3	A	9.5	A
	8.4	A	9.8	A	8.5	A	9.9	A	10.6	B	11.5	B	9.9	A	8.7	A	10.4	B	10.9	B	12.2	B	8.8	A	9.5	A
	6.8	A	8.1	A	6.8	A	8.2	A	7.1	A	8.9	A	10.3	B	6.9	A	8.5	A	7.2	A	9.3	A	7.5	A	9.7	A
	7.9	A	8.7	A	7.9	A	8.8	A	8.4	A	9.3	A	8.2	A	8.0	A	9.0	A	8.5	A	9.5	A	7.7	A	8.1	A
SB Approach	8.0	A	9.6	A	8.1	A	9.8	A	8.7	A	11.9	B	8.2	A	8.2	A	10.3	B	8.9	A	12.8	B	8.9	A	8.1	A

Figure 48 – Delay Summary

LIST OF APPENDICES

Appendix

- A TIA Scoping - Assumptions
- B 2014 Traffic Count Data
- C Existing 2014 Synchro Analysis Results
- D Background 2016 Synchro Analysis Results
- E Site Trip Generation & Distribution Calculations
- F Total 2016 Synchro Analysis Results
- G Background 2022 Synchro Analysis Results
- H Total 2022 Synchro Analysis Results
- I Total 2016 Closed S Mason Synchro Analysis
- J Total 2022 Closed S Mason Synchro Analysis Results
- K Collision Reports

APPENDIX A

TIA Scoping - Assumptions



PRE-SCOPE OF WORK MEETING FORM

Information on the Project Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information				
Consultant Name: Tele: E-mail:	Valley Engineering (Seth Roderick, PE) (540) 434-6365 sroderick@valleyesp.com			
Developer/Owner Name: Tele: E-mail:	City of Harrisonburg, Public Works (Tom Hartman, PE) (540) 434-5928 Tom.Hartman@harrisonburgva.gov			
Project Information				
Project Name:	Hotel-Conf Center-Parking Deck	Locality/County:	Harrisonburg	
Project Location: <small>(Attach regional and site specific location map)</small>	MLK Jr Way & S Main Street			
Submission Type	Comp Plan <input type="checkbox"/>	Rezoning <input type="checkbox"/>	Site Plan <input checked="" type="checkbox"/>	Subd Plat <input type="checkbox"/>
Project Description: <small>(Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)</small>	Development of a hotel / conference center (dpM) and parking deck (JMU).			
Proposed Use(s): <small>(Check all that apply; attach additional pages as necessary)</small>	Residential <input type="checkbox"/>	Commercial <input type="checkbox"/>	Mixed Use <input type="checkbox"/>	Other <input checked="" type="checkbox"/>
	Residential Uses(s) Number of Units: _____ ITE LU Code(s): _____ _____ _____ Commercial Use(s) ITE LU Code(s): 310 (Hotel) 205 rooms _____ Square Ft or Other Variable: _____		_____ _____ _____ Other Use(s) ITE LU Code(s): _____ _____ _____ Independent Variable(s): CONF CTR PKG DECK _____	
Total Peak Hour Trip Projection:	Less than 100 <input type="checkbox"/>	100 – 499 <input type="checkbox"/>	500 – 999 <input checked="" type="checkbox"/>	1,000 or more <input type="checkbox"/>

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Traffic Impact Analysis Assumptions			
Study Period	Existing Year: 2014	Build-out Year: 2016	Design Year: 2022
Study Area Boundaries (Attach map)	North: MLK Jr Way	South: E Grace Street	
	East: S Mason Street	West: S Main Street	
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	South Main Closure (between E Grace and Parking Deck)		
Consistency With Comprehensive Plan (Land use, transportation plan)	n/a		
Available Traffic Data (Historical, forecasts)	7-day average counts provided by City. See attached.		
Trip Distribution (Attach sketch)	Road Name:	Road Name:	
	Road Name:	Road Name:	
Annual Vehicle Trip Growth Rate:	1.4%	Peak Period for Study (check all that apply)	<input checked="" type="checkbox"/> AM <input checked="" type="checkbox"/> PM <input type="checkbox"/> SAT
		Peak Hour of the Generator	
Study Intersections and/or Road Segments (Attach additional sheets as necessary)	1.MLK & Main	6.	
	2.MLK & Mason	7.	
	3.Main & Grace	8.	
	4.Grace & Mason (only in future no-build scenarios)	9.	
	5.Crash Analysis (by City)	10.	
Trip Adjustment Factors	Internal allowance: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Reduction: _____% trips	Pass-by allowance: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Reduction: _____% trips	
	<input checked="" type="checkbox"/> Synchro <input type="checkbox"/> HCS (v.2000/+) <input type="checkbox"/> aaSIDRA <input type="checkbox"/> CORSIM <input type="checkbox"/> Other _____		
Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	Existing signals at MLK & Main, MLK & Mason, Main & Grace		

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Improvement(s) Assumed or to be Considered	Partial closure of South Mason will be analyzed in future scenarios.
Background Traffic Studies Considered	None applicable.
Plan Submission	<input type="checkbox"/> Master Development Plan (MDP) <input type="checkbox"/> Generalized Development Plan (GDP) <input checked="" type="checkbox"/> Preliminary/Sketch Plan <input type="checkbox"/> Other Plan type (Final Site, Subd. Plan)
Additional Issues to be Addressed	<input checked="" type="checkbox"/> Queuing analysis <input type="checkbox"/> Actuation/Coordination <input type="checkbox"/> Weaving analysis <input type="checkbox"/> Merge analysis <input checked="" type="checkbox"/> Bike/Ped Accommodations <input checked="" type="checkbox"/> Intersection(s) <input type="checkbox"/> TDM Measures <input type="checkbox"/> Other _____

NOTES on ASSUMPTIONS:

a) Trip Generation Rates for parking deck to be based upon utilization rates of adjacent JMU decks.

b) Trip Generation Rate for conference center: 0.50 trips/space (PM, 60/40 in/out),

0.15 trips/space (AM, 80/20 in/out)

--> based upon allocation of 100 spaces

c) LOS goal for signalized intersections is 'D'



SIGNED: _____ DATE: 11/20/14
Applicant or Consultant

PRINT NAME: Seth Roderick, PE
Applicant or Consultant

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

APPENDIX B

2014 Traffic Count Data

File Name: S Main & Grace 09-18-2014 AM.ppd

Start Date: 9/18/2014

Start Time: 7:30:00 AM

Site Code:

Comment 1: Clear conditions.

Comment 2: Trucks include all vehicles with 3+ axles.

Comment 3: Peds counted by crosswalk aligned with adjacent parallel vehicular direction.

Comment 4: Diagonal peds counted by the corner at which crossing was started.

Start Time	S Main St Northbound			S Main St Southbound			W Grace St Eastbound			E Grace St Westbound					
	Left	Thru	Right												
07:30 AM	26	89	83	4	6	93	8	8	15	14	5	3	2	0	373
07:45 AM	19	128	59	1	8	133	12	11	29	30	20	4	2	1	481
08:00 AM	13	100	33	3	8	94	12	1	24	6	13	9	1	2	346
08:15 AM	10	125	26	3	4	94	8	0	20	4	13	4	1	0	326
08:30 AM	12	104	24	1	4	99	3	1	12	6	11	6	1	0	299
08:45 AM	13	126	21	1	3	121	8	3	7	8	9	5	1	2	343
09:00 AM	22	147	27	5	4	148	8	8	15	17	9	3	3	11	439
09:15 AM	33	127	24	9	4	107	13	14	12	38	26	5	11	10	442
09:30 AM	13	90	25	3	0	100	3	1	17	7	14	4	0	2	290
09:45 AM	14	160	17	1	0	102	6	2	11	12	9	7	2	0	355
Peah Hour Factor	0.61	0.86	0.89		0.94	0.80	0.62		0.75	0.77	0.53	0.79	0.36		0.86
Peak cars/peds	80	504	96	16	15	475	32	26	46	69	55	19	16	23	1389
Peak trucks/bikes	4	31	1	4	1	19	0	3	0	7	0	1	1	4	58
Grand Total Vehicles	84	535	97	16	16	494	32	24	46	55	55	20	17	1447	1447
Heavy Vehicle %	4.8%	5.8%	1.0%	6.3%	6.3%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.9%		

File Name: S Main & Grace 09-18-2014 PM.ppd

Start Date: 9/18/2014

Start Time: 3:45:00 PM

Site Code:

Comment 1: Clear conditions

Comment 2: Peds counted by crosswalk aligned with adjacent parallel vehicular direction.

Comment 3: Diagonal peds counted by the corner at which crossing was started.

Comment 4: Trucks include all 3+ axle vehicles.

Start Time	S Main St Northbound			S Main St Southbound			W Grace St Eastbound			E Grace St Westbound							
	Left	Thru	Right	Peds													
03:45 PM	12	177	17	5	2	140	6	0	15	10	22	23	34	7	4	3	477
04:00 PM	12	178	25	3	5	173	4	0	18	14	22	12	36	12	6	8	528
04:15 PM	16	182	25	7	3	182	4	1	15	4	15	11	22	6	5	4	502
04:30 PM	11	181	21	11	2	163	11	14	14	4	26	26	41	3	4	4	536
04:45 PM	16	215	39	4	5	189	8	4	15	9	31	33	36	11	3	5	623
05:00 PM	10	257	27	5	2	199	2	1	11	11	20	13	57	23	10	8	656
05:15 PM	14	234	23	4	3	183	6	2	12	3	20	9	40	12	4	3	568
05:30 PM	14	177	25	4	5	169	4	4	4	3	18	9	24	12	6	1	481
05:45 PM	10	197	22	7	4	143	6	1	4	5	12	9	24	4	2	5	455
Peah Hour Factor	0.86	0.88	0.71	0.75	0.75	0.94	0.61	0.86	0.86	0.55	0.76	0.76	0.82	0.67	0.75	0.88	0.88

Trucks & Bikes

0	8	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	1
2	2	0	1	0	4	0	0	0	0	0	0	4	0	0	0	0	3
0	0	0	2	0	5	0	0	1	0	0	0	3	0	0	0	1	1
0	4	0	1	0	1	0	0	0	0	0	0	2	0	0	0	0	2

Transit Buses & Diagonal Peds

3	0	0	5	0	1	0	0	0	0	0	2	1	0	0	0	0	2
1	1	5	5	0	2	0	0	1	0	0	4	1	2	0	0	0	0
2	0	0	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0
2	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0

Diagonal Bikes

0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	1
0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Totals

14	189	21	16	2	166	11	14	14	4	29	27	34	41	3	4	6	6
19	219	44	9	5	195	8	5	15	9	35	34	38	38	11	3	5	5
12	257	27	7	2	205	2	1	11	11	21	13	57	57	23	10	8	8
12	239	23	4	3	184	6	4	12	3	20	9	40	40	12	4	3	3
57	904	115	36	12	750	27	24	52	27	105	83	176	176	49	21	22	22

04:30 PM

Bikes

Bikes

Bikes

Bikes

File Name: S Main & MLK 11-04-2014 AM.ppd

Start Date: 11/4/2014

Start Time: 7:30:00 AM

Site Code:

Comment 1: Clear conditions.

Comment 2: Trucks defined as vehicles with 3+ axes

Comment 3:

Comment 4:

Start Time	S Main St Northbound			S Main St Southbound			MLK Jr Way Eastbound			MLK Jr Way Westbound			MLK	Grace	Mason/MLK	Total			
	Left	Thru	Right					Peds											
07:30 AM	13	55	32	4	11	56	6	14	84	17	4	57	33	4	2	396	373	-	-
07:45 AM	17	69	28	1	6	58	8	9	62	13	1	86	52	4	2	424	481	-	-
08:00 AM	15	75	21	3	7	54	8	10	46	8	0	46	31	6	1	331	346	241	918
08:15 AM	15	77	20	2	4	51	9	9	38	9	1	34	33	3	0	308	326	236	870
08:30 AM	17	63	23	4	13	46	8	2	50	11	1	46	40	5	1	345	299	274	918
08:45 AM	16	91	47	8	7	61	7	4	47	18	1	62	67	3	1	451	543	346	1140
09:00 AM	17	59	58	10	8	63	10	6	66	14	3	74	43	6	4	449	439	347	1235
09:15 AM	16	98	47	10	9	53	20	8	46	5	0	61	59	3	2	451	442	377	1270
09:30 AM	18	93	32	1	9	57	13	7	42	8	2	40	54	4	1	394	290	231	915
09:45 AM	22	88	38	1	14	62	16	1	45	11	1	29	46	9	1	395	355	229	979
Peak Hour Factor	0.97	0.79	0.75		0.71	0.88	0.56	0.80	0.79	0.67		0.82	0.78	0.71		0.94			
Peak cars/peds	66	311	175	32	37	223	45	48	209	48	5	243	209	17	8	1631			65
Peak trucks/bikes	4	31	1	4	1	19	0	3	0	0	7	0	1	1	4	58			18
Transit buses	2	1	0	0	0	3	0	0	1	0	0	3	0	1	0	11			
Grand Total Vehicles	70	342	176		38	242	45	48	209	48		243	210	18		1689			
Heavy Vehicle %	5.7%	9.1%	0.6%		2.6%	7.9%	0.0%	0.0%	0.0%	0.0%		0.0%	0.5%	5.6%					

File Name: S Main & Grace 10-02-2014 AM.ppd

Start Date: 10/2/2014

Start Time: 7:45:00 AM

Site Code:

Comment 1:

Comment 2:

Comment 3:

Comment 4:

Start Time	MASON Northbound			MASON Southbound			GRACE Eastbound			GRACE Westbound			Vehicles	Bikes	
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
07:45 AM	5	5	2	0	67	11	5	64	1	2	0	7	6	0	186
08:00 AM	2	2	1	0	32	7	11	24	1	1	0	13	10	0	121
08:15 AM	1	0	1	0	23	1	4	22	0	0	0	5	7	0	71
08:30 AM	3	2	1	1	9	2	5	21	1	2	0	11	8	0	68
08:45 AM	1	2	0	1	10	2	5	15	1	0	2	10	7	1	61
09:00 AM	1	0	0	1	12	8	5	21	1	2	0	12	10	0	82
09:15 AM	6	6	1	1	12	7	10	18	0	2	0	13	19	5	110
09:30 AM	3	4	2	1	12	6	7	15	0	0	1	15	10	2	99
Peak Hour Factor	0.46	0.42	0.50	0.90	0.50	0.58	0.63	0.89	0.75	0.25	0.88	0.58	0.73		

Peak Vehicles/Bikes 11 10 2 4 43 2 23 19 25 75 3 6 2 46 44 6 286 35

Peak Pedestrians 110 178 31 20 339

File Name: Mason & MLK 09-11-2014 AM.ppd

Start Date: 9/11/2014

Start Time: 8:30:00 AM

Site Code:

Comment 1: Clear conditions.

Comment 2: Trucks defined as vehicles with 3+ axles

Comment 3:

Comment 4:

Start Time	S Mason St Northbound			S Mason St Southbound			Martin Luther King, Jr. Way Eastbound			Martin Luther King, Jr. Way Westbound			Cars	Peds	
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
08:30 AM	0	3	10	2	3	12	21	9	7	102	1	15	72	1	0
08:45 AM	2	3	14	21	6	9	29	15	4	97	5	19	92	4	0
09:00 AM	5	3	10	21	12	6	37	22	6	100	6	18	90	2	0
09:15 AM	3	4	21	28	6	11	27	33	6	78	5	20	91	5	1
Peak Hour Factor	0.50	0.81	0.65		0.56	0.79	0.77		0.82	0.92	0.71	0.90	0.94	0.60	0.93
Peak cars/peds	10	13	55	72	27	38	114	79	23	377	17	6	72	12	1
Peak trucks/bikes	0	0	1	3	1	0	0	36	0	16	0	3	0	0	3
Transit buses	2	0	3	0	0	0	0	0	0	1	0	0	0	0	8
Grand Total Vehicles	12	13	59	28	28	38	114	394	23	394	17	72	358	12	1140
Heavy Vehicle %	0.0%	0.0%	1.7%	3.6%	0.0%	0.0%	0.0%	4.1%	0.0%	4.1%	0.0%	0.0%	3.1%	0.0%	0.0%

File Name: Mason & MLK PM 09-11-2014.ppd

Start Date: 9/11/2014

Start Time: 4:00:00 PM

Site Code:

Comment 1: Light rain at times - clear conditions through most of count

Comment 2: Trucks classified as all vehicles over 2 axles

Comment 3:

Comment 4:

Start Time	S Mason St Northbound			S Mason St Southbound			MLK Way Eastbound			MLK Way Westbound			Cats	Peds	150		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right				Trucks	Bikes
16:00	5	9	37	7	14	37	0	16	149	6	3	0	18	104	5	0	441
16:15	8	13	26	6	6	22	2	8	127	3	1	0	15	115	10	1	381
16:30	0	11	29	1	21	5	37	1	13	146	4	6	16	135	2	0	455
16:45	12	10	31	7	17	10	30	4	12	127	6	1	25	131	11	0	482
17:00	10	9	39	4	15	6	41	1	14	146	8	1	0	141	16	0	513
17:15	7	10	38	12	3	19	7	47	11	147	4	1	17	124	11	1	466
17:30	6	7	18	6	4	13	7	31	102	0	3	0	20	105	10	0	353
17:45	2	9	33	11	6	15	8	34	100	4	1	0	19	113	7	0	392
18:00	5	5	20	15	1	12	11	43	115	2	2	0	13	117	9	1	386
18:15	3	12	28	21	10	8	7	31	96	7	1	0	27	108	12	1	395
18:30	3	8	13	21	3	11	9	15	108	7	3	0	24	112	4	1	355
18:45	4	3	25	20	2	8	9	17	96	3	2	0	31	104	9	0	358
Peak Hour Factor	0.60	0.91	0.88		0.86	0.70	0.82		0.89	0.96	0.69		0.72	0.94	0.63		0.93
Peak cars/peds	29	40	137	95	72	28	154	45	50	550	22	9	72	524	39	1	1717
Peak trucks/bikes	0	0	0	15	0	0	1	6	0	16	0	1	0	7	1	2	24
Grand Total Vehicles	29	40	137	155	72	28	155	22	50	566	22	40	72	531	40	2	1742
Heavy Vehicle %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%	1.3%	2.5%		

APPENDIX C

Existing 2014 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	48	209	48	243	210	18	70	342	176	38	242	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			1.00			0.98			0.99	
Frt		0.968			0.991			0.947			0.966	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1841	3544	0	1684	3425	0	1728	3204	0	1770	3287	0
Flt Permitted	0.950			0.950	0.987		0.524			0.308		
Satd. Flow (perm)	1841	3544	0	1684	3425	0	953	3204	0	574	3287	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			5			84			31	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			32			20
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	60	265	72	296	269	25	72	433	235	54	275	80
Shared Lane Traffic (%)				35%								
Lane Group Flow (vph)	60	337	0	192	398	0	72	668	0	54	355	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	34.4		14.4	34.4	
Total Split (s)	31.0	31.0		33.0	33.0		15.0	35.0		15.0	35.0	
Total Split (%)	27.2%	27.2%		28.9%	28.9%		13.2%	30.7%		13.2%	30.7%	
Maximum Green (s)	24.0	24.0		25.8	25.8		7.6	27.6		7.6	27.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	5	5		8	8			32			20	
Act Effct Green (s)	16.2	16.2		20.1	20.1		50.5	44.2		49.9	43.9	
Actuated g/C Ratio	0.14	0.14		0.18	0.18		0.44	0.39		0.44	0.39	
v/c Ratio	0.23	0.64		0.65	0.66		0.15	0.52		0.16	0.28	
Control Delay	43.6	47.5		33.7	29.0		4.3	4.4		20.2	25.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	43.6	47.5		33.7	29.0		4.3	4.4		20.2	25.9	
LOS	D	D		C	C		A	A		C	C	
Approach Delay		46.9			30.5			4.4			25.2	
Approach LOS		D			C			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 67 (59%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 23.5
 Intersection LOS: C
 Intersection Capacity Utilization 73.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 1: South Main Street & MLK Jr Way

15 s	35 s	33 s	31 s
15 s	35 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	24	27	46	55	20	17	84	535	97	16	494	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.906			0.902			0.978			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1670	0	1850	1643	0	1702	3307	0	1686	3399	0
Flt Permitted	0.710			0.518			0.146			0.255		
Satd. Flow (perm)	1329	1670	0	1009	1643	0	262	3307	0	453	3399	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	28	36	60	104	25	47	138	622	109	17	618	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	96	0	104	72	0	138	731	0	17	670	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/2/2015

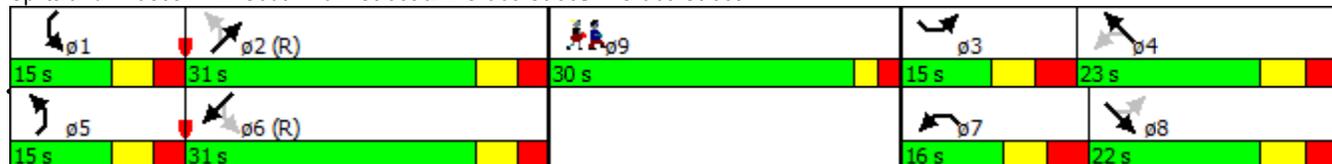


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	22.0		16.0	23.0		15.0	31.0		15.0	31.0	
Total Split (%)	13.2%	19.3%		14.0%	20.2%		13.2%	27.2%		13.2%	27.2%	
Maximum Green (s)	7.6	14.6		8.6	15.6		8.7	24.7		8.7	24.7	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	18.7	11.4		20.6	15.3		41.3	37.7		34.3	27.2	
Actuated g/C Ratio	0.16	0.10		0.18	0.13		0.36	0.33		0.30	0.24	
v/c Ratio	0.11	0.57		0.43	0.33		0.64	0.67		0.08	0.83	
Control Delay	33.5	62.0		40.7	48.7		54.4	39.3		29.8	53.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.5	62.0		40.7	48.7		54.4	39.3		29.8	53.6	
LOS	C	E		D	D		D	D		C	D	
Approach Delay		55.5			44.0			41.7			53.0	
Approach LOS		E			D			D			D	

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 59 (52%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 47.1 Intersection LOS: D
 Intersection Capacity Utilization 50.1% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street



Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	26%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	134
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.93			1.00			0.97	
Frt		0.861			0.899			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1468	0	1770	1553	0	1770	3527	0	1770	3303	0
Flt Permitted	0.661			0.739			0.353			0.350		
Satd. Flow (perm)	1149	1468	0	1377	1553	0	658	3527	0	652	3303	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			27			2			37	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Adj. Flow (vph)	17	2	26	7	13	27	218	761	12	25	473	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	28	0	7	40	0	218	773	0	25	610	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015

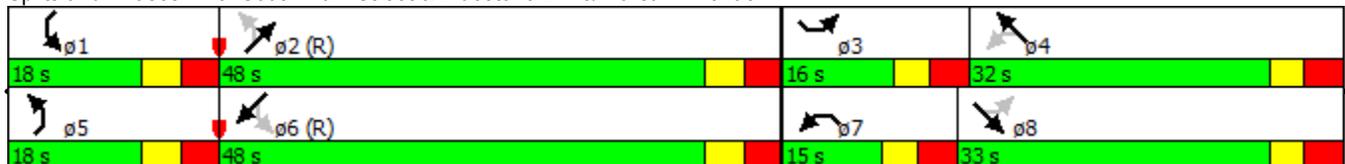


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	16.0	33.0		15.0	32.0		18.0	48.0		18.0	48.0	
Total Split (%)	14.0%	28.9%		13.2%	28.1%		15.8%	42.1%		15.8%	42.1%	
Maximum Green (s)	9.5	26.5		8.5	25.5		11.4	41.4		11.4	41.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	18.6	17.1		17.1	14.3		82.6	76.9		74.1	67.1	
Actuated g/C Ratio	0.16	0.15		0.15	0.13		0.72	0.67		0.65	0.59	
v/c Ratio	0.08	0.12		0.03	0.18		0.38	0.32		0.05	0.31	
Control Delay	31.7	14.0		29.0	20.8		8.6	11.9		11.9	13.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.7	14.0		29.0	20.8		8.6	11.9		11.9	13.3	
LOS	C	B		C	C		A	B		B	B	
Approach Delay		20.7			22.0			11.2			13.3	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 57 (50%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 12.5
 Intersection Capacity Utilization 67.8%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 3: South Main Street & Bluestone Drive/Warsaw Avenue



Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955						0.982				
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1779	0	1652	1739	0	0	1752	0	0	1863	0
Flt Permitted				0.586				0.958				
Satd. Flow (perm)	0	1779	0	1019	1739	0	0	1752	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		14										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Adj. Flow (vph)	0	28	14	18	350	0	112	0	17	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	42	0	18	350	0	0	129	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8
Permitted Phases				2								

Lanes, Volumes, Timings

4: Harrison Street & Warsaw Avenue

2/2/2015

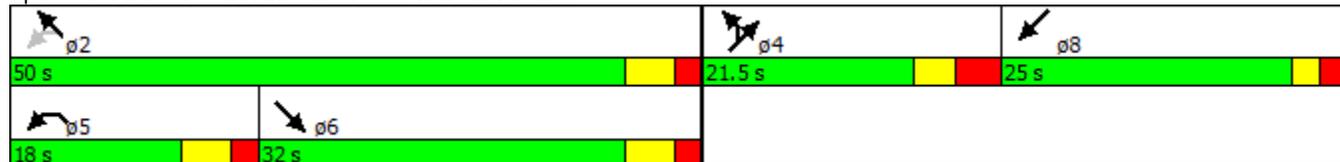


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		32.0		18.0	50.0		21.5	21.5			25.0	
Total Split (%)		33.2%		18.7%	51.8%		22.3%	22.3%			25.9%	
Maximum Green (s)		26.4		12.4	44.4		15.2	15.2			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		24.9		24.6	26.7			10.5				
Actuated g/C Ratio		0.46		0.45	0.49			0.19				
v/c Ratio		0.05		0.03	0.41			0.38				
Control Delay		16.4		16.2	18.5			27.6				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		16.4		16.2	18.6			27.6				
LOS		B		B	B			C				
Approach Delay		16.4			18.4			27.6				
Approach LOS		B			B			C				

Intersection Summary

Area Type: Other
 Cycle Length: 96.5
 Actuated Cycle Length: 54.3
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.41
 Intersection Signal Delay: 20.5
 Intersection LOS: C
 Intersection Capacity Utilization 33.5%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/2/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1505	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			262		4				233			346
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Adj. Flow (vph)	36	445	262	147	299	12	33	220	49	155	224	502
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	445	262	147	311	0	33	220	49	155	224	502
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

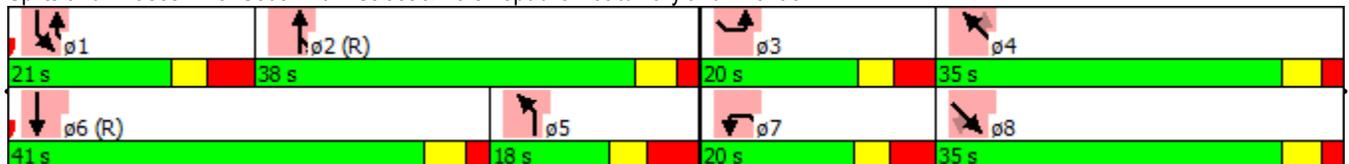
2/2/2015

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	18.0	38.0	38.0	21.0	41.0		20.0	35.0	35.0	20.0	35.0	21.0
Total Split (%)	15.8%	33.3%	33.3%	18.4%	36.0%		17.5%	30.7%	30.7%	17.5%	30.7%	18.4%
Maximum Green (s)	10.3	32.4	32.4	13.9	35.4		13.5	29.5	29.5	13.1	29.5	13.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	9.0	52.7	52.7	10.6	59.5		8.2	15.2	15.2	10.4	23.3	32.2
Actuated g/C Ratio	0.08	0.46	0.46	0.09	0.52		0.07	0.13	0.13	0.09	0.20	0.28
v/c Ratio	0.26	0.27	0.30	0.46	0.17		0.28	0.48	0.12	0.49	0.31	0.73
Control Delay	53.5	21.9	4.4	55.6	8.0		55.7	47.9	0.6	54.3	39.7	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.5	21.9	4.4	55.6	8.0		55.7	47.9	0.6	54.3	39.7	15.6
LOS	D	C	A	E	A		E	D	A	D	D	B
Approach Delay		17.2			23.3			41.1			28.6	
Approach LOS		B			C			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 25.6
 Intersection LOS: C
 Intersection Capacity Utilization 76.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	23	394	17	72	358	12	12	13	59	28	38	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.85			0.84	
Frt		0.994			0.996			0.877			0.887	
Flt Protected		0.997			0.992		0.950			0.950		
Satd. Flow (prot)	0	3343	0	0	3549	0	1778	1367	0	1596	1298	0
Flt Permitted		0.997			0.992		0.484			0.707		
Satd. Flow (perm)	0	3343	0	0	3549	0	906	1367	0	1187	1298	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			2			63			111	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			72			79
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	25	428	18	77	381	13	13	14	63	30	41	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	471	0	0	471	0	13	77	0	30	164	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt		NA
Protected Phases	8	8		4	4		5	2		1		6
Permitted Phases							2			6		
Detector Phase	8	8		4	4		15	2		15		6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0		7.0
Minimum Split (s)	27.5	27.5		28.9	28.9		13.3	23.0		13.3		23.0
Total Split (s)	35.0	35.0		31.0	31.0		15.0	23.0		15.0		23.0
Total Split (%)	30.7%	30.7%		27.2%	27.2%		13.2%	20.2%		13.2%		20.2%
Maximum Green (s)	29.6	29.6		24.1	24.1		8.7	16.7		8.7		16.7
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5		3.5
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8		2.8
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)		5.4			6.9		6.3	6.3		6.3		6.3
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0		1.0
Recall Mode	Max	Max		C-Max	C-Max		None	None		None		None
Walk Time (s)	5.0	5.0		5.0	5.0			0.0				0.0
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			14.0				16.0
Pedestrian Calls (#/hr)	6	6		1	1			72				79
Act Effct Green (s)		29.6			32.5		22.7	14.3		22.7		14.3
Actuated g/C Ratio		0.26			0.29		0.20	0.13		0.20		0.13
v/c Ratio		0.54			0.47		0.05	0.34		0.11		0.63
Control Delay		38.5			37.6		25.4	18.9		26.8		28.2
Queue Delay		0.0			0.0		0.0	0.0		0.0		0.0
Total Delay		38.5			37.6		25.4	18.9		26.8		28.2
LOS		D			D		C	B		C		C
Approach Delay		38.5			37.6			19.8				28.0
Approach LOS		D			D			B				C

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 96 (84%), Referenced to phase 4:NWTL, Start of 1st Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.63
 Intersection Signal Delay: 35.1
 Intersection Capacity Utilization 65.5%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service C

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø4 (R)	 ø8
15 s	10 s	23 s	31 s	35 s
 ø5	 ø10	 ø6		
15 s	10 s	23 s		

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	9%	9%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Intersection Summary		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	25	75	3	2	46	44	11	10	2	43	2	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996				0.850		0.987			0.954	
Flt Protected		0.988			0.998			0.977			0.970	
Satd. Flow (prot)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Flt Permitted		0.988			0.998			0.977			0.970	
Satd. Flow (perm)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	20		31	31		20	178		110	110		178
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	103	4	3	63	60	15	14	3	59	3	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	141	0	0	66	60	0	32	0	0	94	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.5%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	42	301	47	286	350	39	122	540	277	74	442	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			0.98			0.99	
Frt		0.979			0.988			0.951			0.974	
Flt Protected	0.950			0.950	0.992		0.950			0.950		
Satd. Flow (prot)	1841	3490	0	1684	3431	0	1832	3389	0	1823	3460	0
Flt Permitted	0.950			0.950	0.992		0.280			0.174		
Satd. Flow (perm)	1841	3490	0	1684	3431	0	540	3389	0	334	3460	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			6			58			17	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			9			9			26			22
Confl. Bikes (#/hr)			1			2			3			
Peak Hour Factor	0.85	0.90	0.85	0.80	0.81	0.85	0.86	0.88	0.92	0.85	0.79	0.85
Heavy Vehicles (%)	0%	3%	2%	0%	1%	3%	0%	1%	1%	0%	2%	1%
Adj. Flow (vph)	49	334	55	358	432	46	142	614	301	87	559	116
Shared Lane Traffic (%)				24%								
Lane Group Flow (vph)	49	389	0	272	564	0	142	915	0	87	675	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	38.0		14.4	38.0	
Total Split (s)	32.0	32.0		45.0	45.0		18.0	55.0		18.0	55.0	
Total Split (%)	21.3%	21.3%		30.0%	30.0%		12.0%	36.7%		12.0%	36.7%	
Maximum Green (s)	25.0	25.0		37.8	37.8		10.6	47.6		10.6	47.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			7.0			7.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	13	13		11	11			41			51	
Act Effct Green (s)	21.2	21.2		32.8	32.8		68.2	57.9		65.8	56.6	
Actuated g/C Ratio	0.14	0.14		0.22	0.22		0.45	0.39		0.44	0.38	
v/c Ratio	0.19	0.77		0.74	0.75		0.43	0.68		0.37	0.51	
Control Delay	57.3	71.1		36.8	31.5		10.1	6.9		27.1	38.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.5		0.0	0.0	
Total Delay	57.3	71.1		36.8	31.5		10.1	7.4		27.1	38.4	
LOS	E	E		D	C		B	A		C	D	
Approach Delay		69.6			33.2			7.8			37.1	
Approach LOS		E			C			A			D	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	85 (57%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	30.7
Intersection LOS:	C
Intersection Capacity Utilization	82.6%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 1: South Main Street & MLK Jr Way

 18 s	 55 s	 45 s	 32 s
 18 s	 55 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	52	27	105	176	49	21	57	904	115	12	750	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.97			0.99			1.00			1.00	
Frt		0.878			0.955			0.980			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1602	0	1850	1848	0	1718	3427	0	1787	3482	0
Flt Permitted	0.705			0.311			0.148			0.081		
Satd. Flow (perm)	1319	1602	0	606	1848	0	268	3427	0	152	3482	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			10			8			12			2
Peak Hour Factor	0.88	0.88	0.76	0.82	0.88	0.88	0.88	0.88	0.71	0.88	0.94	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	2%	0%	0%	2%	0%
Adj. Flow (vph)	59	31	138	215	56	24	65	1027	162	14	798	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	59	169	0	215	80	0	65	1189	0	14	829	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/2/2015

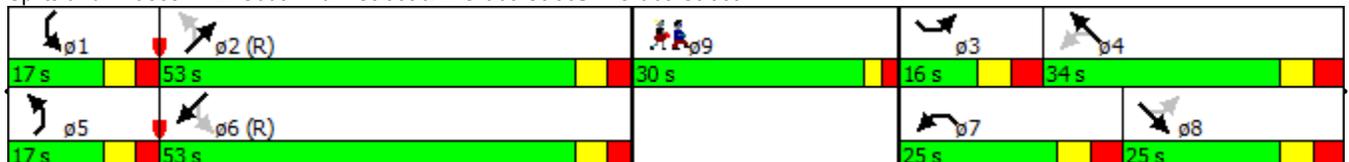


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	31.0		13.3	36.0		13.3	36.0	
Total Split (s)	16.0	25.0		25.0	34.0		17.0	53.0		17.0	53.0	
Total Split (%)	10.7%	16.7%		16.7%	22.7%		11.3%	35.3%		11.3%	35.3%	
Maximum Green (s)	8.6	17.6		17.6	26.6		10.7	46.7		10.7	46.7	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.5	17.3		41.9	29.2		63.2	59.0		57.6	51.9	
Actuated g/C Ratio	0.17	0.12		0.28	0.19		0.42	0.39		0.38	0.35	
v/c Ratio	0.24	0.92		0.69	0.22		0.33	0.88		0.10	0.69	
Control Delay	43.5	112.1		56.5	54.4		22.2	35.9		26.9	39.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.4	
Total Delay	43.5	112.1		56.5	54.4		22.2	35.9		26.9	39.6	
LOS	D	F		E	D		C	D		C	D	
Approach Delay		94.3			55.9			35.2			39.4	
Approach LOS		F			E			D			D	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	77 (51%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	145
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	44.0
Intersection LOS:	D
Intersection Capacity Utilization:	75.0%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street



Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	165
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Grade (%)		5%			1%			3%				-2%
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.95			1.00			0.99	
Frt		0.851			0.862			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1610	1386	0	1761	1510	0	1743	3472	0	1787	3526	0
Flt Permitted	0.552			0.644			0.202			0.238		
Satd. Flow (perm)	936	1386	0	1194	1510	0	371	3472	0	448	3526	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		179			23			1			4	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Adj. Flow (vph)	102	1	179	15	2	23	45	978	15	12	978	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	180	0	15	25	0	45	993	0	12	1031	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.13	1.13	1.13	1.01	1.01	1.01	1.02	1.02	1.02	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	28.0	42.0		22.0	36.0		18.0	68.0		18.0	68.0	
Total Split (%)	18.7%	28.0%		14.7%	24.0%		12.0%	45.3%		12.0%	45.3%	
Maximum Green (s)	21.5	35.5		15.5	29.5		11.4	61.4		11.4	61.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		16			27			34			28	
Act Effct Green (s)	34.6	29.1		23.5	17.8		100.1	96.8		96.5	90.9	
Actuated g/C Ratio	0.23	0.19		0.16	0.12		0.67	0.65		0.64	0.61	
v/c Ratio	0.37	0.44		0.07	0.13		0.14	0.44		0.03	0.48	
Control Delay	47.3	9.8		38.3	21.5		9.9	13.4		7.5	9.8	
Queue Delay	4.5	2.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	51.8	11.8		38.3	21.5		9.9	13.4		7.5	9.8	
LOS	D	B		D	C		A	B		A	A	
Approach Delay		26.3			27.8			13.3			9.7	
Approach LOS		C			C			B			A	

Intersection Summary

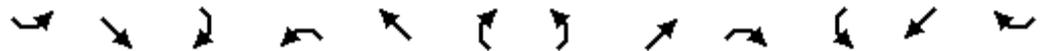
Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 74 (49%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.48
 Intersection Signal Delay: 13.5 Intersection LOS: B
 Intersection Capacity Utilization 62.1% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 3: South Main Street & Bluestone Drive/Warsaw Avenue



Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/2/2015

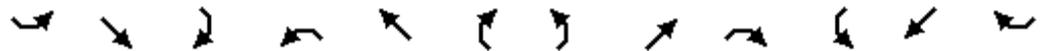


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.448								
Satd. Flow (perm)	0	1807	0	779	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		21										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Adj. Flow (vph)	0	168	48	52	51	0	0	0	103	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	216	0	52	51	0	0	103	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2			4				8
Permitted Phases				2			4					

Lanes, Volumes, Timings

4: Harrison Street & Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		13.3	13.3			22.0	
Total Split (s)		32.0		18.0	50.0		25.0	25.0			25.0	
Total Split (%)		42.7%		24.0%	66.7%		33.3%	33.3%			33.3%	
Maximum Green (s)		26.4		12.4	44.4		18.7	18.7			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0	0.0			1.0	
Recall Mode		None		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											21	
Act Effct Green (s)		19.8		22.5	24.2			9.4				
Actuated g/C Ratio		0.49		0.55	0.59			0.23				
v/c Ratio		0.24		0.09	0.05			0.28				
Control Delay		12.6		6.5	6.3			17.0				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		12.6		6.5	6.3			17.0				
LOS		B		A	A			B				
Approach Delay		12.6			6.4			17.0				
Approach LOS		B			A			B				

Intersection Summary

Area Type: Other
 Cycle Length: 75
 Actuated Cycle Length: 40.7
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 12.2
 Intersection LOS: B
 Intersection Capacity Utilization 35.5%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/2/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Fr _t			0.850		0.990				0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Fl _t Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			259		6				224			171
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		798			1557			637			1182	
Travel Time (s)		15.5			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Adj. Flow (vph)	111	641	359	529	579	41	33	304	64	343	386	403
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	641	359	529	620	0	33	304	64	343	386	403
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

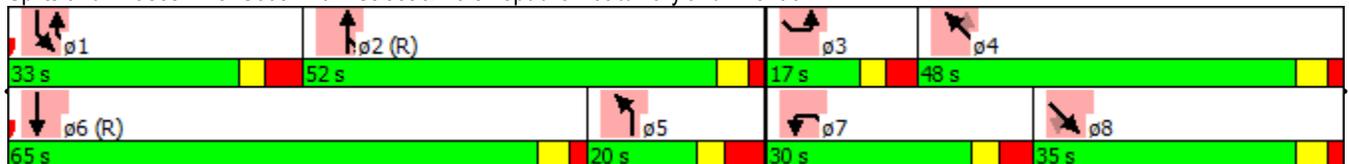
2/2/2015

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	36.0		13.5	34.5	34.5	13.9	34.5	14.1
Total Split (s)	20.0	52.0	52.0	33.0	65.0		17.0	35.0	35.0	30.0	48.0	33.0
Total Split (%)	13.3%	34.7%	34.7%	22.0%	43.3%		11.3%	23.3%	23.3%	20.0%	32.0%	22.0%
Maximum Green (s)	12.3	46.4	46.4	25.9	59.4		10.5	29.5	29.5	23.1	42.5	25.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		21	21		38			3	3		15	
Act Effct Green (s)	12.3	57.4	57.4	28.0	72.5		8.5	19.7	19.7	19.8	34.1	60.4
Actuated g/C Ratio	0.08	0.38	0.38	0.19	0.48		0.06	0.13	0.13	0.13	0.23	0.40
v/c Ratio	0.77	0.47	0.47	0.83	0.37		0.35	0.68	0.16	0.76	0.48	0.55
Control Delay	98.5	38.1	13.0	46.3	19.5		78.0	69.2	0.9	73.9	52.2	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.5	38.1	13.0	46.3	19.5		78.0	69.2	0.9	73.9	52.2	18.8
LOS	F	D	B	D	B		E	E	A	E	D	B
Approach Delay		36.0			31.8			59.0			46.9	
Approach LOS		D			C			E			D	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 145 (97%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 40.4
 Intersection LOS: D
 Intersection Capacity Utilization 80.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	566	22	72	531	40	29	40	137	72	28	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.79			0.89	
Frt		0.995			0.991			0.882			0.871	
Flt Protected		0.996			0.994		0.950			0.950		
Satd. Flow (prot)	0	3374	0	0	3585	0	1778	1302	0	1659	1360	0
Flt Permitted		0.996			0.994		0.266			0.329		
Satd. Flow (perm)	0	3374	0	0	3585	0	498	1302	0	575	1360	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			4			105			182	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			9			1			95			45
Confl. Bikes (#/hr)			1			2			15			6
Peak Hour Factor	0.93	0.96	0.93	0.93	0.94	0.93	0.93	0.93	0.88	0.93	0.93	0.82
Heavy Vehicles (%)	0%	3%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	54	590	24	77	565	43	31	43	156	77	30	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	668	0	0	685	0	31	199	0	77	219	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	28.0	28.0		28.9	28.9		13.3	30.3		13.3	32.0	
Total Split (s)	51.0	51.0		39.0	39.0		18.0	32.0		18.0	32.0	
Total Split (%)	34.0%	34.0%		26.0%	26.0%		12.0%	21.3%		12.0%	21.3%	
Maximum Green (s)	45.6	45.6		32.1	32.1		11.7	25.7		11.7	25.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.4			6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0			0.0			0.0	
Flash Dont Walk (s)	17.0	17.0		17.0	17.0			17.0			19.0	
Pedestrian Calls (#/hr)	11	11		4	4			102			55	
Act Effct Green (s)		45.6			37.4		32.1	20.4		31.2	20.4	
Actuated g/C Ratio		0.30			0.25		0.21	0.14		0.21	0.14	
v/c Ratio		0.65			0.76		0.15	0.74		0.39	0.64	
Control Delay		39.9			58.7		36.4	45.9		42.3	21.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		39.9			58.7		36.4	45.9		42.3	21.8	
LOS		D			E		D	D		D	C	
Approach Delay		39.9			58.7			44.6			27.1	
Approach LOS		D			E			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 139 (93%), Referenced to phase 4:NWTL, Start of 1st Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 45.3
 Intersection Capacity Utilization 78.7%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service D

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ϕ1	 ϕ9	 ϕ2	 ϕ4 (R)	 ϕ8
18 s	10 s	32 s	39 s	51 s
 ϕ5	 ϕ10	 ϕ6		
18 s	10 s	32 s		

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Intersection Summary		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	39	90	2	1	113	98	8	19	1	71	1	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.997			0.937	
Flt Protected		0.985						0.986			0.974	
Satd. Flow (prot)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Flt Permitted		0.985						0.986			0.974	
Satd. Flow (perm)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	63		9	9		63	94		253	253		94
Confl. Bikes (#/hr)			2			10			26			13
Peak Hour Factor	0.70	0.70	0.70	0.73	0.73	0.73	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	56	129	3	1	155	134	11	27	1	101	1	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	156	134	0	39	0	0	191	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	45.0%
ICU Level of Service	A
Analysis Period (min)	15

APPENDIX D

Background 2016 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	48	209	48	243	210	18	70	342	176	38	242	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			1.00			0.98			0.99	
Frt		0.968			0.990			0.947			0.966	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1841	3544	0	1684	3421	0	1728	3205	0	1770	3287	0
Flt Permitted	0.950			0.950	0.987		0.513			0.295		
Satd. Flow (perm)	1841	3544	0	1684	3421	0	933	3205	0	550	3287	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			5			85			32	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			32			20
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	62	272	74	305	277	26	74	446	242	55	283	83
Shared Lane Traffic (%)				35%								
Lane Group Flow (vph)	62	346	0	198	410	0	74	688	0	55	366	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	34.4		14.4	34.4	
Total Split (s)	31.0	31.0		32.2	32.2		14.4	36.4		14.4	36.4	
Total Split (%)	27.2%	27.2%		28.2%	28.2%		12.6%	31.9%		12.6%	31.9%	
Maximum Green (s)	24.0	24.0		25.0	25.0		7.0	29.0		7.0	29.0	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	5	5		8	8			32			20	
Act Effct Green (s)	16.4	16.4		20.2	20.2		50.2	44.0		49.5	43.6	
Actuated g/C Ratio	0.14	0.14		0.18	0.18		0.44	0.39		0.43	0.38	
v/c Ratio	0.23	0.65		0.66	0.67		0.16	0.53		0.17	0.29	
Control Delay	43.6	47.7		33.0	28.1		10.9	10.8		20.3	26.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	43.6	47.7		33.0	28.1		10.9	10.8		20.3	26.0	
LOS	D	D		C	C		B	B		C	C	
Approach Delay		47.1			29.7			10.8			25.3	
Approach LOS		D			C			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	114
Offset:	67 (59%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	115
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	25.5
Intersection LOS:	C
Intersection Capacity Utilization	74.0%
ICU Level of Service	D
Analysis Period (min)	15

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/2/2015

Splits and Phases: 1: South Main Street & MLK Jr Way

 ø1	 ø2 (R)	 ø4	 ø8
14.4 s	36.4 s	32.2 s	31 s
 ø5	 ø6 (R)		
14.4 s	36.4 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	24	27	46	55	20	17	84	535	97	16	494	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%			2%	
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.906			0.902			0.978			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1665	0	1850	1639	0	1702	3308	0	1686	3399	0
Flt Permitted	0.708			0.540			0.185			0.246		
Satd. Flow (perm)	1325	1665	0	1052	1639	0	331	3308	0	437	3399	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	29	37	62	107	26	49	142	641	112	18	636	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	99	0	107	75	0	142	753	0	18	689	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	14.4	18.0		14.4	18.0		14.0	38.3		13.3	37.6	
Total Split (%)	12.6%	15.8%		12.6%	15.8%		12.3%	33.6%		11.7%	33.0%	
Maximum Green (s)	7.0	10.6		7.0	10.6		7.7	32.0		7.0	31.3	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	16.9	9.9		16.9	12.7		43.7	40.6		38.9	31.9	
Actuated g/C Ratio	0.15	0.09		0.15	0.11		0.38	0.36		0.34	0.28	
v/c Ratio	0.13	0.69		0.52	0.41		0.65	0.64		0.08	0.73	
Control Delay	37.2	74.3		48.6	55.1		50.5	34.7		24.2	43.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.2	74.3		48.6	55.1		50.5	34.7		24.2	43.9	
LOS	D	E		D	E		D	C		C	D	
Approach Delay		65.9			51.3			37.2			43.4	
Approach LOS		E			D			D			D	

Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	114
Offset:	59 (52%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	42.7
Intersection LOS:	D
Intersection Capacity Utilization:	50.7%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

13.3 s	38.3 s	30 s	14.4 s
14 s	37.6 s	14.4 s	18 s

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	26%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	134
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.93			1.00			0.97	
Frt		0.860			0.898			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1466	0	1770	1550	0	1770	3528	0	1770	3302	0
Flt Permitted	0.661			0.738			0.337			0.345		
Satd. Flow (perm)	1149	1466	0	1375	1550	0	628	3528	0	643	3302	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			28			2			34	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	18	2	27	7	13	28	225	784	12	26	487	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	29	0	7	41	0	225	796	0	26	628	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954						0.982				
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	1777	0	1652	1739	0	0	1754	0	0	1863	0
Flt Permitted				0.586				0.959				
Satd. Flow (perm)	0	1777	0	1019	1739	0	0	1754	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	29	15	19	360	0	115	0	18	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	19	360	0	0	133	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings

4: Harrison Street & Warsaw Avenue

2/2/2015

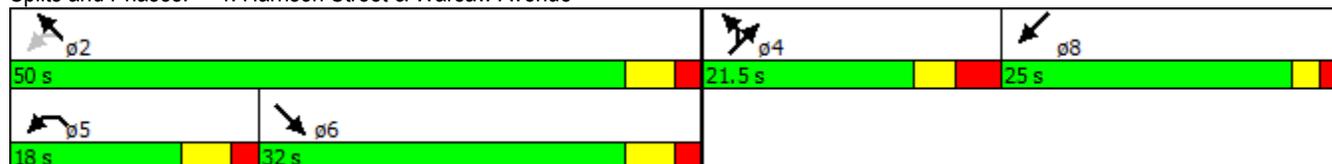


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		32.0		18.0	50.0		21.5	21.5			25.0	
Total Split (%)		33.2%		18.7%	51.8%		22.3%	22.3%			25.9%	
Maximum Green (s)		26.4		12.4	44.4		15.2	15.2			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		25.2		24.9	27.0			10.6				
Actuated g/C Ratio		0.46		0.46	0.49			0.19				
v/c Ratio		0.05		0.04	0.42			0.39				
Control Delay		16.1		16.2	18.7			27.9				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		16.1		16.2	18.7			27.9				
LOS		B		B	B			C				
Approach Delay		16.1			18.6			27.9				
Approach LOS		B			B			C				

Intersection Summary

Area Type: Other
 Cycle Length: 96.5
 Actuated Cycle Length: 54.7
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.42
 Intersection Signal Delay: 20.6
 Intersection Capacity Utilization 34.3%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/2/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1505	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270		4				233			338
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	37	458	270	151	308	12	34	226	50	160	231	517
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	458	270	151	320	0	34	226	50	160	231	517
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

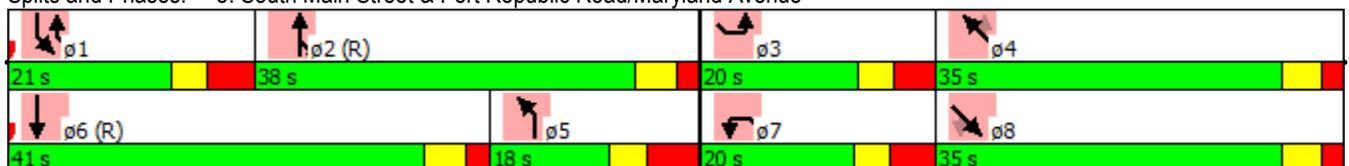
2/2/2015

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	18.0	38.0	38.0	21.0	41.0		20.0	35.0	35.0	20.0	35.0	21.0
Total Split (%)	15.8%	33.3%	33.3%	18.4%	36.0%		17.5%	30.7%	30.7%	17.5%	30.7%	18.4%
Maximum Green (s)	10.3	32.4	32.4	13.9	35.4		13.5	29.5	29.5	13.1	29.5	13.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	9.0	52.3	52.3	10.7	59.3		8.2	15.4	15.4	10.5	23.5	32.6
Actuated g/C Ratio	0.08	0.46	0.46	0.09	0.52		0.07	0.14	0.14	0.09	0.21	0.29
v/c Ratio	0.27	0.28	0.31	0.47	0.18		0.29	0.49	0.12	0.51	0.32	0.75
Control Delay	53.7	22.2	4.4	57.5	4.9		55.7	48.0	0.6	54.6	39.7	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.7	22.2	4.4	57.5	4.9		55.7	48.0	0.6	54.6	39.7	17.6
LOS	D	C	A	E	A		E	D	A	D	D	B
Approach Delay		17.4			21.8			41.2			29.8	
Approach LOS		B			C			D			C	

Intersection Summary

Area Type: Other
 Cycle Length: 114
 Actuated Cycle Length: 114
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 25.8 Intersection LOS: C
 Intersection Capacity Utilization 77.6% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	23	394	17	72	358	12	12	13	59	28	38	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.85			0.84	
Frt		0.994			0.996			0.877			0.887	
Flt Protected		0.997			0.992		0.950			0.950		
Satd. Flow (prot)	0	3343	0	0	3549	0	1778	1366	0	1596	1304	0
Flt Permitted		0.997			0.992		0.484			0.701		
Satd. Flow (perm)	0	3343	0	0	3549	0	906	1366	0	1177	1304	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			2			65			115	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			72			79
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	25	441	19	80	392	13	13	14	65	31	42	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	485	0	0	485	0	13	79	0	31	168	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR	
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex			
Detector 2 Channel													
Detector 2 Extend (s)	0.0			0.0			0.0			0.0			
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA		
Protected Phases	8	8		4	4		5	2		1	6		
Permitted Phases							2				6		
Detector Phase	8	8		4	4		15	2		15	6		
Switch Phase													
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0		
Minimum Split (s)	27.5	27.5		28.9	28.9		13.3	23.0		13.3	23.0		
Total Split (s)	30.0	30.0		34.7	34.7		13.3	25.9		13.4	26.0		
Total Split (%)	26.3%	26.3%		30.4%	30.4%		11.7%	22.7%		11.8%	22.8%		
Maximum Green (s)	24.6	24.6		27.8	27.8		7.0	19.6		7.1	19.7		
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5		
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8		
Lost Time Adjust (s)	0.0			0.0			0.0			0.0			
Total Lost Time (s)	5.4			6.9			6.3			6.3			
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead			
Lead-Lag Optimize?													
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None		
Walk Time (s)	5.0	5.0		5.0	5.0		0.0			0.0			
Flash Dont Walk (s)	17.0	17.0		17.0	17.0		14.0			16.0			
Pedestrian Calls (#/hr)	6	6		1	1		72			79			
Act Effct Green (s)	24.6			38.0			21.8	14.8		21.9	14.8		
Actuated g/C Ratio	0.22			0.33			0.19	0.13		0.19	0.13		
v/c Ratio	0.67			0.41			0.06	0.34		0.12	0.62		
Control Delay	49.5			32.7			25.8	18.2		27.3	26.8		
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0		
Total Delay	49.5			32.7			25.8	18.2		27.3	26.8		
LOS	D			C			C	B		C	C		
Approach Delay	49.5			32.7			19.2			26.9			
Approach LOS	D			C			B			C			

Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	114
Offset:	96 (84%), Referenced to phase 4:NWTL, Start of 1st Green
Natural Cycle:	105
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	37.3
Intersection LOS:	D
Intersection Capacity Utilization:	65.5%
ICU Level of Service:	C
Analysis Period (min):	15

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

Splits and Phases: 10: S Mason Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2$	 $\phi 4 (R)$	 $\phi 8$
13.4 s	10 s	25.9 s	34.7 s	30 s
 $\phi 5$	 $\phi 10$	 $\phi 6$		
13.3 s	10 s	26 s		

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	9%	9%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Intersection Summary		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	25	75	3	2	46	44	11	10	2	43	2	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996				0.850		0.988			0.955	
Flt Protected		0.988			0.998			0.976			0.969	
Satd. Flow (prot)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Flt Permitted		0.988			0.998			0.976			0.969	
Satd. Flow (perm)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	20		31	31		20	178		110	110		178
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	106	4	3	65	62	16	14	3	61	3	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	68	62	0	33	0	0	96	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.6%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	42	301	47	286	350	39	122	540	277	74	442	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			0.98			0.99	
Frt		0.979			0.988			0.951			0.974	
Flt Protected	0.950			0.950	0.992		0.950			0.950		
Satd. Flow (prot)	1841	3490	0	1684	3431	0	1832	3390	0	1823	3460	0
Flt Permitted	0.950			0.950	0.992		0.252			0.171		
Satd. Flow (perm)	1841	3490	0	1684	3431	0	486	3390	0	328	3460	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			5			61			17	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			9			9			26			22
Confl. Bikes (#/hr)			1			2			3			
Peak Hour Factor	0.85	0.90	0.85	0.80	0.81	0.85	0.86	0.88	0.92	0.85	0.79	0.85
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	3%	2%	0%	1%	3%	0%	1%	1%	0%	2%	1%
Adj. Flow (vph)	51	344	57	368	445	47	146	632	310	90	576	120
Shared Lane Traffic (%)				24%								
Lane Group Flow (vph)	51	401	0	280	580	0	146	942	0	90	696	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt		NA
Protected Phases	8	8		4	4		5	2		1		6
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1		6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0		15.0
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	38.0		14.4		38.0
Total Split (s)	31.0	31.0		44.0	44.0		22.0	59.0		16.0		53.0
Total Split (%)	20.7%	20.7%		29.3%	29.3%		14.7%	39.3%		10.7%		35.3%
Maximum Green (s)	24.0	24.0		36.8	36.8		14.6	51.6		8.6		45.6
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8		3.8
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6		3.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4		7.4
Lead/Lag							Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0		1.0
Recall Mode	None	None		None	None		None	C-Max		None		C-Max
Walk Time (s)	5.0	5.0		5.0	5.0			7.0				7.0
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0				22.0
Pedestrian Calls (#/hr)	13	13		11	11			41				51
Act Effct Green (s)	21.3	21.3		32.9	32.9		70.3	58.4		63.3		54.9
Actuated g/C Ratio	0.14	0.14		0.22	0.22		0.47	0.39		0.42		0.37
v/c Ratio	0.20	0.79		0.76	0.77		0.44	0.69		0.41		0.55
Control Delay	57.6	72.5		40.2	34.3		14.5	10.8		28.4		40.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.6		0.0		0.0
Total Delay	57.6	72.5		40.2	34.3		14.5	11.4		28.4		40.4
LOS	E	E		D	C		B	B		C		D
Approach Delay		70.8			36.2			11.8				39.0
Approach LOS		E			D			B				D

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	85 (57%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.79
Intersection Signal Delay:	33.5
Intersection Capacity Utilization:	83.3%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/2/2015

Splits and Phases: 1: South Main Street & MLK Jr Way

 ø1 16 s	 ø2 (R) 59 s	 ø4 44 s	 ø8 31 s
 ø5 22 s	 ø6 (R) 53 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	52	27	105	176	49	21	57	904	115	12	750	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.878			0.954			0.980			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1605	0	1850	1845	0	1718	3428	0	1787	3482	0
Flt Permitted	0.704			0.366			0.175			0.071		
Satd. Flow (perm)	1318	1605	0	713	1845	0	317	3428	0	134	3482	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			10			8			12			2
Peak Hour Factor	0.88	0.88	0.76	0.82	0.88	0.88	0.88	0.88	0.71	0.88	0.94	0.88
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	2%	0%	0%	2%	0%
Adj. Flow (vph)	61	32	142	221	57	25	67	1058	167	14	822	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	174	0	221	82	0	67	1225	0	14	854	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015

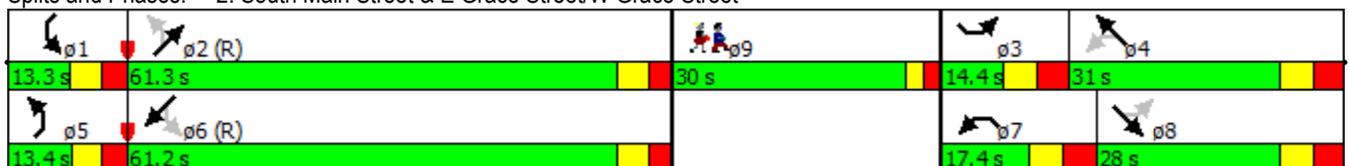


Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	31.0		13.3	36.0		13.3	36.0	
Total Split (s)	14.4	28.0		17.4	31.0		13.4	61.3		13.3	61.2	
Total Split (%)	9.6%	18.7%		11.6%	20.7%		8.9%	40.9%		8.9%	40.8%	
Maximum Green (s)	7.0	20.6		10.0	23.6		7.1	55.0		7.0	54.9	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	26.1	19.1		33.0	25.0		67.3	64.4		64.5	58.9	
Actuated g/C Ratio	0.17	0.13		0.22	0.17		0.45	0.43		0.43	0.39	
v/c Ratio	0.24	0.85		0.95	0.27		0.32	0.83		0.10	0.62	
Control Delay	46.9	97.1		99.5	58.2		20.5	30.5		25.2	34.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.3	
Total Delay	46.9	97.1		99.5	58.2		20.5	30.5		25.2	35.1	
LOS	D	F		F	E		C	C		C	D	
Approach Delay		84.1			88.3			30.0			34.9	
Approach LOS		F			F			C			C	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 77 (51%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 42.8
 Intersection LOS: D
 Intersection Capacity Utilization 76.3%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street



Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/2/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	165
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Grade (%)		5%			1%			3%			-2%	
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.862			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1610	1386	0	1761	1510	0	1743	3472	0	1787	3526	0
Flt Permitted	0.552			0.640			0.194			0.228		
Satd. Flow (perm)	936	1386	0	1186	1510	0	356	3472	0	429	3526	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		185			24			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	105	1	185	16	2	24	46	1008	16	12	1008	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	186	0	16	26	0	46	1024	0	12	1063	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.13	1.13	1.13	1.01	1.01	1.01	1.02	1.02	1.02	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	20.0	39.0		15.0	34.0		16.0	81.0		15.0	80.0	
Total Split (%)	13.3%	26.0%		10.0%	22.7%		10.7%	54.0%		10.0%	53.3%	
Maximum Green (s)	13.5	32.5		8.5	27.5		9.4	74.4		8.4	73.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		16			27			34			28	
Act Effct Green (s)	33.6	28.2		23.6	17.8		100.9	97.7		97.4	91.8	
Actuated g/C Ratio	0.22	0.19		0.16	0.12		0.67	0.65		0.65	0.61	
v/c Ratio	0.40	0.45		0.07	0.13		0.15	0.45		0.04	0.49	
Control Delay	49.1	10.3		39.7	21.2		6.9	11.6		5.0	7.6	
Queue Delay	4.5	2.3		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	53.5	12.6		39.7	21.2		6.9	11.6		5.0	7.6	
LOS	D	B		D	C		A	B		A	A	
Approach Delay		27.4			28.3			11.4			7.6	
Approach LOS		C			C			B			A	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	74 (49%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.49
Intersection Signal Delay:	11.9
Intersection LOS:	B
Intersection Capacity Utilization:	63.2%
ICU Level of Service:	B
Analysis Period (min):	15

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/2/2015

Splits and Phases: 3: South Main Street & Bluestone Drive/Warsaw Avenue



Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.443								
Satd. Flow (perm)	0	1807	0	770	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		21										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	174	49	54	53	0	0	0	106	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	0	54	53	0	0	106	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2			4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2			4					
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		13.3	13.3			22.0	
Total Split (s)		32.0		18.0	50.0		25.0	25.0			25.0	
Total Split (%)		42.7%		24.0%	66.7%		33.3%	33.3%			33.3%	
Maximum Green (s)		26.4		12.4	44.4		18.7	18.7			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0	0.0			1.0	
Recall Mode		None		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											21	
Act Effct Green (s)		19.6		22.4	24.1			9.5				
Actuated g/C Ratio		0.48		0.55	0.59			0.23				
v/c Ratio		0.25		0.09	0.05			0.28				
Control Delay		12.8		6.5	6.3			17.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		12.8		6.5	6.3			17.1				
LOS		B		A	A			B				
Approach Delay		12.8			6.4			17.1				
Approach LOS		B			A			B				

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	40.7
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.28
Intersection Signal Delay:	12.3
Intersection LOS:	B
Intersection Capacity Utilization:	36.0%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/2/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			258		6				224			165
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		798			1557			637			1182	
Travel Time (s)		15.5			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	114	661	369	545	597	43	34	313	66	354	397	415
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	661	369	545	640	0	34	313	66	354	397	415
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

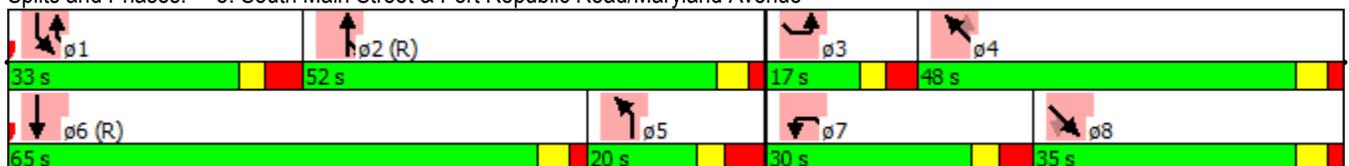
2/2/2015

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	36.0		13.5	34.5	34.5	13.9	34.5	14.1
Total Split (s)	20.0	52.0	52.0	33.0	65.0		17.0	35.0	35.0	30.0	48.0	33.0
Total Split (%)	13.3%	34.7%	34.7%	22.0%	43.3%		11.3%	23.3%	23.3%	20.0%	32.0%	22.0%
Maximum Green (s)	12.3	46.4	46.4	25.9	59.4		10.5	29.5	29.5	23.1	42.5	25.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		21	21		38			3	3		15	
Act Effct Green (s)	12.3	55.9	55.9	28.8	71.8		8.6	20.0	20.0	20.1	34.7	61.9
Actuated g/C Ratio	0.08	0.37	0.37	0.19	0.48		0.06	0.13	0.13	0.13	0.23	0.41
v/c Ratio	0.79	0.50	0.49	0.83	0.38		0.36	0.69	0.17	0.77	0.49	0.56
Control Delay	101.1	39.6	14.1	51.7	17.1		78.3	69.4	0.9	74.2	51.9	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.1	39.6	14.1	51.7	17.1		78.3	69.4	0.9	74.2	51.9	19.3
LOS	F	D	B	D	B		E	E	A	E	D	B
Approach Delay		37.5			33.0			59.2			47.1	
Approach LOS		D			C			E			D	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 145 (97%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 41.3 Intersection LOS: D
 Intersection Capacity Utilization 81.3% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	566	22	72	531	40	29	40	137	72	28	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.79			0.89	
Frt		0.995			0.991			0.882			0.871	
Flt Protected		0.996			0.994		0.950			0.950		
Satd. Flow (prot)	0	3374	0	0	3585	0	1778	1303	0	1659	1361	0
Flt Permitted		0.996			0.994		0.273			0.315		
Satd. Flow (perm)	0	3374	0	0	3585	0	511	1303	0	550	1361	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			4			108			188	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			9			1			95			45
Confl. Bikes (#/hr)			1			2			15			6
Peak Hour Factor	0.93	0.96	0.93	0.93	0.94	0.93	0.93	0.93	0.88	0.93	0.93	0.82
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	3%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	55	607	24	80	582	44	32	44	160	80	31	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	686	0	0	706	0	32	204	0	80	226	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	28.0	28.0		28.9	28.9		13.3	30.3		13.3	32.0	
Total Split (s)	44.0	44.0		47.0	47.0		13.3	35.2		13.8	35.7	
Total Split (%)	29.3%	29.3%		31.3%	31.3%		8.9%	23.5%		9.2%	23.8%	
Maximum Green (s)	38.6	38.6		40.1	40.1		7.0	28.9		7.5	29.4	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0			0.0			0.0			0.0		
Total Lost Time (s)	5.4			6.9			6.3			6.3		
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0		0.0			0.0		
Flash Dont Walk (s)	17.0	17.0		17.0	17.0		17.0			19.0		
Pedestrian Calls (#/hr)	11	11		4	4		102			55		
Act Effct Green (s)	38.6			48.1			27.9	20.9		28.8	21.4	
Actuated g/C Ratio	0.26			0.32			0.19	0.14		0.19	0.14	
v/c Ratio	0.79			0.61			0.21	0.74		0.50	0.64	
Control Delay	49.0			46.3			40.2	45.2		50.5	20.9	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	49.0			46.3			40.2	45.2		50.5	20.9	
LOS	D			D			D	D		D	C	
Approach Delay	49.0			46.3			44.5			28.6		
Approach LOS	D			D			D			C		

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	139 (93%), Referenced to phase 4:NWTL, Start of 1st Green
Natural Cycle:	115
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.79
Intersection Signal Delay:	44.2
Intersection LOS:	D
Intersection Capacity Utilization	79.1%
ICU Level of Service	D
Analysis Period (min)	15

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/2/2015

Splits and Phases: 10: S Mason Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2$	 $\phi 4 (R)$	 $\phi 8$
13.8 s	10 s	35.2 s	47 s	44 s
 $\phi 5$	 $\phi 10$	 $\phi 6$		
13.3 s	10 s	35.7 s		

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Intersection Summary		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/2/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	39	90	2	1	113	98	8	19	1	71	1	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.997			0.937	
Flt Protected		0.985						0.986			0.974	
Satd. Flow (prot)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Flt Permitted		0.985						0.986			0.974	
Satd. Flow (perm)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	63		9	9		63	94		253	253		94
Confl. Bikes (#/hr)			2			10			26			13
Peak Hour Factor	0.70	0.70	0.70	0.73	0.73	0.73	0.70	0.70	0.70	0.70	0.70	0.70
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	57	132	3	1	159	138	12	28	1	104	1	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	192	0	0	160	138	0	41	0	0	196	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	45.2%
ICU Level of Service	A
Analysis Period (min)	15

APPENDIX D

Background 2016 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	48	209	48	243	210	18	70	342	176	38	242	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			1.00			0.98			0.99	
Frt		0.968			0.990			0.947			0.966	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1841	3544	0	1684	3421	0	1728	3204	0	1770	3287	0
Flt Permitted	0.950			0.950	0.987		0.513			0.297		
Satd. Flow (perm)	1841	3544	0	1684	3421	0	933	3204	0	553	3287	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			5			85			32	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			32			20
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	62	272	74	305	277	26	74	446	242	55	283	83
Shared Lane Traffic (%)				35%								
Lane Group Flow (vph)	62	346	0	198	410	0	74	688	0	55	366	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	34.4		14.4	34.4	
Total Split (s)	31.0	31.0		32.2	32.2		14.4	37.4		14.4	37.4	
Total Split (%)	27.0%	27.0%		28.0%	28.0%		12.5%	32.5%		12.5%	32.5%	
Maximum Green (s)	24.0	24.0		25.0	25.0		7.0	30.0		7.0	30.0	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	5	5		8	8			32			20	
Act Effct Green (s)	16.5	16.5		20.3	20.3		51.0	44.8		50.3	44.4	
Actuated g/C Ratio	0.14	0.14		0.18	0.18		0.44	0.39		0.44	0.39	
v/c Ratio	0.23	0.65		0.67	0.68		0.16	0.53		0.17	0.28	
Control Delay	44.1	48.2		36.3	31.1		5.9	5.8		20.2	25.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	44.1	48.2		36.3	31.1		5.9	5.8		20.2	25.9	
LOS	D	D		D	C		A	A		C	C	
Approach Delay		47.6			32.8			5.8			25.1	
Approach LOS		D			C			A			C	
Queue Length 50th (ft)	42	120		71	71		5	26		21	91	
Queue Length 95th (ft)	67	133		120	101		m21	46		41	149	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100			150		
Base Capacity (vph)	384	760		366	747		466	1298		319	1289	
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	0.16	0.46		0.54	0.55		0.16	0.53		0.17	0.28	

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Offset: 18 (16%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 24.7

Intersection LOS: C

Intersection Capacity Utilization 74.0%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 1: South Main Street & MLK Jr Way

 ø1	 ø2 (R)	 ø4	 ø8
14.4 s	37.4 s	32.2 s	31 s
 ø5	 ø6 (R)		
14.4 s	37.4 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	24	27	46	55	20	17	84	535	97	16	494	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.906			0.902			0.978			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1665	0	1850	1639	0	1702	3308	0	1686	3399	0
Flt Permitted	0.708			0.525			0.185			0.243		
Satd. Flow (perm)	1325	1665	0	1022	1639	0	331	3308	0	431	3399	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	29	37	62	107	26	49	142	641	112	18	636	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	99	0	107	75	0	142	753	0	18	689	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	18.0		15.0	18.0		14.0	38.0		14.0	38.0	
Total Split (%)	13.0%	15.7%		13.0%	15.7%		12.2%	33.0%		12.2%	33.0%	
Maximum Green (s)	7.6	10.6		7.6	10.6		7.7	31.7		7.7	31.7	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	17.2	10.0		17.6	13.0		44.0	40.9		39.4	32.3	
Actuated g/C Ratio	0.15	0.09		0.15	0.11		0.38	0.36		0.34	0.28	
v/c Ratio	0.13	0.69		0.51	0.41		0.65	0.64		0.08	0.72	
Control Delay	37.2	74.9		47.6	55.2		29.7	26.7		24.5	43.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.2	74.9		47.6	55.2		29.7	26.7		24.5	43.6	
LOS	D	E		D	E		C	C		C	D	
Approach Delay		66.3			50.8			27.2			43.1	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	17	72		66	53		61	214		9	196	
Queue Length 95th (ft)	41	107		66	90		35	352		m22	237	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400			120			125			50		
Base Capacity (vph)	232	153		211	195		219	1176		233	953	
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	0.13	0.65		0.51	0.38		0.65	0.64		0.08	0.72	

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 8 (7%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	26%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	134
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.93			1.00			0.97	
Frt		0.860			0.898			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1466	0	1770	1549	0	1770	3528	0	1770	3301	0
Flt Permitted	0.661			0.738			0.338			0.345		
Satd. Flow (perm)	1149	1466	0	1375	1549	0	630	3528	0	643	3301	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			28			2			34	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	18	2	27	7	13	28	225	784	12	26	487	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	29	0	7	41	0	225	796	0	26	628	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	14.0	33.0		14.0	33.0		26.0	54.0		14.0	42.0	
Total Split (%)	12.2%	28.7%		12.2%	28.7%		22.6%	47.0%		12.2%	36.5%	
Maximum Green (s)	7.5	26.5		7.5	26.5		19.4	47.4		7.4	35.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	18.6	17.1		17.1	14.3		83.8	77.9		74.2	67.1	
Actuated g/C Ratio	0.16	0.15		0.15	0.12		0.73	0.68		0.65	0.58	
v/c Ratio	0.08	0.12		0.03	0.19		0.40	0.33		0.05	0.32	
Control Delay	32.5	14.0		29.5	20.8		9.7	8.8		10.4	21.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.5	14.0		29.5	20.8		9.7	8.8		10.4	21.0	
LOS	C	B		C	C		A	A		B	C	
Approach Delay		21.1			22.0			9.0			20.6	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	13	1		5	9		16	54		2	199	
Queue Length 95th (ft)	25	26		14	38		m117	193		m21	254	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	221	388		236	378		657	2389		489	1940	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.07		0.03	0.11		0.34	0.33		0.05	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 76 (66%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

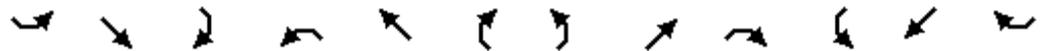
Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954						0.982				
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	1777	0	1652	1739	0	0	1754	0	0	1863	0
Flt Permitted				0.591				0.959				
Satd. Flow (perm)	0	1777	0	1027	1739	0	0	1754	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	29	15	19	360	0	115	0	18	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	19	360	0	0	133	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		46.0		15.0	61.0		32.0	32.0			22.0	
Total Split (%)		40.0%		13.0%	53.0%		27.8%	27.8%			19.1%	
Maximum Green (s)		40.4		9.4	55.4		25.7	25.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		26.1		25.9	28.0			10.8				
Actuated g/C Ratio		0.47		0.46	0.50			0.19				
v/c Ratio		0.05		0.03	0.41			0.39				
Control Delay		16.0		16.1	18.5			28.2				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		16.0		16.1	18.5			28.2				
LOS		B		B	B			C				
Approach Delay		16.0			18.4			28.2				
Approach LOS		B			B			C				
Queue Length 50th (ft)		8		5	120			46				
Queue Length 95th (ft)		37		19	219			106				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1316		594	1543			907				
Starvation Cap Reductn		0		0	124			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.03		0.03	0.25			0.15				

Intersection Summary

Area Type:	Other
Cycle Length:	115
Actuated Cycle Length:	55.9
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	20.6
Intersection LOS:	C

Lanes, Volumes, Timings

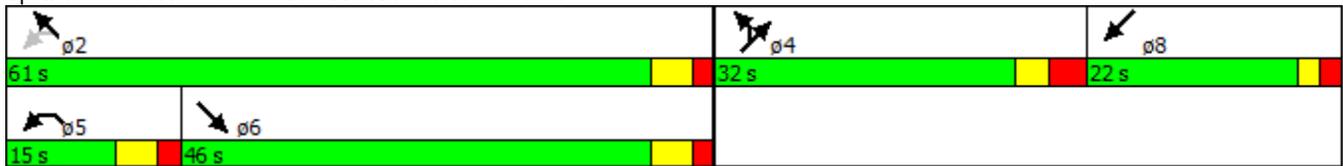
4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 34.3%
 Analysis Period (min) 15

ICU Level of Service A

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1505	3433	3539	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270		4				227			206
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	37	458	270	151	308	12	34	226	50	160	231	517
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	458	270	151	320	0	34	226	50	160	231	517
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	38.0	38.0	27.0	50.3		13.5	35.0	35.0	15.0	36.5	27.0
Total Split (%)	12.8%	33.0%	33.0%	23.5%	43.7%		11.7%	30.4%	30.4%	13.0%	31.7%	23.5%
Maximum Green (s)	7.0	32.4	32.4	19.9	44.7		7.0	29.5	29.5	8.1	31.0	19.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	50.4	50.4	16.1	64.7		7.0	15.4	15.4	8.0	22.3	36.7
Actuated g/C Ratio	0.06	0.44	0.44	0.14	0.56		0.06	0.13	0.13	0.07	0.19	0.32
v/c Ratio	0.35	0.30	0.32	0.32	0.16		0.34	0.49	0.13	0.67	0.34	0.81
Control Delay	61.1	24.1	4.5	40.1	16.4		61.5	48.6	0.7	66.4	41.6	28.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.1	24.1	4.5	40.1	16.4		61.5	48.6	0.7	66.4	41.6	28.5
LOS	E	C	A	D	B		E	D	A	E	D	C
Approach Delay		19.0			24.0			42.3			38.5	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	27	116	0	55	41		25	85	0	60	85	208
Queue Length 95th (ft)	62	191	60	95	172		59	106	0	#101	105	278
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	107	1550	845	630	1976		100	877	554	241	953	701
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.30	0.32	0.24	0.16		0.34	0.26	0.09	0.66	0.24	0.74

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 47 (41%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 30.1

Intersection LOS: C

Intersection Capacity Utilization 77.6%

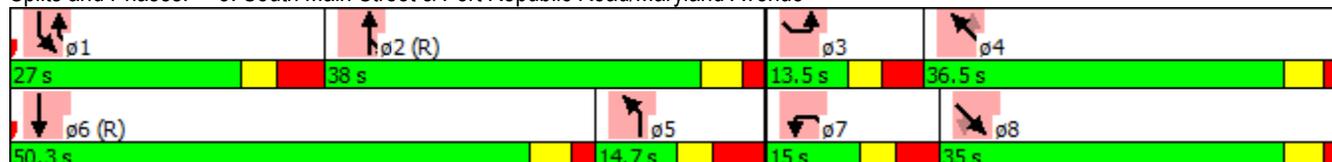
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	23	394	17	72	358	12	12	13	59	28	38	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.84			0.84	
Frt		0.994			0.996			0.877			0.887	
Flt Protected		0.997			0.992		0.950			0.950		
Satd. Flow (prot)	0	3343	0	0	3549	0	1778	1364	0	1596	1304	0
Flt Permitted		0.997			0.992		0.474			0.706		
Satd. Flow (perm)	0	3343	0	0	3549	0	887	1364	0	1186	1304	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			2			65			115	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			72			79
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	25	441	19	80	392	13	13	14	65	31	42	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	485	0	0	485	0	13	79	0	31	168	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	27.5	27.5		28.9	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	31.0	31.0		33.0	33.0		14.0	27.0		14.0	27.0	
Total Split (%)	27.0%	27.0%		28.7%	28.7%		12.2%	23.5%		12.2%	23.5%	
Maximum Green (s)	25.6	25.6		26.1	26.1		7.7	20.7		7.7	20.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0			0.0			0.0			0.0		
Total Lost Time (s)	5.4			6.9			6.3			6.3		
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0		0.0			0.0		
Flash Dont Walk (s)	17.0	17.0		17.0	17.0		14.0			16.0		
Pedestrian Calls (#/hr)	6	6		1	1		72			79		
Act Effct Green (s)	25.6			37.6			22.4	14.8		22.4	14.8	
Actuated g/C Ratio	0.22			0.33			0.19	0.13		0.19	0.13	
v/c Ratio	0.65			0.42			0.06	0.34		0.12	0.63	
Control Delay	43.2			33.7			25.7	18.3		27.3	27.1	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	43.2			33.7			25.7	18.3		27.3	27.1	
LOS	D			C			C	B		C	C	
Approach Delay	43.2			33.7			19.4			27.1		
Approach LOS	D			C			B			C		
Queue Length 50th (ft)	113			160			6	9		15	36	
Queue Length 95th (ft)	208			222			19	53		35	105	
Internal Link Dist (ft)	665			1500			466			490		
Turn Bay Length (ft)										180		
Base Capacity (vph)	746			1160			233	298		259	329	
Starvation Cap Reductn	0			0			0	0		0	0	
Spillback Cap Reductn	0			0			0	0		0	0	
Storage Cap Reductn	0			0			0	0		0	0	
Reduced v/c Ratio	0.65			0.42			0.06	0.27		0.12	0.51	

Intersection Summary

Area Type: Other
 Cycle Length: 115

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	9%	9%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Actuated Cycle Length: 115
 Offset: 52 (45%), Referenced to phase 4:NWTL, Start of 1st Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.65
 Intersection Signal Delay: 35.3
 Intersection LOS: D
 Intersection Capacity Utilization 65.5%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø4 (R)	 ø8
14 s	10 s	27 s	33 s	31 s
 ø5	 ø10	 ø6		
14 s	10 s	27 s		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	25	75	3	2	46	44	11	10	2	43	2	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996				0.850		0.988			0.955	
Flt Protected		0.988			0.998			0.976			0.969	
Satd. Flow (prot)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Flt Permitted		0.988			0.998			0.976			0.969	
Satd. Flow (perm)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	20		31	31		20	178		110	110		178
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	35	106	4	3	65	62	16	14	3	61	3	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	145	0	0	68	62	0	33	0	0	96	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.6%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	42	301	47	286	350	39	122	540	277	74	442	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			0.98			0.99	
Frt		0.979			0.988			0.951			0.974	
Flt Protected	0.950			0.950	0.992		0.950			0.950		
Satd. Flow (prot)	1841	3490	0	1684	3431	0	1832	3390	0	1823	3460	0
Flt Permitted	0.950			0.950	0.992		0.252			0.171		
Satd. Flow (perm)	1841	3490	0	1684	3431	0	486	3390	0	328	3460	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			5			61			17	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			9			9			26			22
Confl. Bikes (#/hr)			1			2			3			
Peak Hour Factor	0.85	0.90	0.85	0.80	0.81	0.85	0.86	0.88	0.92	0.85	0.79	0.85
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	3%	2%	0%	1%	3%	0%	1%	1%	0%	2%	1%
Adj. Flow (vph)	51	344	57	368	445	47	146	632	310	90	576	120
Shared Lane Traffic (%)				24%								
Lane Group Flow (vph)	51	401	0	280	580	0	146	942	0	90	696	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	38.0		14.4	38.0	
Total Split (s)	31.0	31.0		44.0	44.0		22.0	59.0		16.0	53.0	
Total Split (%)	20.7%	20.7%		29.3%	29.3%		14.7%	39.3%		10.7%	35.3%	
Maximum Green (s)	24.0	24.0		36.8	36.8		14.6	51.6		8.6	45.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			7.0			7.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	13	13		11	11			41			51	
Act Effct Green (s)	21.3	21.3		32.9	32.9		70.3	58.4		63.3	54.9	
Actuated g/C Ratio	0.14	0.14		0.22	0.22		0.47	0.39		0.42	0.37	
v/c Ratio	0.20	0.79		0.76	0.77		0.44	0.69		0.41	0.55	
Control Delay	57.6	72.5		37.1	31.4		17.6	14.6		28.4	40.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.6		0.0	0.0	
Total Delay	57.6	72.5		37.1	31.4		17.6	15.1		28.4	40.4	
LOS	E	E		D	C		B	B		C	D	
Approach Delay		70.8			33.3			15.5			39.0	
Approach LOS		E			C			B			D	
Queue Length 50th (ft)	44	196		252	262		18	46		47	284	
Queue Length 95th (ft)	82	253		140	122		m51	140		81	317	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100			150		
Base Capacity (vph)	294	567		413	845		367	1356		226	1276	
Starvation Cap Reductn	0	0		0	0		0	132		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	0.71		0.68	0.69		0.40	0.77		0.40	0.55	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Offset: 80 (53%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 33.9

Intersection LOS: C

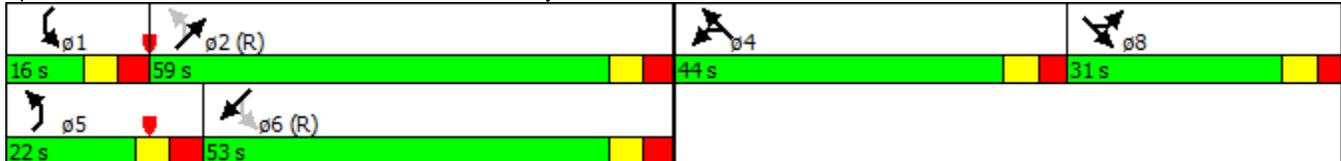
Intersection Capacity Utilization 83.3%

ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 1: South Main Street & MLK Jr Way



Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	52	27	105	176	49	21	57	904	115	12	750	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.878			0.954			0.980			0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1605	0	1850	1845	0	1718	3428	0	1787	3482	0
Flt Permitted	0.704			0.366			0.175			0.071		
Satd. Flow (perm)	1318	1605	0	713	1845	0	317	3428	0	134	3482	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			10			8			12			2
Peak Hour Factor	0.88	0.88	0.76	0.82	0.88	0.88	0.88	0.88	0.71	0.88	0.94	0.88
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	2%	0%	0%	2%	0%
Adj. Flow (vph)	61	32	142	221	57	25	67	1058	167	14	822	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	174	0	221	82	0	67	1225	0	14	854	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	31.0		13.3	36.0		13.3	36.0	
Total Split (s)	14.4	28.0		17.4	31.0		13.4	61.3		13.3	61.2	
Total Split (%)	9.6%	18.7%		11.6%	20.7%		8.9%	40.9%		8.9%	40.8%	
Maximum Green (s)	7.0	20.6		10.0	23.6		7.1	55.0		7.0	54.9	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	26.1	19.1		33.0	25.0		67.3	64.4		64.5	58.9	
Actuated g/C Ratio	0.17	0.13		0.22	0.17		0.45	0.43		0.43	0.39	
v/c Ratio	0.24	0.85		0.95	0.27		0.32	0.83		0.10	0.62	
Control Delay	46.9	97.1		99.5	58.2		22.5	31.9		23.8	34.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.3	
Total Delay	46.9	97.1		99.5	58.2		22.5	31.9		23.8	34.3	
LOS	D	F		F	E		C	C		C	C	
Approach Delay		84.1			88.3			31.4			34.2	
Approach LOS		F			F			C			C	
Queue Length 50th (ft)	47	167		185	72		22	229		7	223	
Queue Length 95th (ft)	86	#275		#295	123		50	#722		m11	255	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400			120			125			50		
Base Capacity (vph)	250	220		232	311		209	1472		134	1367	
Starvation Cap Reductn	0	0		0	0		0	0		0	138	
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	0.24	0.79		0.95	0.26		0.32	0.83		0.10	0.69	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 77 (51%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	165
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Grade (%)		5%			1%			3%				-2%
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.862			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1610	1386	0	1761	1510	0	1743	3472	0	1787	3526	0
Flt Permitted	0.552			0.640			0.194			0.228		
Satd. Flow (perm)	936	1386	0	1186	1510	0	356	3472	0	429	3526	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		185			24			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	105	1	185	16	2	24	46	1008	16	12	1008	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	186	0	16	26	0	46	1024	0	12	1063	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.13	1.13	1.13	1.01	1.01	1.01	1.02	1.02	1.02	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	20.0	39.0		15.0	34.0		16.0	81.0		15.0	80.0	
Total Split (%)	13.3%	26.0%		10.0%	22.7%		10.7%	54.0%		10.0%	53.3%	
Maximum Green (s)	13.5	32.5		8.5	27.5		9.4	74.4		8.4	73.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		16			27			34			28	
Act Effct Green (s)	33.6	28.2		23.6	17.8		100.9	97.7		97.4	91.8	
Actuated g/C Ratio	0.22	0.19		0.16	0.12		0.67	0.65		0.65	0.61	
v/c Ratio	0.40	0.45		0.07	0.13		0.15	0.45		0.04	0.49	
Control Delay	49.1	10.3		39.7	21.2		7.6	11.1		3.2	6.1	
Queue Delay	4.5	2.3		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	53.5	12.6		39.7	21.2		7.6	11.1		3.2	6.1	
LOS	D	B		D	C		A	B		A	A	
Approach Delay		27.4			28.3			10.9			6.1	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	78	1		11	2		8	103		2	184	
Queue Length 95th (ft)	130	70		30	31		m18	302		m2	m222	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	275	464		229	296		327	2261		358	2159	
Starvation Cap Reductn	111	170		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	0.64	0.63		0.07	0.09		0.14	0.45		0.03	0.49	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

Offset: 77 (51%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 11.1

Intersection LOS: B

Intersection Capacity Utilization 63.2%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 3: South Main Street & Bluestone Drive/Warsaw Avenue

 ø1	 ø2 (R)	 ø3	 ø4
15 s	31 s	20 s	34 s
 ø5	 ø6 (R)	 ø7	 ø8
16 s	80 s	15 s	39 s

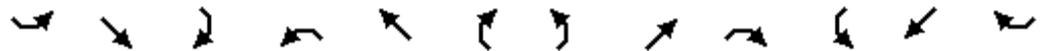
Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.444								
Satd. Flow (perm)	0	1807	0	772	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		21										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	174	49	54	53	0	0	0	106	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	0	54	53	0	0	106	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2			4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2			4					
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		13.3	13.3			22.0	
Total Split (s)		33.0		17.0	50.0		25.0	25.0			25.0	
Total Split (%)		44.0%		22.7%	66.7%		33.3%	33.3%			33.3%	
Maximum Green (s)		27.4		11.4	44.4		18.7	18.7			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0	0.0			1.0	
Recall Mode		None		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											21	
Act Effct Green (s)		19.6		22.4	24.0			9.4				
Actuated g/C Ratio		0.48		0.55	0.59			0.23				
v/c Ratio		0.25		0.09	0.05			0.28				
Control Delay		12.7		6.5	6.3			17.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		12.7		6.5	6.3			17.1				
LOS		B		A	A			B				
Approach Delay		12.7			6.4			17.1				
Approach LOS		B			A			B				
Queue Length 50th (ft)		22		5	5			14				
Queue Length 95th (ft)		112		22	21			63				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1310		689	1642			793				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.17		0.08	0.03			0.13				

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	40.6
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.28
Intersection Signal Delay:	12.3
Intersection LOS:	B

Lanes, Volumes, Timings

4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			243		6				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		798			1557			637			1182	
Travel Time (s)		15.5			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	114	661	369	545	597	43	34	313	66	354	397	415
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	661	369	545	640	0	34	313	66	354	397	415
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	36.0		13.5	34.5	34.5	13.9	34.5	14.1
Total Split (s)	25.5	45.5	45.5	40.0	60.0		14.0	34.5	34.5	30.0	50.5	40.0
Total Split (%)	17.0%	30.3%	30.3%	26.7%	40.0%		9.3%	23.0%	23.0%	20.0%	33.7%	26.7%
Maximum Green (s)	17.8	39.9	39.9	32.9	54.4		7.5	29.0	29.0	23.1	45.0	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		21	21		38			3	3		15	
Act Effct Green (s)	17.8	55.6	55.6	29.1	66.3		7.3	20.0	20.0	20.1	35.9	63.5
Actuated g/C Ratio	0.12	0.37	0.37	0.19	0.44		0.05	0.13	0.13	0.13	0.24	0.42
v/c Ratio	0.54	0.50	0.50	0.82	0.41		0.42	0.69	0.17	0.77	0.47	0.57
Control Delay	72.7	40.5	16.2	43.2	20.9		85.5	69.4	0.9	74.2	50.4	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	40.5	16.2	43.2	20.9		85.5	69.4	0.9	74.2	50.4	21.6
LOS	E	D	B	D	C		F	E	A	E	D	C
Approach Delay		35.9			31.1			59.8			47.4	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	107	263	88	210	197		33	157	0	174	182	203
Queue Length 95th (ft)	176	381	222	307	352		72	195	0	226	211	243
Internal Link Dist (ft)		718			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1312	739	753	1545		82	661	471	528	1061	765
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.50	0.50	0.72	0.41		0.41	0.47	0.14	0.67	0.37	0.54

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 2 (1%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	566	22	72	531	40	29	40	137	72	28	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.79			0.89	
Frt		0.995			0.991			0.882			0.871	
Flt Protected		0.996			0.994		0.950			0.950		
Satd. Flow (prot)	0	3374	0	0	3585	0	1778	1303	0	1659	1361	0
Flt Permitted		0.996			0.994		0.273			0.315		
Satd. Flow (perm)	0	3374	0	0	3585	0	511	1303	0	550	1361	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			4			108			188	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			9			1			95			45
Confl. Bikes (#/hr)			1			2			15			6
Peak Hour Factor	0.93	0.96	0.93	0.93	0.94	0.93	0.93	0.93	0.88	0.93	0.93	0.82
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	3%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	55	607	24	80	582	44	32	44	160	80	31	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	686	0	0	706	0	32	204	0	80	226	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Split	NA	Split		NA	pm+pt		NA	pm+pt		NA	
Protected Phases	8	8	4		4	5		2	1		6	
Permitted Phases							2				6	
Detector Phase	8	8	4		4	15		2	15		6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0		7.0	7.0		7.0	7.0		7.0	
Minimum Split (s)	28.0	28.0	28.9		28.9	13.3		30.3	13.3		32.0	
Total Split (s)	44.0	44.0	47.0		47.0	13.3		35.2	13.8		35.7	
Total Split (%)	29.3%	29.3%	31.3%		31.3%	8.9%		23.5%	9.2%		23.8%	
Maximum Green (s)	38.6	38.6	40.1		40.1	7.0		28.9	7.5		29.4	
Yellow Time (s)	3.0	3.0	4.5		4.5	3.5		3.5	3.5		3.5	
All-Red Time (s)	2.4	2.4	2.4		2.4	2.8		2.8	2.8		2.8	
Lost Time Adjust (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Total Lost Time (s)	5.4		6.9		6.3		6.3		6.3		6.3	
Lead/Lag	Lag	Lag	Lead		Lead	Lead				Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0		0.0	0.0		0.0	
Time To Reduce (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	
Recall Mode	Max	Max	C-Max		C-Max	None		None	None		None	
Walk Time (s)	5.0	5.0	5.0		5.0			0.0			0.0	
Flash Dont Walk (s)	17.0	17.0	17.0		17.0			17.0			19.0	
Pedestrian Calls (#/hr)	11	11	4		4			102			55	
Act Effct Green (s)	38.6		48.1		27.9		20.9	28.8		21.4		
Actuated g/C Ratio	0.26		0.32		0.19		0.14	0.19		0.14		
v/c Ratio	0.79		0.61		0.21		0.74	0.50		0.64		
Control Delay	52.9		46.3		40.2		45.2	50.5		20.9		
Queue Delay	0.0		0.0		0.0		0.0	0.0		0.0		
Total Delay	52.9		46.3		40.2		45.2	50.5		20.9		
LOS	D		D		D		D	D		C		
Approach Delay	52.9		46.3		44.5		28.6					
Approach LOS	D		D		D		C					
Queue Length 50th (ft)	210		298		23		94	59		34		
Queue Length 95th (ft)	316		404		46		179	95		119		
Internal Link Dist (ft)	665		1500		466		490					
Turn Bay Length (ft)									180			
Base Capacity (vph)	869		1153		153		338	161		417		
Starvation Cap Reductn	0		0		0		0	0		0		
Spillback Cap Reductn	0		0		0		0	0		0		
Storage Cap Reductn	0		0		0		0	0		0		
Reduced v/c Ratio	0.79		0.61		0.21		0.60	0.50		0.54		

Intersection Summary

Area Type: Other
 Cycle Length: 150

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Actuated Cycle Length: 150	
Offset: 128 (85%), Referenced to phase 4:NWTL, Start of 1st Green	
Natural Cycle: 115	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 45.6	Intersection LOS: D
Intersection Capacity Utilization 79.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 10: S Mason Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2$	 $\phi 4 (R)$	 $\phi 8$
13.8 s	10 s	35.2 s	47 s	44 s
 $\phi 5$	 $\phi 10$	 $\phi 6$		
13.3 s	10 s	35.7 s		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	39	90	2	1	113	98	8	19	1	71	1	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.997			0.937	
Flt Protected		0.985						0.986			0.974	
Satd. Flow (prot)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Flt Permitted		0.985						0.986			0.974	
Satd. Flow (perm)	0	1855	0	0	1900	1615	0	1868	0	0	1734	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	63		9	9		63	94		253	253		94
Confl. Bikes (#/hr)			2			10			26			13
Peak Hour Factor	0.70	0.70	0.70	0.73	0.73	0.73	0.70	0.70	0.70	0.70	0.70	0.70
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	57	132	3	1	159	138	12	28	1	104	1	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	192	0	0	160	138	0	41	0	0	196	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.2%

ICU Level of Service A

Analysis Period (min) 15

APPENDIX E

Site Trip Generation & Distribution Calculations

TRIP GENERATION / DISTRIBUTION

USE	ITE CODE	UNIT	#	ADT RATE	ADT	AM		PM		Origin / Destination					
						IN	OUT	IN	OUT	11-N	MLK-E	MLK-W	Msn-N	Gra-W	11-S
Hotel	310	Rooms	205	8.17	1675	59%	41%	51%	49%	25%	40%	10%	5%	5%	15%
Conf Center	n/a	Spaces	100			80%	20%	60%	40%	25%	40%	10%	5%	5%	15%
Parking Deck	n/a	Spaces	700			81%	19%	32%	68%	15%	25%	10%	10%	5%	35%

100%
100%

PEAK HOUR OF ADJ. STREET TRAFFIC, 7-9 AM

USE	RATE	TRIPS	IN (from)				OUT (to)							
			11-N	MLK-E	MLK-W	Msn-N	Gra-W	11-S	11-N	MLK-E	MLK-W	Msn-N	Gra-W	11-S
Hotel	0.53	109	16	26	6	3	3	10	11	19	4	2	2	7
Conf Center	0.15	15	3	5	1	1	1	2	1	1	0	0	0	0
Parking Deck	0.59	413	50	84	33	33	17	117	12	20	8	8	4	27
Total			69	115	40	37	21	129	24	40	12	10	6	34

(check)

109 64 45
15 13 2
413 334 79

PEAK HOUR OF ADJ. STREET TRAFFIC, 4-6 PM

USE	RATE	TRIPS	IN (from)				OUT (to)							
			11-N	MLK-E	MLK-W	Msn-N	Gra-W	11-S	11-N	MLK-E	MLK-W	Msn-N	Gra-W	11-S
Hotel	0.60	123	16	26	6	3	3	9	15	24	6	3	3	9
Conf Center	0.50	50	7	11	3	2	2	5	5	8	2	1	1	3
Parking Deck	0.65	455	22	36	15	15	7	51	46	77	31	31	15	109
Total			45	73	24	20	12	65	66	109	39	35	19	121

(check)

123 63 60
50 30 20
455 146 309

Note: Parking Deck rates determined by averaging rates of Grace St and Warsaw Ave Parking Decks

ENTRANCE DISTRIBUTION

Assume 40% Utilization of Right-In

Assume 30% Utilization of Right-Out

Warsaw Avenue Parking Deck Vehicle Counts

	10/28/2014 (Tuesday)	00:00-	01:00-	02:00-	03:00-	04:00-	05:00-	06:00-	07:00-	08:00-	09:00-	10:00-	11:00-	12:00-	13:00-	14:00-	15:00-	16:00-	17:00-	18:00-	19:00-	20:00-	21:00-	22:00-	23:00-	Total
Enter		4	2	1	5	1	9	32	198	188	313	75	62	99	111	44	103	51	59	68	101	58	6	6	3	1599
Level 2 (Commuter)		2	1	1	5	1	0	0	125	169	278	55	58	72	89	36	99	25	17	20	34	22	5	1	0	1115
Level G (Faculty/Staff)		16	13	3	2	4	0	2	2	3	36	44	79	120	83	112	191	192	167	115	76	58	60	176	35	1589
Level 2 (Commuter)		7	6	1	2	3	0	0	1	2	33	44	64	93	73	86	156	132	127	79	52	43	35	60	12	1111
total trips		29	22	6	14	9	9	34	326	362	660	218	263	384	356	278	549	400	370	282	263	181	106	243	50	

	10/29/2014 (Wednesday)	00:00-	01:00-	02:00-	03:00-	04:00-	05:00-	06:00-	07:00-	08:00-	09:00-	10:00-	11:00-	12:00-	13:00-	14:00-	15:00-	16:00-	17:00-	18:00-	19:00-	20:00-	21:00-	22:00-	23:00-	Total
Enter		3	1	0	0	1	8	29	168	274	275	103	88	105	91	108	70	60	74	60	126	22	4	7	4	1681
Level 2 (Commuter)		2	1	0	0	1	0	1	88	242	251	84	81	73	70	93	67	23	22	9	38	5	1	0	1	1153
Level G (Faculty/Staff)		21	10	0	2	3	0	2	3	6	40	74	100	108	96	126	197	212	171	128	82	57	117	124	27	1706
Level 2 (Commuter)		8	8	0	0	2	0	0	0	6	33	86	89	70	90	108	164	112	126	79	54	38	54	30	7	1164
total trips		34	20	0	2	7	8	32	259	528	599	347	358	356	347	435	498	407	393	276	300	122	176	161	39	

Levels G-2: 219 faculty/staff spaces
 Levels 2-5: 540 commuter spaces
 Note: levels G-2 open to commuters at 4:00 PM

peak hour 08:30-09:30
 rate (trips/spaces) 0.71
 staff gen 1.20
 in 93%
 out 7%

peak hour 16:30-17:30
 rate (trips/spaces) 0.52
 staff gen 0.28
 in 21%
 out 79%

Grace Street Parking Deck Vehicle Counts

	10/28/2014 (Tuesday)	00:00-	01:00-	02:00-	03:00-	04:00-	05:00-	06:00-	07:00-	08:00-	09:00-	10:00-	11:00-	12:00-	13:00-	14:00-	15:00-	16:00-	17:00-	18:00-	19:00-	20:00-	21:00-	22:00-	23:00-	Total
Enter		2	1	0	2	0	20	23	257	87	65	46	43	63	48	62	70	93	91	138	97	75	34	12	1	1330
Level 5 (Commuter)		0	1	0	0	0	9	7	208	22	43	38	34	47	38	44	59	31	28	31	30	9	2	3	0	684
Level 2 (Faculty/Staff)		37	19	5	0	0	0	4	9	24	42	33	50	62	47	74	102	100	144	111	115	118	99	82	48	1325
Level 5 (Commuter)		10	3	1	0	0	0	2	7	23	41	33	41	46	41	38	65	70	64	53	54	32	23	21	17	685
total trips		49	24	6	2	0	29	36	481	156	191	150	168	218	174	218	296	294	327	333	296	234	158	118	66	

	10/29/2014 (Wednesday)	00:00-	01:00-	02:00-	03:00-	04:00-	05:00-	06:00-	07:00-	08:00-	09:00-	10:00-	11:00-	12:00-	13:00-	14:00-	15:00-	16:00-	17:00-	18:00-	19:00-	20:00-	21:00-	22:00-	23:00-	Total
Enter		2	2	0	2	0	12	21	197	145	56	63	50	77	77	71	84	96	141	141	117	63	32	10	4	1463
Level 5 (Commuter)		2	1	0	0	0	0	3	147	85	36	51	46	87	72	56	65	27	38	80	42	6	2	0	2	848
Level 2 (Faculty/Staff)		25	29	10	0	1	0	1	1	17	32	46	51	71	83	93	95	115	133	127	152	129	161	55	51	1478
Level 5 (Commuter)		5	8	2	0	0	0	0	1	18	38	45	50	84	83	60	61	55	61	72	71	54	54	12	18	852
total trips		34	40	12	2	1	12	25	346	265	162	205	197	319	315	280	305	293	373	420	382	252	249	77	75	

Levels 2-4: 197 faculty/staff spaces
 Levels 5-7: 217 commuter spaces
 Note: levels 2-4 open to commuter students at 4:00 PM

peak hour 08:30-09:30
 rate (trips/spaces) 0.47
 staff gen 0.45
 in 69%
 out 31%

peak hour 16:30-17:30
 rate (trips/spaces) 0.78
 staff gen 0.53
 in 42%
 out 58%

NOTE: JMU-utilized parking deck space trip generation rates for peak hours, used in trip gen table on previous page, are based upon the average experienced trip generation rates of the two decks listed above. Data provided for Champions Deck was not utilized, as associated destinations differ more significantly that Warsaw and Grace, and trip gen rates were significantly lower.

APPENDIX F

Total 2016 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	49	248	42	250	224	38	72	353	205	97	247	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00				0.94		0.99	
Frt		0.975			0.981				0.850		0.966	
Flt Protected	0.950			0.950	0.989		0.950			0.950		
Satd. Flow (prot)	1841	3574	0	1684	3379	0	1728	3362	1623	1770	3284	0
Flt Permitted	0.950			0.950	0.989		0.535			0.420		
Satd. Flow (perm)	1841	3574	0	1684	3379	0	973	3362	1518	783	3284	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			10				273		28	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			33			21
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	61	314	63	305	287	54	74	447	273	137	281	82
Shared Lane Traffic (%)				30%								
Lane Group Flow (vph)	61	377	0	213	433	0	74	447	273	137	363	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		31.0	31.0		14.4	34.4	31.0	14.4	34.4	
Total Split (s)	34.0	34.0		31.0	31.0		15.0	35.0	31.0	15.0	35.0	
Total Split (%)	27.2%	27.2%		24.8%	24.8%		12.0%	28.0%	24.8%	12.0%	28.0%	
Maximum Green (s)	26.8	26.8		24.0	24.0		7.6	27.6	24.0	7.6	27.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		2.9	2.9		3.6	3.6	2.9	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.0	7.0		7.4	7.4	7.0	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		19.0	19.0			22.0	19.0		22.0	
Pedestrian Calls (#/hr)	8	8		5	5			32	5		20	
Act Effct Green (s)	18.4	18.4		24.4	24.4		52.2	44.6	69.4	55.6	48.4	
Actuated g/C Ratio	0.15	0.15		0.20	0.20		0.42	0.36	0.56	0.44	0.39	
v/c Ratio	0.23	0.70		0.65	0.65		0.16	0.37	0.28	0.33	0.28	
Control Delay	47.4	55.0		49.5	43.8		5.5	9.9	2.0	23.1	27.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	47.4	55.0		49.5	43.8		5.5	9.9	2.0	23.1	27.6	
LOS	D	E		D	D		A	A	A	C	C	
Approach Delay		54.0			45.7			6.8			26.4	
Approach LOS		D			D			A			C	
Queue Length 50th (ft)	44	148		180	178		8	85	30	62	103	
Queue Length 95th (ft)	72	162		248	204		m16	37	0	87	151	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	394	779		351	712		455	1198	1002	417	1288	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.15	0.48		0.61	0.61		0.16	0.37	0.27	0.33	0.28	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 53 (42%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	28	42	47	78	25	18	86	571	180	7	508	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	250		0	125		0	50		0
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.97		0.99			0.99			1.00	
Frt			0.850		0.909			0.965			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	3589	1658	0	1702	3270	0	1686	3399	0
Flt Permitted	0.704			0.950			0.204			0.234		
Satd. Flow (perm)	1318	1872	1543	3589	1658	0	365	3270	0	415	3399	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			248									
Link Speed (mph)		25			25			30				30
Link Distance (ft)		1460			736			1028				515
Travel Time (s)		39.8			20.1			23.4				11.7
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	33	56	61	147	32	50	141	664	202	7	635	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	56	61	147	82	0	141	866	0	7	688	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		24			15			12				12
Link Offset(ft)		-2			12			0				0
Crosswalk Width(ft)		30			18			30				25
Two way Left Turn Lane								Yes				Yes
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25				25
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8				2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	18.0	18.0	23.0	26.0		14.0	40.0		14.0	40.0	
Total Split (%)	12.0%	14.4%	14.4%	18.4%	20.8%		11.2%	32.0%		11.2%	32.0%	
Maximum Green (s)	7.6	10.6	10.6	15.6	18.6		7.7	33.7		7.7	33.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.2	9.3	9.3	10.5	15.3		56.0	54.3		47.6	40.6	
Actuated g/C Ratio	0.12	0.07	0.07	0.08	0.12		0.45	0.43		0.38	0.32	
v/c Ratio	0.18	0.40	0.18	0.49	0.41		0.52	0.61		0.03	0.62	
Control Delay	39.8	63.1	1.1	59.9	56.4		39.4	26.9		13.6	30.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.8	63.1	1.1	59.9	56.4		39.4	26.9		13.6	30.2	
LOS	D	E	A	E	E		D	C		B	C	
Approach Delay		32.8			58.7			28.6			30.1	
Approach LOS		C			E			C			C	
Queue Length 50th (ft)	22	44	0	59	64		40	122		3	212	
Queue Length 95th (ft)	45	72	0	53	97		79	#426		m6	226	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	250			125			50		
Base Capacity (vph)	191	163	361	447	261		271	1420		238	1103	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.34	0.17	0.33	0.31		0.52	0.61		0.03	0.62	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 36 (29%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 105

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	24%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	200
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 32.7

Intersection LOS: C

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 $\phi 1$	 $\phi 2 (R)$	 $\phi 9$	 $\phi 3$	 $\phi 4$
14 s	40 s	30 s	15 s	26 s
 $\phi 5$	 $\phi 6 (R)$		 $\phi 7$	 $\phi 8$
14 s	40 s		23 s	18 s

Lanes, Volumes, Timings 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.92			1.00			0.96	
Frt		0.860			0.898			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1465	0	1770	1540	0	1770	3527	0	1770	3294	0
Flt Permitted	0.670			0.738			0.339			0.342		
Satd. Flow (perm)	1165	1465	0	1375	1540	0	631	3527	0	637	3294	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			28			2			32	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	18	2	27	7	13	28	225	784	12	26	487	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	29	0	7	41	0	225	796	0	26	628	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	15.0	34.0		14.0	33.0		29.0	62.0		15.0	48.0	
Total Split (%)	12.0%	27.2%		11.2%	26.4%		23.2%	49.6%		12.0%	38.4%	
Maximum Green (s)	8.5	27.5		7.5	26.5		22.4	55.4		8.4	41.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	22.3	20.7		20.6	17.8		90.7	84.3		80.1	73.0	
Actuated g/C Ratio	0.18	0.17		0.16	0.14		0.73	0.67		0.64	0.58	
v/c Ratio	0.08	0.11		0.03	0.17		0.40	0.33		0.06	0.32	
Control Delay	34.2	15.0		31.8	21.5		8.9	10.9		5.0	7.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.2	15.0		31.8	21.5		8.9	10.9		5.0	7.2	
LOS	C	B		C	C		A	B		A	A	
Approach Delay		22.4			23.0			10.5			7.1	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	12	1		5	9		51	157		2	57	
Queue Length 95th (ft)	29	28		15	41		101	210		m10	100	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	247	368		254	348		664	2379		491	1938	
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	0.07	0.08		0.03	0.12		0.34	0.33		0.05	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 32 (26%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954						0.982				
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	1777	0	1652	1739	0	0	1754	0	0	1863	0
Flt Permitted				0.591				0.959				
Satd. Flow (perm)	0	1777	0	1027	1739	0	0	1754	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	29	15	19	360	0	115	0	18	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	19	360	0	0	133	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		52.0		16.0	68.0		35.0	35.0			22.0	
Total Split (%)		41.6%		12.8%	54.4%		28.0%	28.0%			17.6%	
Maximum Green (s)		46.4		10.4	62.4		28.7	28.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		26.1		25.9	28.0			10.9				
Actuated g/C Ratio		0.47		0.46	0.50			0.19				
v/c Ratio		0.05		0.03	0.41			0.39				
Control Delay		15.9		16.1	18.5			28.2				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		15.9		16.1	18.6			28.2				
LOS		B		B	B			C				
Approach Delay		15.9			18.4			28.2				
Approach LOS		B			B			C				
Queue Length 50th (ft)		8		5	121			46				
Queue Length 95th (ft)		37		19	219			105				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1438		605	1649			1012				
Starvation Cap Reductn		0		0	126			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.03		0.03	0.24			0.13				

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	55.9
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	20.6
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 34.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue

 $\phi 2$		 $\phi 4$		 $\phi 8$	
68 s		35 s		22 s	
 $\phi 5$		 $\phi 6$			
16 s		52 s			

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1504	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270		4				209			182
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	37	458	270	151	308	12	34	226	50	160	231	517
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	458	270	151	320	0	34	226	50	160	231	517
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	37.8	37.8	35.0	58.1		13.5	35.0	35.0	17.2	38.7	35.0
Total Split (%)	11.8%	30.2%	30.2%	28.0%	46.5%		10.8%	28.0%	28.0%	13.8%	31.0%	28.0%
Maximum Green (s)	7.0	32.2	32.2	27.9	52.5		7.0	29.5	29.5	10.3	33.2	27.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	56.5	56.5	17.7	72.5		7.0	15.9	15.9	9.8	24.5	40.6
Actuated g/C Ratio	0.06	0.45	0.45	0.14	0.58		0.06	0.13	0.13	0.08	0.20	0.32
v/c Ratio	0.37	0.29	0.31	0.31	0.16		0.37	0.52	0.13	0.60	0.33	0.82
Control Delay	68.0	24.9	4.5	23.3	10.0		68.6	54.0	0.7	65.4	44.6	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	24.9	4.5	23.3	10.0		68.6	54.0	0.7	65.4	44.6	32.3
LOS	E	C	A	C	B		E	D	A	E	D	C
Approach Delay		19.8			14.3			47.0			41.3	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	29	125	0	20	33		27	93	0	65	92	245
Queue Length 95th (ft)	67	201	61	73	156		63	117	0	102	114	314
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	99	1600	863	766	2035		92	807	514	282	939	746
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.29	0.31	0.20	0.16		0.37	0.28	0.10	0.57	0.25	0.69

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 111 (89%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	19	421	90	173	368	12	39	20	79	29	67	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.84			0.86	
Frt		0.974			0.995			0.881			0.905	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3277	0	1841	3557	0	1778	1355	0	1596	1364	0
Flt Permitted	0.950			0.330			0.390			0.670		
Satd. Flow (perm)	1751	3277	0	640	3557	0	730	1355	0	1125	1364	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			3			85			73	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			74			81
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	20	458	97	186	391	13	42	22	85	31	72	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	555	0	186	404	0	42	107	0	31	198	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.9	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	14.0	31.0		25.0	42.0		14.0	45.0		14.0	45.0	
Total Split (%)	11.2%	24.8%		20.0%	33.6%		11.2%	36.0%		11.2%	36.0%	
Maximum Green (s)	8.6	25.6		18.1	35.1		7.7	38.7		7.7	38.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		6			1			72			79	
Act Effct Green (s)	7.6	55.3		72.6	67.1		25.5	18.0		25.5	18.0	
Actuated g/C Ratio	0.06	0.44		0.58	0.54		0.20	0.14		0.20	0.14	
v/c Ratio	0.19	0.38		0.38	0.21		0.20	0.40		0.12	0.77	
Control Delay	66.4	13.9		16.9	18.7		29.0	17.8		27.6	50.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	66.4	13.9		16.9	18.7		29.0	17.8		27.6	50.4	
LOS	E	B		B	B		C	B		C	D	
Approach Delay		15.7			18.2			21.0			47.3	
Approach LOS		B			B			C			D	
Queue Length 50th (ft)	15	111		70	80		23	16		17	100	
Queue Length 95th (ft)	m36	174		131	161		44	64		36	172	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	121	1460		545	1910		214	478		260	472	
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	0.38		0.34	0.21		0.20	0.22		0.12	0.42	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 94 (75%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 68.6%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø3	 ø4 (R)
14 s	10 s	45 s	14 s	42 s
 ø5	 ø10	 ø6	 ø7	 ø8
14 s	10 s	45 s	25 s	31 s

Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	134	77	3	2	47	45	11	10	2	44	2	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.987			0.930	
Flt Protected		0.970			0.998			0.977			0.978	
Satd. Flow (prot)	0	1833	0	0	1896	1615	0	1832	0	0	1728	0
Flt Permitted		0.970			0.998			0.977			0.978	
Satd. Flow (perm)	0	1833	0	0	1896	1615	0	1832	0	0	1728	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	21		32	32		21	183		113	113		183
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	184	105	4	3	64	62	15	14	3	60	3	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	293	0	0	67	62	0	32	0	0	131	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.0% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	43	329	42	294	387	89	125	508	304	115	450	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%				-2%
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			0.99				0.93		0.99	
Frt		0.980			0.971				0.850		0.961	
Flt Protected	0.950			0.950	0.997		0.950			0.950		
Satd. Flow (prot)	1841	3595	0	1684	3349	0	1728	3362	1623	1770	3267	0
Flt Permitted	0.950			0.950	0.997		0.235			0.240		
Satd. Flow (perm)	1841	3595	0	1684	3349	0	428	3362	1509	447	3267	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			17				258		30	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			32			20
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	54	416	63	359	496	125	129	643	405	162	511	182
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	54	479	0	323	657	0	129	643	405	162	693	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	40.0	40.0		45.0	45.0		15.0	40.0	45.0	15.0	40.0	
Total Split (%)	26.7%	26.7%		30.0%	30.0%		10.0%	26.7%	30.0%	10.0%	26.7%	
Maximum Green (s)	32.8	32.8		37.8	37.8		7.6	32.6	37.8	7.6	32.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	11	11		13	13			42	13		52	
Act Effct Green (s)	25.0	25.0		40.2	40.2		53.9	44.1	84.5	57.3	45.8	
Actuated g/C Ratio	0.17	0.17		0.27	0.27		0.36	0.29	0.56	0.38	0.31	
v/c Ratio	0.18	0.79		0.72	0.72		0.54	0.65	0.41	0.60	0.68	
Control Delay	53.4	68.2		51.5	46.0		25.5	20.6	4.1	43.5	48.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.2	0.0	1.0	
Total Delay	53.4	68.2		51.5	46.0		25.5	20.6	4.3	43.5	49.6	
LOS	D	E		D	D		C	C	A	D	D	
Approach Delay		66.7			47.8			15.5			48.4	
Approach LOS		E			D			B			D	
Queue Length 50th (ft)	46	235		309	307		20	165	58	107	311	
Queue Length 95th (ft)	74	243		402	338		m48	106	49	126	374	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	402	793		462	932		238	987	1002	272	1018	
Starvation Cap Reductn	0	0		0	0		0	0	123	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	134	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.13	0.60		0.70	0.70		0.54	0.65	0.46	0.60	0.78	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 102 (68%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 40.1
 Intersection LOS: D
 Intersection Capacity Utilization 82.1%
 ICU Level of Service E
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: South Main Street & MLK Jr Way

 ø1	 ø9	 ø2 (R)	 ø4	 ø8
15 s	10 s	40 s	40 s	45 s
 ø5	 ø10	 ø6 (R)		
15 s	10 s	40 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	57	32	108	262	63	27	59	944	136	2	771	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	250		0	125		0	50		0
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.96		0.99			1.00				1.00
Frt			0.850		0.927			0.982				0.993
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	3589	1698	0	1702	3320	0	1686	3415	0
Flt Permitted	0.659			0.950			0.075			0.085		
Satd. Flow (perm)	1233	1872	1523	3589	1698	0	134	3320	0	151	3415	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			207									
Link Speed (mph)		25			25			30				30
Link Distance (ft)		1460			736			1028				515
Travel Time (s)		39.8			20.1			23.4				11.7
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	66	43	140	494	80	75	97	1098	153	2	964	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	43	140	494	155	0	97	1251	0	2	1009	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		24			15			12				12
Link Offset(ft)		-2			12			0				0
Crosswalk Width(ft)		30			18			30				25
Two way Left Turn Lane								Yes				Yes
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25				25
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8				2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	15.0	15.0	41.0	41.0		14.0	50.0		14.0	50.0	
Total Split (%)	10.0%	10.0%	10.0%	27.3%	27.3%		9.3%	33.3%		9.3%	33.3%	
Maximum Green (s)	7.6	7.6	7.6	33.6	33.6		7.7	43.7		7.7	43.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	16.1	8.6	8.6	25.9	29.9		63.3	61.7		55.8	48.8	
Actuated g/C Ratio	0.11	0.06	0.06	0.17	0.20		0.42	0.41		0.37	0.33	
v/c Ratio	0.42	0.40	0.50	0.80	0.46		0.63	0.92		0.02	0.91	
Control Delay	49.5	78.9	6.8	69.6	57.8		65.4	41.6		22.5	45.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	4.4	
Total Delay	49.5	78.9	6.8	69.6	57.8		65.4	41.6		22.5	50.0	
LOS	D	E	A	E	E		E	D		C	D	
Approach Delay		30.6			66.8			43.3			50.0	
Approach LOS		C			E			D			D	
Queue Length 50th (ft)	49	41	0	242	139		55	249		1	301	
Queue Length 95th (ft)	80	70	0	159	175		78	#868		m0	#483	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	250			125			50		
Base Capacity (vph)	160	109	284	803	382		154	1366		135	1110	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	62	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.41	0.39	0.49	0.62	0.41		0.63	0.92		0.01	0.96	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 88 (59%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 145

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	250
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 49.1

Intersection LOS: D

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 ø1	 ø2 (R)	 ø9	 ø3	 ø4
14 s	50 s	30 s	15 s	41 s
 ø5	 ø6 (R)		 ø7	 ø8
14 s	50 s		41 s	15 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.862			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1422	0	1770	1517	0	1770	3525	0	1770	3491	0
Flt Permitted	0.552			0.640			0.195			0.229		
Satd. Flow (perm)	960	1422	0	1192	1517	0	363	3525	0	427	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		185			24			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	105	1	185	16	2	24	46	1008	16	12	1008	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	186	0	16	26	0	46	1024	0	12	1063	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	19.0	38.0		15.0	34.0		16.0	82.0		15.0	81.0	
Total Split (%)	12.7%	25.3%		10.0%	22.7%		10.7%	54.7%		10.0%	54.0%	
Maximum Green (s)	12.5	31.5		8.5	27.5		9.4	75.4		8.4	74.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	32.7	27.7		23.6	17.8		101.4	98.2		97.9	92.3	
Actuated g/C Ratio	0.22	0.18		0.16	0.12		0.68	0.65		0.65	0.62	
v/c Ratio	0.40	0.45		0.07	0.13		0.15	0.44		0.04	0.49	
Control Delay	49.5	10.3		40.2	21.2		8.2	10.7		4.0	9.2	
Queue Delay	5.4	2.5		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	54.9	12.8		40.2	21.2		8.2	10.7		4.0	9.2	
LOS	D	B		D	C		A	B		A	A	
Approach Delay		28.0			28.4			10.6			9.2	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	78	1		11	2		10	120		3	206	
Queue Length 95th (ft)	131	70		31	30		m19	165		m3	m231	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	271	465		230	297		334	2307		357	2150	
Starvation Cap Reductn	114	174		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	0.67	0.64		0.07	0.09		0.14	0.44		0.03	0.49	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 80 (53%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.490								
Satd. Flow (perm)	0	1807	0	852	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	174	49	54	53	0	0	0	106	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	0	54	53	0	0	106	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		63.0		21.0	84.0		44.0	44.0			22.0	
Total Split (%)		42.0%		14.0%	56.0%		29.3%	29.3%			14.7%	
Maximum Green (s)		57.4		15.4	78.4		37.7	37.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		25.7		30.2	32.7			11.3				
Actuated g/C Ratio		0.43		0.50	0.54			0.19				
v/c Ratio		0.29		0.10	0.06			0.35				
Control Delay		24.1		14.3	14.0			32.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		24.1		14.3	14.0			32.1				
LOS		C		B	B			C				
Approach Delay		24.1			14.1			32.1				
Approach LOS		C			B			C				
Queue Length 50th (ft)		86		15	14			44				
Queue Length 95th (ft)		169		38	37			99				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1529		672	1712			1092				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.15		0.08	0.03			0.10				

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	60.3
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.35
Intersection Signal Delay:	23.6
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue

 ø2	 ø4	 ø8
84 s	44 s	22 s
 ø5	 ø6	
21 s	63 s	

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242		5				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	114	661	369	545	597	43	34	313	66	354	397	415
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	661	369	545	640	0	34	313	66	354	397	415
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	25.5	45.0	45.0	40.0	59.5		14.0	35.0	35.0	30.0	51.0	40.0
Total Split (%)	17.0%	30.0%	30.0%	26.7%	39.7%		9.3%	23.3%	23.3%	20.0%	34.0%	26.7%
Maximum Green (s)	17.8	39.4	39.4	32.9	53.9		7.5	29.5	29.5	23.1	45.5	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	17.8	55.5	55.5	29.2	66.3		7.3	20.0	20.0	20.1	35.9	63.6
Actuated g/C Ratio	0.12	0.37	0.37	0.19	0.44		0.05	0.13	0.13	0.13	0.24	0.42
v/c Ratio	0.54	0.50	0.50	0.82	0.41		0.42	0.69	0.17	0.77	0.47	0.57
Control Delay	72.7	40.6	16.4	47.8	21.7		85.5	69.4	0.9	74.2	50.4	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	40.6	16.4	47.8	21.7		85.5	69.4	0.9	74.2	50.4	21.5
LOS	E	D	B	D	C		F	E	A	E	D	C
Approach Delay		36.0			33.7			59.8			47.4	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	107	263	89	227	191		33	157	0	174	182	203
Queue Length 95th (ft)	176	383	224	296	348		72	195	0	226	211	241
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1310	738	755	1545		82	672	475	528	1073	766
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.50	0.50	0.72	0.41		0.41	0.47	0.14	0.67	0.37	0.54

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 10 (7%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	35	609	42	128	546	41	106	68	200	74	40	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.82			0.80	
Frt		0.990			0.989			0.888			0.880	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3332	0	1841	3536	0	1778	1344	0	1596	1232	0
Flt Permitted	0.950			0.255			0.400			0.234		
Satd. Flow (perm)	1751	3332	0	494	3536	0	749	1344	0	393	1232	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			6			97			131	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			72			79
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	38	662	45	138	581	44	114	73	215	80	43	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	707	0	138	625	0	114	288	0	80	214	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	53.0		22.0	60.0		18.0	47.0		18.0	47.0	
Total Split (%)	10.0%	35.3%		14.7%	40.0%		12.0%	31.3%		12.0%	31.3%	
Maximum Green (s)	9.6	47.6		15.1	53.1		11.7	40.7		11.7	40.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		11			4			105			57	
Act Effct Green (s)	8.5	63.9		78.9	69.1		39.9	28.2		39.9	28.2	
Actuated g/C Ratio	0.06	0.43		0.53	0.46		0.27	0.19		0.27	0.19	
v/c Ratio	0.38	0.50		0.38	0.38		0.41	0.87		0.40	0.63	
Control Delay	92.8	14.0		22.6	29.6		34.9	62.9		35.9	28.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	92.8	14.0		22.6	29.6		34.9	62.9		35.9	28.7	
LOS	F	B		C	C		C	E		D	C	
Approach Delay		18.0			28.3			54.9			30.7	
Approach LOS		B			C			D			C	
Queue Length 50th (ft)	35	169		66	213		74	190		51	74	
Queue Length 95th (ft)	m66	243		125	310		105	282		78	152	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	113	1422		400	1632		279	435		198	429	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.50		0.34	0.38		0.41	0.66		0.40	0.50	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 135 (90%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 30.0

Intersection LOS: C

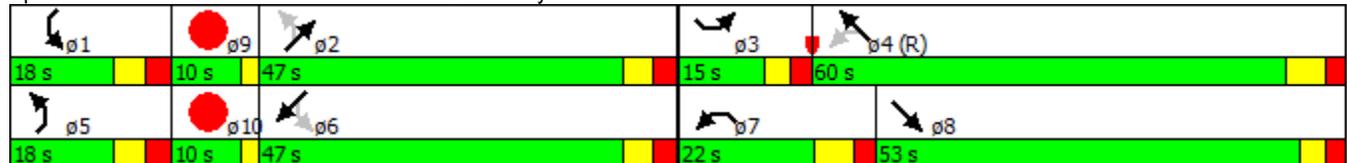
Intersection Capacity Utilization 71.6%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way



Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	76	93	2	1	116	101	8	20	1	73	1	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.997			0.907	
Flt Protected		0.978						0.986			0.985	
Satd. Flow (prot)	0	1844	0	0	1900	1615	0	1868	0	0	1697	0
Flt Permitted		0.978						0.986			0.985	
Satd. Flow (perm)	0	1844	0	0	1900	1615	0	1868	0	0	1697	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	65		9	9		65	97		261	261		97
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	104	127	3	1	159	138	11	27	1	100	1	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	234	0	0	160	138	0	39	0	0	324	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	46.7%
ICU Level of Service	A
Analysis Period (min)	15

APPENDIX G

Background 2022 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	48	209	48	243	210	18	70	342	176	38	242	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.99			1.00			0.98			0.99	
Frt		0.968			0.991			0.947			0.966	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1841	3544	0	1684	3425	0	1728	3204	0	1770	3287	0
Flt Permitted	0.950			0.950	0.987		0.482			0.251		
Satd. Flow (perm)	1841	3544	0	1684	3425	0	877	3204	0	468	3287	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			5			85			32	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			5			8			32			20
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	67	296	80	332	302	28	81	485	263	60	308	90
Shared Lane Traffic (%)				35%								
Lane Group Flow (vph)	67	376	0	216	446	0	81	748	0	60	398	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt		NA
Protected Phases	8	8		4	4		5	2		1		6
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1		6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0		15.0
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	34.4		14.4		34.4
Total Split (s)	31.0	31.0		32.2	32.2		14.4	37.4		14.4		37.4
Total Split (%)	27.0%	27.0%		28.0%	28.0%		12.5%	32.5%		12.5%		32.5%
Maximum Green (s)	24.0	24.0		25.0	25.0		7.0	30.0		7.0		30.0
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8		3.8
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6		3.6
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4		7.4
Lead/Lag							Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0		1.0
Recall Mode	None	None		None	None		None	C-Max		None		C-Max
Walk Time (s)	5.0	5.0		5.0	5.0			5.0				5.0
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0				22.0
Pedestrian Calls (#/hr)	5	5		8	8			32				20
Act Effct Green (s)	17.2	17.2		21.6	21.6		49.0	42.5		48.2		42.1
Actuated g/C Ratio	0.15	0.15		0.19	0.19		0.43	0.37		0.42		0.37
v/c Ratio	0.24	0.68		0.68	0.69		0.19	0.60		0.21		0.33
Control Delay	43.7	48.8		38.5	33.0		8.1	9.3		21.6		27.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Delay	43.7	48.8		38.5	33.0		8.1	9.3		21.6		27.7
LOS	D	D		D	C		A	A		C		C
Approach Delay		48.0			34.8			9.2				26.9
Approach LOS		D			C			A				C
Queue Length 50th (ft)	45	131		78	78		6	30		24		106
Queue Length 95th (ft)	72	145		158	132		m24	62		44		163
Internal Link Dist (ft)		650			665			435				425
Turn Bay Length (ft)	250			200			100			150		
Base Capacity (vph)	384	760		366	748		432	1238		280		1224
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	0.49		0.59	0.60		0.19	0.60		0.21		0.33

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Offset: 17 (15%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 26.9

Intersection LOS: C

Intersection Capacity Utilization 75.2%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 1: South Main Street & MLK Jr Way

 $\phi 1$	 $\phi 2 (R)$	 $\phi 4$	 $\phi 8$
14.4 s	37.4 s	32.2 s	31 s
 $\phi 5$	 $\phi 6 (R)$		
14.4 s	37.4 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	24	27	46	55	20	17	84	535	97	16	494	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.906			0.902			0.978			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1665	0	1850	1639	0	1702	3308	0	1686	3399	0
Flt Permitted	0.704			0.522			0.147			0.201		
Satd. Flow (perm)	1318	1665	0	1017	1639	0	263	3308	0	357	3399	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	31	40	67	116	28	53	154	697	122	19	692	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	31	107	0	116	81	0	154	819	0	19	750	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	18.0		15.0	18.0		14.0	38.0		14.0	38.0	
Total Split (%)	13.0%	15.7%		13.0%	15.7%		12.2%	33.0%		12.2%	33.0%	
Maximum Green (s)	7.6	10.6		7.6	10.6		7.7	31.7		7.7	31.7	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	17.4	10.1		17.7	13.0		43.8	40.7		39.0	31.9	
Actuated g/C Ratio	0.15	0.09		0.15	0.11		0.38	0.35		0.34	0.28	
v/c Ratio	0.14	0.73		0.55	0.44		0.77	0.70		0.09	0.80	
Control Delay	37.3	79.2		49.6	56.3		44.6	29.2		24.5	46.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.3	79.2		49.6	56.3		44.6	29.2		24.5	46.1	
LOS	D	E		D	E		D	C		C	D	
Approach Delay		69.8			52.3			31.7			45.6	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	18	78		72	58		66	234		9	212	
Queue Length 95th (ft)	43	114		70	97		38	#394		m23	254	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400			120			125			50		
Base Capacity (vph)	233	153		211	195		199	1171		212	943	
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	0.13	0.70		0.55	0.42		0.77	0.70		0.09	0.80	

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 8 (7%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	26%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	134
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.93			1.00			0.97	
Frt		0.860			0.900			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1466	0	1770	1556	0	1770	3528	0	1770	3301	0
Flt Permitted	0.658			0.737			0.311			0.316		
Satd. Flow (perm)	1144	1466	0	1373	1556	0	579	3528	0	589	3301	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			30			2			34	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	19	2	29	7	15	30	245	852	13	28	530	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	31	0	7	45	0	245	865	0	28	683	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	14.0	33.0		14.0	33.0		26.0	54.0		14.0	42.0	
Total Split (%)	12.2%	28.7%		12.2%	28.7%		22.6%	47.0%		12.2%	36.5%	
Maximum Green (s)	7.5	26.5		7.5	26.5		19.4	47.4		7.4	35.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	18.6	17.1		17.1	14.3		83.8	77.9		73.7	66.6	
Actuated g/C Ratio	0.16	0.15		0.15	0.12		0.73	0.68		0.64	0.58	
v/c Ratio	0.09	0.13		0.03	0.21		0.45	0.36		0.06	0.35	
Control Delay	32.5	13.6		29.5	21.0		11.1	8.6		10.0	21.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.5	13.6		29.5	21.0		11.1	8.6		10.0	21.4	
LOS	C	B		C	C		B	A		A	C	
Approach Delay		20.8			22.2			9.2			20.9	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	14	1		5	11		15	48		2	218	
Queue Length 95th (ft)	26	27		14	40		m129	210		m19	274	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	221	390		235	381		627	2389		455	1926	
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	0.09	0.08		0.03	0.12		0.39	0.36		0.06	0.35	

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 115
 Offset: 76 (66%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955						0.982				
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1779	0	1652	1739	0	0	1752	0	0	1863	0
Flt Permitted				0.586				0.958				
Satd. Flow (perm)	0	1779	0	1019	1739	0	0	1752	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		16										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	32	16	21	392	0	125	0	19	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	21	392	0	0	144	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		46.0		15.0	61.0		32.0	32.0			22.0	
Total Split (%)		40.0%		13.0%	53.0%		27.8%	27.8%			19.1%	
Maximum Green (s)		40.4		9.4	55.4		25.7	25.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		23.4		25.4	25.4			11.1				
Actuated g/C Ratio		0.39		0.42	0.42			0.18				
v/c Ratio		0.07		0.04	0.54			0.45				
Control Delay		15.8		16.1	20.4			30.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		15.8		16.1	20.5			30.1				
LOS		B		B	C			C				
Approach Delay		15.8			20.2			30.1				
Approach LOS		B			C			C				
Queue Length 50th (ft)		9		6	136			52				
Queue Length 95th (ft)		40		21	245			117				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1272		533	1508			794				
Starvation Cap Reductn		0		0	152			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.04		0.04	0.29			0.18				

Intersection Summary

Area Type:	Other
Cycle Length:	115
Actuated Cycle Length:	60.4
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	22.2
Intersection LOS:	C

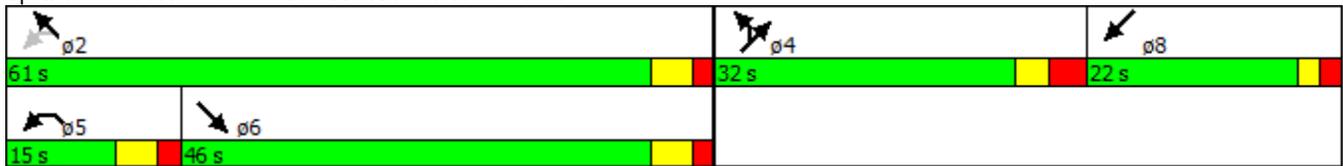
Lanes, Volumes, Timings

4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.4% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1505	3433	3539	1555
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			293		4				227			183
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	40	498	293	164	335	13	37	246	55	174	251	562
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	498	293	164	348	0	37	246	55	174	251	562
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	38.0	38.0	27.0	50.3		13.5	35.0	35.0	15.0	36.5	27.0
Total Split (%)	12.8%	33.0%	33.0%	23.5%	43.7%		11.7%	30.4%	30.4%	13.0%	31.7%	23.5%
Maximum Green (s)	7.0	32.4	32.4	19.9	44.7		7.0	29.5	29.5	8.1	31.0	19.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	47.3	47.3	18.6	64.2		7.0	15.9	15.9	8.1	22.8	39.8
Actuated g/C Ratio	0.06	0.41	0.41	0.16	0.56		0.06	0.14	0.14	0.07	0.20	0.35
v/c Ratio	0.37	0.34	0.36	0.30	0.18		0.37	0.52	0.14	0.72	0.36	0.85
Control Delay	62.2	26.9	4.9	35.6	16.2		62.8	48.8	0.7	69.9	41.5	32.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.2	26.9	4.9	35.6	16.2		62.8	48.8	0.7	69.9	41.5	32.6
LOS	E	C	A	D	B		E	D	A	E	D	C
Approach Delay		20.9			22.4			42.5			41.4	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	29	141	0	58	82		27	92	0	66	92	244
Queue Length 95th (ft)	66	215	65	102	184		63	114	0	#115	113	328
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	107	1454	823	689	1959		100	877	554	241	953	717
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.34	0.36	0.24	0.18		0.37	0.28	0.10	0.72	0.26	0.78

Intersection Summary

Area Type: Other

Cycle Length: 115

Actuated Cycle Length: 115

Offset: 42 (37%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	23	394	17	72	358	12	12	13	59	28	38	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.85			0.84	
Frt		0.994			0.996			0.878			0.888	
Flt Protected		0.997			0.992		0.950			0.950		
Satd. Flow (prot)	0	3343	0	0	3549	0	1778	1368	0	1596	1306	0
Flt Permitted		0.997			0.992		0.429			0.701		
Satd. Flow (perm)	0	3343	0	0	3549	0	803	1368	0	1177	1306	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			2			71			114	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			6			1			72			79
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	28	480	20	87	427	14	14	16	71	34	46	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	528	0	0	528	0	14	87	0	34	183	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR	
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex			
Detector 2 Channel													
Detector 2 Extend (s)	0.0			0.0			0.0			0.0			
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA		
Protected Phases	8	8		4	4		5	2		1	6		
Permitted Phases							2				6		
Detector Phase	8	8		4	4		15	2		15	6		
Switch Phase													
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0		
Minimum Split (s)	27.5	27.5		28.9	28.9		13.3	23.0		13.3	23.0		
Total Split (s)	31.0	31.0		33.0	33.0		14.0	27.0		14.0	27.0		
Total Split (%)	27.0%	27.0%		28.7%	28.7%		12.2%	23.5%		12.2%	23.5%		
Maximum Green (s)	25.6	25.6		26.1	26.1		7.7	20.7		7.7	20.7		
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5		
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8		
Lost Time Adjust (s)	0.0			0.0			0.0			0.0			
Total Lost Time (s)	5.4			6.9			6.3			6.3			
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead			
Lead-Lag Optimize?													
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None		
Walk Time (s)	5.0	5.0		5.0	5.0		0.0			0.0			
Flash Dont Walk (s)	17.0	17.0		17.0	17.0		14.0			16.0			
Pedestrian Calls (#/hr)	6	6		1	1		72			79			
Act Effct Green (s)	25.6			37.3			22.7	15.1		22.7	15.1		
Actuated g/C Ratio	0.22			0.32			0.20	0.13		0.20	0.13		
v/c Ratio	0.71			0.46			0.06	0.36		0.13	0.68		
Control Delay	45.7			34.8			25.5	18.0		27.1	31.4		
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0		
Total Delay	45.7			34.8			25.5	18.0		27.1	31.4		
LOS	D			C			C	B		C	C		
Approach Delay	45.7			34.8			19.0			30.7			
Approach LOS	D			C			B			C			
Queue Length 50th (ft)	135			176			7	10		17	47		
Queue Length 95th (ft)	220			247			20	56		37	121		
Internal Link Dist (ft)	665			1500			466			490			
Turn Bay Length (ft)										180			
Base Capacity (vph)	746			1151			224	304		261	328		
Starvation Cap Reductn	0			0			0	0		0	0		
Spillback Cap Reductn	0			0			0	0		0	0		
Storage Cap Reductn	0			0			0	0		0	0		
Reduced v/c Ratio	0.71			0.46			0.06	0.29		0.13	0.56		

Intersection Summary

Area Type: Other
 Cycle Length: 115

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	9%	9%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Actuated Cycle Length: 115
 Offset: 52 (45%), Referenced to phase 4:NWTL, Start of 1st Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 37.2
 Intersection LOS: D
 Intersection Capacity Utilization 66.2%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø4 (R)	 ø8
14 s	10 s	27 s	33 s	31 s
 ø5	 ø10	 ø6		
14 s	10 s	27 s		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	25	75	3	2	46	44	11	10	2	43	2	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.996				0.850		0.988			0.955	
Flt Protected		0.988			0.998			0.976			0.969	
Satd. Flow (prot)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Flt Permitted		0.988			0.998			0.976			0.969	
Satd. Flow (perm)	0	1856	0	0	1896	1615	0	1832	0	0	1758	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	20		31	31		20	178		110	110		178
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	38	115	5	3	71	68	17	15	3	66	3	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	158	0	0	74	68	0	35	0	0	104	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.9%
ICU Level of Service	A
Analysis Period (min)	15

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	42	301	47	286	350	39	122	540	277	74	442	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00			0.98			0.99	
Frt		0.979			0.988			0.951			0.974	
Flt Protected	0.950			0.950	0.993		0.950			0.950		
Satd. Flow (prot)	1841	3490	0	1684	3434	0	1832	3390	0	1823	3460	0
Flt Permitted	0.950			0.950	0.993		0.206			0.126		
Satd. Flow (perm)	1841	3490	0	1684	3434	0	397	3390	0	242	3460	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			6			61			17	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			9			9			26			22
Confl. Bikes (#/hr)			1			2			3			
Peak Hour Factor	0.85	0.90	0.85	0.80	0.81	0.85	0.86	0.88	0.92	0.85	0.79	0.85
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	3%	2%	0%	1%	3%	0%	1%	1%	0%	2%	1%
Adj. Flow (vph)	55	375	62	400	484	51	159	687	337	98	627	130
Shared Lane Traffic (%)				23%								
Lane Group Flow (vph)	55	437	0	308	627	0	159	1024	0	98	757	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left						Left			Left		
Leading Detector (ft)	20	31		20	160		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	31.0	31.0		32.2	32.2		14.4	38.0		14.4	38.0	
Total Split (s)	31.0	31.0		44.0	44.0		22.0	59.0		16.0	53.0	
Total Split (%)	20.7%	20.7%		29.3%	29.3%		14.7%	39.3%		10.7%	35.3%	
Maximum Green (s)	24.0	24.0		36.8	36.8		14.6	51.6		8.6	45.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8		3.8	3.8	
All-Red Time (s)	2.9	2.9		3.1	3.1		3.6	3.6		3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0		7.2	7.2		7.4	7.4		7.4	7.4	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			7.0			7.0	
Flash Dont Walk (s)	19.0	19.0		20.0	20.0			22.0			22.0	
Pedestrian Calls (#/hr)	13	13		11	11			41			51	
Act Effct Green (s)	22.1	22.1		34.3	34.3		68.6	56.2		60.6	52.2	
Actuated g/C Ratio	0.15	0.15		0.23	0.23		0.46	0.37		0.40	0.35	
v/c Ratio	0.20	0.83		0.80	0.79		0.53	0.78		0.53	0.62	
Control Delay	57.3	74.9		41.2	33.8		28.0	17.7		34.4	43.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	1.2		0.0	0.0	
Total Delay	57.3	74.9		41.2	33.8		28.0	18.9		34.4	43.9	
LOS	E	E		D	C		C	B		C	D	
Approach Delay		73.0			36.3			20.2			42.8	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	47	214		192	188		23	96		55	333	
Queue Length 95th (ft)	86	277		213	180		m72	m172		87	349	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100			150		
Base Capacity (vph)	294	567		413	847		326	1308		190	1214	
Starvation Cap Reductn	0	0		0	0		0	117		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	0.19	0.77		0.75	0.74		0.49	0.86		0.52	0.62	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Offset: 76 (51%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 37.6

Intersection LOS: D

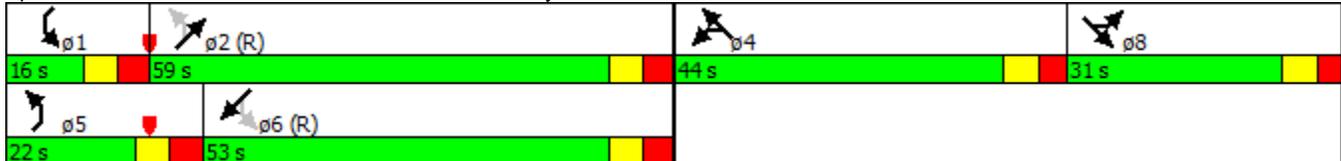
Intersection Capacity Utilization 87.0%

ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 1: South Main Street & MLK Jr Way



Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	52	27	105	176	49	21	57	904	115	12	750	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		0	120		0	125		0	50		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.99			1.00			1.00	
Frt		0.877			0.954			0.980			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1603	0	1850	1845	0	1718	3428	0	1787	3486	0
Flt Permitted	0.699			0.338			0.131			0.074		
Satd. Flow (perm)	1308	1603	0	658	1845	0	237	3428	0	139	3486	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			10			8			12			2
Peak Hour Factor	0.88	0.88	0.76	0.82	0.88	0.88	0.88	0.88	0.71	0.88	0.94	0.88
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	4%	2%	0%	0%	2%	0%
Adj. Flow (vph)	66	34	155	240	62	27	73	1151	181	15	894	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	189	0	240	89	0	73	1332	0	15	928	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

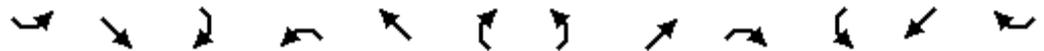
Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4		14.4	31.0		13.3	36.0		13.3	36.0	
Total Split (s)	14.4	28.0		17.4	31.0		13.4	61.3		13.3	61.2	
Total Split (%)	9.6%	18.7%		11.6%	20.7%		8.9%	40.9%		8.9%	40.8%	
Maximum Green (s)	7.0	20.6		10.0	23.6		7.1	55.0		7.0	54.9	
Yellow Time (s)	3.8	3.8		3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6		3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4		7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	26.8	19.8		33.7	25.7		66.6	63.7		62.7	55.7	
Actuated g/C Ratio	0.18	0.13		0.22	0.17		0.44	0.42		0.42	0.37	
v/c Ratio	0.26	0.89		1.06	0.28		0.42	0.91		0.11	0.72	
Control Delay	47.2	102.5		125.4	58.2		29.9	39.7		23.9	36.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.8	
Total Delay	47.2	102.5		125.4	58.2		29.9	39.7		23.9	37.8	
LOS	D	F		F	E		C	D		C	D	
Approach Delay		88.2			107.2			39.2			37.5	
Approach LOS		F			F			D			D	
Queue Length 50th (ft)	51	184		~218	78		24	245		7	237	
Queue Length 95th (ft)	91	#312		#270	132		67	#835		m11	278	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400			120			125			50		
Base Capacity (vph)	255	220		227	316		175	1456		135	1293	
Starvation Cap Reductn	0	0		0	0		0	0		0	140	
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	0.26	0.86		1.06	0.28		0.42	0.91		0.11	0.80	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 75 (50%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	165
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Grade (%)		5%			1%			3%			-2%	
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.861			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1610	1386	0	1761	1507	0	1743	3472	0	1787	3526	0
Flt Permitted	0.550			0.631			0.165			0.199		
Satd. Flow (perm)	932	1386	0	1170	1507	0	303	3472	0	374	3526	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		201			26			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	114	1	201	17	2	26	50	1096	17	13	1096	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	202	0	17	28	0	50	1113	0	13	1156	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.13	1.13	1.13	1.01	1.01	1.01	1.02	1.02	1.02	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	20.0	39.0		15.0	34.0		16.0	81.0		15.0	80.0	
Total Split (%)	13.3%	26.0%		10.0%	22.7%		10.7%	54.0%		10.0%	53.3%	
Maximum Green (s)	13.5	32.5		8.5	27.5		9.4	74.4		8.4	73.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		16			27			34			28	
Act Effct Green (s)	33.9	28.5		23.6	17.8		100.6	97.3		96.9	91.3	
Actuated g/C Ratio	0.23	0.19		0.16	0.12		0.67	0.65		0.65	0.61	
v/c Ratio	0.43	0.47		0.08	0.14		0.18	0.49		0.04	0.54	
Control Delay	49.8	10.2		39.6	20.8		7.9	11.5		3.2	6.3	
Queue Delay	5.8	2.5		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	55.5	12.7		39.6	20.8		7.9	11.5		3.2	6.3	
LOS	E	B		D	C		A	B		A	A	
Approach Delay		28.2			27.9			11.3			6.3	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	84	1		12	2		9	118		2	200	
Queue Length 95th (ft)	139	73		32	32		m18	520		m3	m236	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	276	477		227	297		294	2252		323	2148	
Starvation Cap Reductn	112	171		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	0.70	0.66		0.07	0.09		0.17	0.49		0.04	0.54	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

Offset: 75 (50%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 11.4

Intersection LOS: B

Intersection Capacity Utilization 66.7%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 3: South Main Street & Bluestone Drive/Warsaw Avenue

 ø1	 ø2 (R)	 ø3	 ø4
15 s	31 s	20 s	34 s
 ø5	 ø6 (R)	 ø7	 ø8
16 s	80 s	15 s	39 s

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.432								
Satd. Flow (perm)	0	1807	0	751	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		22										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	189	54	58	57	0	0	0	116	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	0	58	57	0	0	116	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2			4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2			4					
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		13.3	13.3			22.0	
Total Split (s)		33.0		17.0	50.0		25.0	25.0			25.0	
Total Split (%)		44.0%		22.7%	66.7%		33.3%	33.3%			33.3%	
Maximum Green (s)		27.4		11.4	44.4		18.7	18.7			21.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		0.0	0.0			1.0	
Recall Mode		None		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											21	
Act Effct Green (s)		19.4		22.1	23.8			9.7				
Actuated g/C Ratio		0.48		0.54	0.58			0.24				
v/c Ratio		0.28		0.10	0.06			0.30				
Control Delay		13.0		6.6	6.3			17.5				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		13.0		6.6	6.3			17.5				
LOS		B		A	A			B				
Approach Delay		13.0			6.5			17.5				
Approach LOS		B			A			B				
Queue Length 50th (ft)		25		6	6			15				
Queue Length 95th (ft)		123		23	23			70				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1318		680	1625			798				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.18		0.09	0.04			0.15				

Intersection Summary

Area Type:	Other
Cycle Length:	75
Actuated Cycle Length:	40.7
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.30
Intersection Signal Delay:	12.5
Intersection LOS:	B

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 37.5% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			243		5				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		798			1557			637			1182	
Travel Time (s)		15.5			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	124	718	402	593	649	46	37	341	72	385	432	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	718	402	593	695	0	37	341	72	385	432	452
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	36.0		13.5	34.5	34.5	13.9	34.5	14.1
Total Split (s)	25.5	45.5	45.5	40.0	60.0		14.0	34.5	34.5	30.0	50.5	40.0
Total Split (%)	17.0%	30.3%	30.3%	26.7%	40.0%		9.3%	23.0%	23.0%	20.0%	33.7%	26.7%
Maximum Green (s)	17.8	39.9	39.9	32.9	54.4		7.5	29.0	29.0	23.1	45.0	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		21	21		38			3	3		15	
Act Effct Green (s)	17.8	52.0	52.0	31.0	64.6		7.4	21.0	21.0	20.9	37.6	67.0
Actuated g/C Ratio	0.12	0.35	0.35	0.21	0.43		0.05	0.14	0.14	0.14	0.25	0.45
v/c Ratio	0.59	0.59	0.57	0.84	0.46		0.46	0.71	0.18	0.80	0.49	0.59
Control Delay	75.0	44.5	20.2	43.9	20.9		87.7	69.8	1.0	75.8	49.7	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	44.5	20.2	43.9	20.9		87.7	69.8	1.0	75.8	49.7	21.5
LOS	E	D	C	D	C		F	E	A	E	D	C
Approach Delay		39.7			31.5			60.3			47.6	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	117	308	125	247	236		36	171	0	189	195	220
Queue Length 95th (ft)	190	420	267	344	391		77	212	0	246	230	278
Internal Link Dist (ft)		718			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1227	707	762	1505		82	661	471	528	1061	785
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.59	0.57	0.78	0.46		0.45	0.52	0.15	0.73	0.41	0.58

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 149 (99%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	50	566	22	72	531	40	29	40	137	72	28	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	0		0	0		0	0		0	180		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.79			0.89	
Frt		0.995			0.991			0.882			0.871	
Flt Protected		0.996			0.994		0.950			0.950		
Satd. Flow (prot)	0	3374	0	0	3585	0	1778	1303	0	1659	1361	0
Flt Permitted		0.996			0.994		0.229			0.276		
Satd. Flow (perm)	0	3374	0	0	3585	0	429	1303	0	482	1361	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			4			108			186	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			9			1			95			45
Confl. Bikes (#/hr)			1			2			15			6
Peak Hour Factor	0.93	0.96	0.93	0.93	0.94	0.93	0.93	0.93	0.88	0.93	0.93	0.82
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	3%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	60	660	26	87	633	48	35	48	174	87	34	212
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	746	0	0	768	0	35	222	0	87	246	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Growth Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases							2			6		
Detector Phase	8	8		4	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	28.0	28.0		28.9	28.9		13.3	30.3		13.3	32.0	
Total Split (s)	44.0	44.0		47.0	47.0		13.3	35.2		13.8	35.7	
Total Split (%)	29.3%	29.3%		31.3%	31.3%		8.9%	23.5%		9.2%	23.8%	
Maximum Green (s)	38.6	38.6		40.1	40.1		7.0	28.9		7.5	29.4	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0			0.0			0.0			0.0		
Total Lost Time (s)	5.4			6.9			6.3			6.3		
Lead/Lag	Lag	Lag		Lead	Lead		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	Max	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0		0.0			0.0		
Flash Dont Walk (s)	17.0	17.0		17.0	17.0		17.0			19.0		
Pedestrian Calls (#/hr)	11	11		4	4		102			55		
Act Effct Green (s)	38.6			47.4			28.6	21.6		29.6	22.1	
Actuated g/C Ratio	0.26			0.32			0.19	0.14		0.20	0.15	
v/c Ratio	0.86			0.68			0.24	0.79		0.57	0.69	
Control Delay	52.5			48.8			40.5	51.3		54.1	25.9	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	52.5			48.8			40.5	51.3		54.1	25.9	
LOS	D			D			D	D		D	C	
Approach Delay	52.5			48.8			49.8			33.3		
Approach LOS	D			D			D			C		
Queue Length 50th (ft)	228			336			25	113		64	54	
Queue Length 95th (ft)	#315			448			50	204		102	147	
Internal Link Dist (ft)	665			1500			466			490		
Turn Bay Length (ft)										180		
Base Capacity (vph)	869			1134			144	338		154	416	
Starvation Cap Reductn	0			0			0	0		0	0	
Spillback Cap Reductn	0			0			0	0		0	0	
Storage Cap Reductn	0			0			0	0		0	0	
Reduced v/c Ratio	0.86			0.68			0.24	0.66		0.56	0.59	

Intersection Summary

Area Type: Other
 Cycle Length: 150

Lane Group	ø9	ø10
Detector 2 Type		
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Actuated Cycle Length: 150
 Offset: 128 (85%), Referenced to phase 4:NWTL, Start of 1st Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 47.8
 Intersection LOS: D
 Intersection Capacity Utilization 83.1%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø4 (R)	 ø8
13.8 s	10 s	35.2 s	47 s	44 s
 ø5	 ø10	 ø6		
13.3 s	10 s	35.7 s		

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	39	90	2	1	113	98	8	19	1	71	1	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.994			0.938	
Flt Protected		0.985			0.999			0.986			0.974	
Satd. Flow (prot)	0	1855	0	0	1898	1615	0	1862	0	0	1736	0
Flt Permitted		0.985			0.999			0.986			0.974	
Satd. Flow (perm)	0	1855	0	0	1898	1615	0	1862	0	0	1736	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	63		9	9		63	94		253	253		94
Confl. Bikes (#/hr)			2			10			26			13
Peak Hour Factor	0.70	0.70	0.70	0.73	0.73	0.73	0.70	0.70	0.70	0.70	0.70	0.70
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	62	144	3	2	173	150	13	30	2	114	2	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	209	0	0	175	150	0	45	0	0	215	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	49.9%
ICU Level of Service	A
Analysis Period (min)	15

APPENDIX H

Total 2022 Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	54	267	47	272	243	39	78	383	221	100	268	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%				-2%
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00				0.93		0.99	
Frt		0.974			0.982				0.850		0.966	
Flt Protected	0.950			0.950	0.989		0.950			0.950		
Satd. Flow (prot)	1841	3569	0	1684	3383	0	1728	3362	1623	1770	3281	0
Flt Permitted	0.950			0.950	0.989		0.511			0.386		
Satd. Flow (perm)	1841	3569	0	1684	3383	0	930	3362	1510	719	3281	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			10				295		28	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			36			23
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	68	338	70	332	312	55	80	485	295	141	305	89
Shared Lane Traffic (%)				31%								
Lane Group Flow (vph)	68	408	0	229	470	0	80	485	295	141	394	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		31.0	31.0		14.4	34.4	31.0	14.4	34.4	
Total Split (s)	34.0	34.0		31.0	31.0		15.0	35.0	31.0	15.0	35.0	
Total Split (%)	27.2%	27.2%		24.8%	24.8%		12.0%	28.0%	24.8%	12.0%	28.0%	
Maximum Green (s)	26.8	26.8		24.0	24.0		7.6	27.6	24.0	7.6	27.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		2.9	2.9		3.6	3.6	2.9	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.0	7.0		7.4	7.4	7.0	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		19.0	19.0			22.0	19.0		22.0	
Pedestrian Calls (#/hr)	8	8		5	5			32	5		20	
Act Effct Green (s)	19.2	19.2		25.4	25.4		50.5	42.8	68.5	53.8	46.6	
Actuated g/C Ratio	0.15	0.15		0.20	0.20		0.40	0.34	0.55	0.43	0.37	
v/c Ratio	0.24	0.72		0.67	0.68		0.19	0.42	0.30	0.37	0.32	
Control Delay	47.2	55.5		48.8	43.2		4.9	10.1	2.3	24.7	29.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	47.2	55.5		48.8	43.2		4.9	10.1	2.3	24.7	29.1	
LOS	D	E		D	D		A	B	A	C	C	
Approach Delay		54.3			45.0			7.0			28.0	
Approach LOS		D			D			A			C	
Queue Length 50th (ft)	49	160		191	192		10	90	30	67	119	
Queue Length 95th (ft)	79	175		269	224		m15	35	0	90	165	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	394	779		356	723		426	1150	995	382	1240	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.17	0.52		0.64	0.65		0.19	0.42	0.30	0.37	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 53 (42%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	30	48	51	82	26	20	94	619	188	9	552	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	250		0	125		0	50		0
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.97		0.99			0.99				1.00
Frt			0.850		0.906			0.966				0.988
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	3589	1652	0	1702	3273	0	1686	3399	0
Flt Permitted	0.699			0.950			0.154			0.190		
Satd. Flow (perm)	1308	1872	1543	3589	1652	0	276	3273	0	337	3399	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			248									
Link Speed (mph)		25			25			30				30
Link Distance (ft)		1460			736			1028				515
Travel Time (s)		39.8			20.1			23.4				11.7
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	35	64	66	155	33	56	154	720	211	10	690	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	64	66	155	89	0	154	931	0	10	748	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			15			12				12
Link Offset(ft)		-2			12			0				0
Crosswalk Width(ft)		30			18			30				25
Two way Left Turn Lane								Yes				Yes
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25				25
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8				2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	18.0	18.0	23.0	26.0		14.0	40.0		14.0	40.0	
Total Split (%)	12.0%	14.4%	14.4%	18.4%	20.8%		11.2%	32.0%		11.2%	32.0%	
Maximum Green (s)	7.6	10.6	10.6	15.6	18.6		7.7	33.7		7.7	33.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.6	9.7	9.7	10.7	15.9		55.3	53.7		46.3	39.3	
Actuated g/C Ratio	0.12	0.08	0.08	0.09	0.13		0.44	0.43		0.37	0.31	
v/c Ratio	0.18	0.44	0.19	0.50	0.42		0.63	0.66		0.05	0.70	
Control Delay	39.5	64.2	1.2	60.0	56.3		50.9	29.5		14.4	32.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.5	64.2	1.2	60.0	56.3		50.9	29.5		14.4	32.6	
LOS	D	E	A	E	E		D	C		B	C	
Approach Delay		33.8			58.7			32.6			32.4	
Approach LOS		C			E			C			C	
Queue Length 50th (ft)	23	50	0	62	69		68	123		4	232	
Queue Length 95th (ft)	46	79	0	55	103		100	#490		m9	255	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	250			125			50		
Base Capacity (vph)	194	165	362	447	262		244	1407		209	1069	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.39	0.18	0.35	0.34		0.63	0.66		0.05	0.70	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 35 (28%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 105

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	24%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	225
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 35.4

Intersection LOS: D

Intersection Capacity Utilization 54.6%

ICU Level of Service A

Analysis Period (min) 15

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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 $\phi 1$	 $\phi 2 (R)$	 $\phi 9$	 $\phi 3$	 $\phi 4$
14 s	40 s	30 s	15 s	26 s
 $\phi 5$	 $\phi 6 (R)$		 $\phi 7$	 $\phi 8$
14 s	40 s		23 s	18 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.92			1.00			0.96	
Frt		0.860			0.900			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1465	0	1770	1546	0	1770	3527	0	1770	3294	0
Flt Permitted	0.667			0.737			0.312			0.313		
Satd. Flow (perm)	1160	1465	0	1373	1546	0	581	3527	0	583	3294	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			30			2			32	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	19	2	29	7	15	30	245	852	13	28	530	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	31	0	7	45	0	245	865	0	28	683	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	15.0	34.0		14.0	33.0		29.0	62.0		15.0	48.0	
Total Split (%)	12.0%	27.2%		11.2%	26.4%		23.2%	49.6%		12.0%	38.4%	
Maximum Green (s)	8.5	27.5		7.5	26.5		22.4	55.4		8.4	41.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	22.4	20.7		20.6	17.8		90.8	84.2		79.5	72.4	
Actuated g/C Ratio	0.18	0.17		0.16	0.14		0.73	0.67		0.64	0.58	
v/c Ratio	0.08	0.12		0.03	0.18		0.46	0.36		0.06	0.36	
Control Delay	34.5	14.7		31.7	21.7		11.0	12.4		6.3	8.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.5	14.7		31.7	21.7		11.0	12.4		6.3	8.6	
LOS	C	B		C	C		B	B		A	A	
Approach Delay		22.2			23.0			12.1			8.5	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	13	1		5	10		50	174		2	62	
Queue Length 95th (ft)	29	29		15	44		m106	231		m11	121	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	247	370		254	351		636	2377		456	1921	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.08		0.03	0.13		0.39	0.36		0.06	0.36	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 31 (25%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955						0.982				
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1779	0	1652	1739	0	0	1752	0	0	1863	0
Flt Permitted				0.586				0.958				
Satd. Flow (perm)	0	1779	0	1019	1739	0	0	1752	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		16										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	32	16	21	392	0	125	0	19	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	21	392	0	0	144	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		52.0		16.0	68.0		35.0	35.0			22.0	
Total Split (%)		41.6%		12.8%	54.4%		28.0%	28.0%			17.6%	
Maximum Green (s)		46.4		10.4	62.4		28.7	28.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		23.5		25.5	25.5			11.2				
Actuated g/C Ratio		0.39		0.42	0.42			0.19				
v/c Ratio		0.07		0.04	0.54			0.45				
Control Delay		15.8		16.1	20.4			30.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		15.8		16.1	20.4			30.1				
LOS		B		B	C			C				
Approach Delay		15.8			20.2			30.1				
Approach LOS		B			C			C				
Queue Length 50th (ft)		9		6	137			53				
Queue Length 95th (ft)		40		21	245			117				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1410		544	1609			883				
Starvation Cap Reductn		0		0	155			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.03		0.04	0.27			0.16				

Intersection Summary

Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	60.5
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	22.2
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.4% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue

$\phi 2$ 68 s		$\phi 4$ 35 s		$\phi 8$ 22 s	
$\phi 5$ 16 s	$\phi 6$ 52 s				

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1504	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			293		4				209			161
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	40	498	293	164	335	13	37	246	55	174	251	562
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	498	293	164	348	0	37	246	55	174	251	562
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	37.8	37.8	35.0	58.1		13.5	35.0	35.0	17.2	38.7	35.0
Total Split (%)	11.8%	30.2%	30.2%	28.0%	46.5%		10.8%	28.0%	28.0%	13.8%	31.0%	28.0%
Maximum Green (s)	7.0	32.2	32.2	27.9	52.5		7.0	29.5	29.5	10.3	33.2	27.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	52.5	52.5	21.0	68.9		7.0	16.5	16.5	9.9	25.2	44.6
Actuated g/C Ratio	0.06	0.42	0.42	0.17	0.55		0.06	0.13	0.13	0.08	0.20	0.36
v/c Ratio	0.40	0.34	0.35	0.28	0.18		0.40	0.55	0.15	0.64	0.35	0.85
Control Delay	69.5	28.7	5.0	27.3	8.3		70.3	54.3	0.8	67.0	44.5	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.5	28.7	5.0	27.3	8.3		70.3	54.3	0.8	67.0	44.5	34.9
LOS	E	C	A	C	A		E	D	A	E	D	C
Approach Delay		22.3			14.4			47.3			43.0	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	32	152	0	31	35		29	101	0	71	100	281
Queue Length 95th (ft)	70	235	68	58	122		67	126	0	109	123	348
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	99	1486	835	793	1934		92	807	514	282	939	752
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.34	0.35	0.21	0.18		0.40	0.30	0.11	0.62	0.27	0.75

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 102 (82%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	21	441	92	179	400	13	40	22	84	31	70	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.82			0.85	
Frt		0.974			0.995			0.882			0.903	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3276	0	1841	3557	0	1778	1335	0	1596	1338	0
Flt Permitted	0.950			0.312			0.369			0.653		
Satd. Flow (perm)	1751	3276	0	605	3557	0	691	1335	0	1097	1338	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			3			90			76	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			1			81			89
Confl. Bikes (#/hr)			3			3			3			40
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	23	479	99	192	426	14	43	24	90	33	75	137
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	578	0	192	440	0	43	114	0	33	212	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.9	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	14.0	31.0		25.0	42.0		14.0	45.0		14.0	45.0	
Total Split (%)	11.2%	24.8%		20.0%	33.6%		11.2%	36.0%		11.2%	36.0%	
Maximum Green (s)	8.6	25.6		18.1	35.1		7.7	38.7		7.7	38.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		6			1			72			79	
Act Effct Green (s)	7.7	53.6		71.4	63.3		26.7	19.1		26.7	19.1	
Actuated g/C Ratio	0.06	0.43		0.57	0.51		0.21	0.15		0.21	0.15	
v/c Ratio	0.21	0.41		0.41	0.24		0.20	0.41		0.12	0.79	
Control Delay	66.1	14.7		18.0	21.3		28.1	17.2		26.7	51.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	66.1	14.7		18.0	21.3		28.1	17.2		26.7	51.8	
LOS	E	B		B	C		C	B		C	D	
Approach Delay		16.6			20.3			20.2			48.4	
Approach LOS		B			C			C			D	
Queue Length 50th (ft)	18	114		75	114		23	17		18	109	
Queue Length 95th (ft)	m38	180		139	182		44	66		37	184	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	122	1414		525	1803		215	475		266	466	
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	0.19	0.41		0.37	0.24		0.20	0.24		0.12	0.45	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 93 (74%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 23.1

Intersection LOS: C

Intersection Capacity Utilization 69.9%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ø1	 ø9	 ø2	 ø3	 ø4 (R)
14 s	10 s	45 s	14 s	42 s
 ø5	 ø10	 ø6	 ø7	 ø8
14 s	10 s	45 s	25 s	31 s

Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	136	84	3	2	51	49	12	11	2	48	2	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.988			0.932	
Flt Protected		0.970			0.998			0.977			0.977	
Satd. Flow (prot)	0	1832	0	0	1896	1615	0	1834	0	0	1730	0
Flt Permitted		0.970			0.998			0.977			0.977	
Satd. Flow (perm)	0	1832	0	0	1896	1615	0	1834	0	0	1730	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	23		35	35		23	201		124	124		201
Confl. Bikes (#/hr)			7			7			5			21
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	186	115	4	3	70	67	16	15	3	66	3	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	305	0	0	73	67	0	34	0	0	140	0
Enter Blocked Intersection	No	No	No									
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 45.7% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	47	356	47	320	418	93	136	552	329	122	490	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%				-2%
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			0.99				0.92		0.99	
Frt		0.980			0.972				0.850		0.961	
Flt Protected	0.950			0.950	0.997		0.950			0.950		
Satd. Flow (prot)	1841	3594	0	1684	3352	0	1728	3362	1623	1770	3264	0
Flt Permitted	0.950			0.950	0.997		0.180			0.198		
Satd. Flow (perm)	1841	3594	0	1684	3352	0	327	3362	1500	369	3264	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			16				240		31	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			35			22
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	59	451	70	390	536	131	140	699	439	172	557	198
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	59	521	0	351	706	0	140	699	439	172	755	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	40.0	40.0		45.0	45.0		15.0	40.0	45.0	15.0	40.0	
Total Split (%)	26.7%	26.7%		30.0%	30.0%		10.0%	26.7%	30.0%	10.0%	26.7%	
Maximum Green (s)	32.8	32.8		37.8	37.8		7.6	32.6	37.8	7.6	32.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	11	11		13	13			42	13		52	
Act Effct Green (s)	26.6	26.6		40.6	40.6		52.5	42.6	83.4	54.6	43.7	
Actuated g/C Ratio	0.18	0.18		0.27	0.27		0.35	0.28	0.56	0.36	0.29	
v/c Ratio	0.18	0.81		0.77	0.77		0.68	0.73	0.45	0.73	0.78	
Control Delay	52.2	67.8		53.0	46.2		33.8	20.3	5.3	54.3	53.4	
Queue Delay	0.0	0.0		0.9	0.2		0.0	0.0	0.2	0.0	0.9	
Total Delay	52.2	67.8		53.9	46.4		33.8	20.3	5.5	54.3	54.2	
LOS	D	E		D	D		C	C	A	D	D	
Approach Delay		66.2			48.9			16.7			54.2	
Approach LOS		E			D			B			D	
Queue Length 50th (ft)	50	255		347	341		26	220	125	114	347	
Queue Length 95th (ft)	79	262		437	371		m64	164	0	#136	415	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	402	794		461	929		207	954	978	236	972	
Starvation Cap Reductn	0	0		0	0		0	0	115	0	0	
Spillback Cap Reductn	0	0		19	19		0	0	0	0	60	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.15	0.66		0.79	0.78		0.68	0.73	0.51	0.73	0.83	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 107 (71%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	62	34	117	278	68	28	64	1025	147	3	838	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	250		0	125		0	50		0
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.96		0.99			1.00			1.00	
Frt			0.850		0.929			0.982			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	3589	1701	0	1702	3320	0	1686	3415	0
Flt Permitted	0.653			0.950			0.067			0.075		
Satd. Flow (perm)	1222	1872	1523	3589	1701	0	120	3320	0	133	3415	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			207									
Link Speed (mph)		25			25			30				30
Link Distance (ft)		1460			736			1028				515
Travel Time (s)		39.8			20.1			23.4				11.7
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	72	45	152	525	86	78	105	1192	165	3	1048	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	45	152	525	164	0	105	1357	0	3	1096	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		24			15			12				12
Link Offset(ft)		-2			12			0				0
Crosswalk Width(ft)		30			18			30				25
Two way Left Turn Lane								Yes				Yes
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25				25
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8				2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	15.0	15.0	32.0	32.0		14.0	59.0		14.0	59.0	
Total Split (%)	10.0%	10.0%	10.0%	21.3%	21.3%		9.3%	39.3%		9.3%	39.3%	
Maximum Green (s)	7.6	7.6	7.6	24.6	24.6		7.7	52.7		7.7	52.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.0	7.5	7.5	24.1	24.1		66.2	64.6		60.2	53.2	
Actuated g/C Ratio	0.10	0.05	0.05	0.16	0.16		0.44	0.43		0.40	0.35	
v/c Ratio	0.48	0.48	0.56	0.91	0.60		0.78	0.95		0.02	0.91	
Control Delay	56.4	87.1	10.0	82.5	68.4		81.0	45.9		23.0	44.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	9.5	
Total Delay	56.4	87.1	10.0	82.5	68.4		81.0	45.9		23.0	54.1	
LOS	E	F	B	F	E		F	D		C	D	
Approach Delay		35.3			79.2			48.4			54.1	
Approach LOS		D			E			D			D	
Queue Length 50th (ft)	54	44	0	262	151		68	281		1	372	
Queue Length 95th (ft)	93	73	0	179	200		88	#868		m2	411	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	250			125			50		
Base Capacity (vph)	151	94	273	588	278		135	1430		133	1210	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	107	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.48	0.48	0.56	0.89	0.59		0.78	0.95		0.02	0.99	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 81 (54%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 145

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	275
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 55.2

Intersection LOS: E

Intersection Capacity Utilization 70.1%

ICU Level of Service C

Analysis Period (min) 15

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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 ø1	 ø2 (R)	 ø9	 ø3	 ø4
14 s	59 s	30 s	15 s	32 s
 ø5	 ø6 (R)		 ø7	 ø8
14 s	59 s		32 s	15 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.861			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1422	0	1770	1515	0	1770	3525	0	1770	3491	0
Flt Permitted	0.551			0.626			0.166			0.200		
Satd. Flow (perm)	958	1422	0	1166	1515	0	309	3525	0	373	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		201			26			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	114	1	201	17	2	26	50	1096	17	13	1096	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	202	0	17	28	0	50	1113	0	13	1156	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	19.0	38.0		15.0	34.0		16.0	82.0		15.0	81.0	
Total Split (%)	12.7%	25.3%		10.0%	22.7%		10.7%	54.7%		10.0%	54.0%	
Maximum Green (s)	12.5	31.5		8.5	27.5		9.4	75.4		8.4	74.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	32.8	27.8		23.7	17.8		101.2	98.0		97.6	92.0	
Actuated g/C Ratio	0.22	0.19		0.16	0.12		0.67	0.65		0.65	0.61	
v/c Ratio	0.43	0.47		0.08	0.14		0.18	0.48		0.04	0.54	
Control Delay	50.5	10.3		40.2	20.8		6.9	10.4		3.9	9.3	
Queue Delay	6.9	2.6		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	57.3	12.8		40.2	20.8		6.9	10.4		3.9	9.3	
LOS	E	B		D	C		A	B		A	A	
Approach Delay		28.9			28.1			10.3			9.2	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	85	1		12	2		8	100		3	222	
Queue Length 95th (ft)	140	73		32	32		m17	511		m3	m250	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	271	477		227	298		301	2302		323	2143	
Starvation Cap Reductn	113	172		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	0.72	0.66		0.07	0.09		0.17	0.48		0.04	0.54	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 82 (55%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

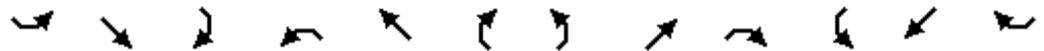
Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.453								
Satd. Flow (perm)	0	1807	0	788	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	189	54	58	57	0	0	0	116	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	0	58	57	0	0	116	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		63.0		21.0	84.0		44.0	44.0			22.0	
Total Split (%)		42.0%		14.0%	56.0%		29.3%	29.3%			14.7%	
Maximum Green (s)		57.4		15.4	78.4		37.7	37.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		24.6		32.7	35.2			11.8				
Actuated g/C Ratio		0.39		0.52	0.56			0.19				
v/c Ratio		0.34		0.11	0.06			0.39				
Control Delay		25.8		14.2	13.9			33.5				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		25.8		14.2	13.9			33.5				
LOS		C		B	B			C				
Approach Delay		25.8			14.1			33.5				
Approach LOS		C			B			C				
Queue Length 50th (ft)		97		16	16			49				
Queue Length 95th (ft)		187		41	40			110				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1503		659	1696			1038				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.16		0.09	0.03			0.11				

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	63.2
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.39
Intersection Signal Delay:	24.9
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 37.5% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242		5				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	124	718	402	593	649	46	37	341	72	385	432	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	718	402	593	695	0	37	341	72	385	432	452
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	25.5	45.0	45.0	40.0	59.5		14.0	35.0	35.0	30.0	51.0	40.0
Total Split (%)	17.0%	30.0%	30.0%	26.7%	39.7%		9.3%	23.3%	23.3%	20.0%	34.0%	26.7%
Maximum Green (s)	17.8	39.4	39.4	32.9	53.9		7.5	29.5	29.5	23.1	45.5	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	17.8	51.9	51.9	31.1	64.6		7.4	21.0	21.0	20.9	37.6	67.1
Actuated g/C Ratio	0.12	0.35	0.35	0.21	0.43		0.05	0.14	0.14	0.14	0.25	0.45
v/c Ratio	0.59	0.59	0.57	0.83	0.46		0.46	0.71	0.18	0.80	0.49	0.59
Control Delay	75.0	44.6	20.4	50.9	20.1		87.7	69.8	1.0	75.8	49.7	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	44.6	20.4	50.9	20.1		87.7	69.8	1.0	75.8	49.7	21.5
LOS	E	D	C	D	C		F	E	A	E	D	C
Approach Delay		39.8			34.3			60.3			47.6	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	117	308	126	248	213		36	171	0	189	195	220
Queue Length 95th (ft)	190	421	270	329	353		77	212	0	246	230	276
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1225	706	764	1505		82	672	475	528	1073	786
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.59	0.57	0.78	0.46		0.45	0.51	0.15	0.73	0.40	0.58

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	40	660	44	134	593	45	108	72	212	80	42	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			1.00			0.80			0.78	
Frt		0.991			0.989			0.888			0.879	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3335	0	1841	3535	0	1778	1316	0	1596	1203	0
Flt Permitted	0.950			0.221			0.383			0.228		
Satd. Flow (perm)	1751	3335	0	428	3535	0	717	1316	0	383	1203	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			6			98			136	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			2			79			87
Confl. Bikes (#/hr)			3			3			3			36
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	43	717	47	144	631	48	116	77	228	86	45	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	764	0	144	679	0	116	305	0	86	231	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	53.0		22.0	60.0		18.0	47.0		18.0	47.0	
Total Split (%)	10.0%	35.3%		14.7%	40.0%		12.0%	31.3%		12.0%	31.3%	
Maximum Green (s)	9.6	47.6		15.1	53.1		11.7	40.7		11.7	40.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		11			4			105			57	
Act Effct Green (s)	8.8	61.7		77.0	67.0		41.8	30.1		41.8	30.1	
Actuated g/C Ratio	0.06	0.41		0.51	0.45		0.28	0.20		0.28	0.20	
v/c Ratio	0.42	0.56		0.44	0.43		0.41	0.89		0.43	0.66	
Control Delay	91.4	15.9		24.7	31.6		33.9	66.0		35.5	30.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	91.4	15.9		24.7	31.6		33.9	66.0		35.5	30.1	
LOS	F	B		C	C		C	E		D	C	
Approach Delay		19.9			30.4			57.2			31.5	
Approach LOS		B			C			E			C	
Queue Length 50th (ft)	39	210		72	245		73	206		54	85	
Queue Length 95th (ft)	m70	264		130	340		107	307		83	170	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	114	1375		366	1582		282	428		201	425	
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	0.38	0.56		0.39	0.43		0.41	0.71		0.43	0.54	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 141 (94%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 31.8

Intersection LOS: C

Intersection Capacity Utilization 74.5%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way

 ϕ_1	 ϕ_9	 ϕ_2	 ϕ_3	 ϕ_4 (R)
18 s	10 s	47 s	15 s	60 s
 ϕ_5	 ϕ_{10}	 ϕ_6	 ϕ_7	 ϕ_8
18 s	10 s	47 s	22 s	53 s

Lanes, Volumes, Timings
 24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	80	101	2	1	126	110	9	21	1	79	1	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998				0.850		0.997			0.908	
Flt Protected		0.979						0.986			0.984	
Satd. Flow (prot)	0	1846	0	0	1900	1615	0	1868	0	0	1698	0
Flt Permitted		0.979						0.986			0.984	
Satd. Flow (perm)	0	1846	0	0	1900	1615	0	1868	0	0	1698	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	71		10	10		71	107		287	287		107
Confl. Bikes (#/hr)			7			7			5			21
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	110	138	3	1	173	151	12	29	1	108	1	230
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	251	0	0	174	151	0	42	0	0	339	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	58.0%
ICU Level of Service	B
Analysis Period (min)	15

APPENDIX I

Total 2016 Closed S Mason Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	54	267	47	409	242	40	103	394	415	105	263	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		0.99			1.00				0.93		0.99	
Frt		0.974			0.986				0.850		0.966	
Flt Protected	0.950			0.950	0.982		0.950			0.950		
Satd. Flow (prot)	1841	3568	0	1684	3384	0	1728	3362	1623	1770	3282	0
Flt Permitted	0.950			0.950	0.982		0.477			0.383		
Satd. Flow (perm)	1841	3568	0	1684	3384	0	868	3362	1514	714	3282	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			8				338		29	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			36			23
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	68	338	70	499	310	56	106	499	553	148	299	89
Shared Lane Traffic (%)				43%								
Lane Group Flow (vph)	68	408	0	284	581	0	106	499	553	148	388	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	32.5	32.5		32.5	32.5		15.0	35.0	32.5	15.0	35.0	
Total Split (%)	26.0%	26.0%		26.0%	26.0%		12.0%	28.0%	26.0%	12.0%	28.0%	
Maximum Green (s)	25.3	25.3		25.3	25.3		7.6	27.6	25.3	7.6	27.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	8	8		8	8			33	8		21	
Act Effct Green (s)	19.2	19.2		29.5	29.5		47.0	39.5	69.1	47.3	39.6	
Actuated g/C Ratio	0.15	0.15		0.24	0.24		0.38	0.32	0.55	0.38	0.32	
v/c Ratio	0.24	0.73		0.72	0.72		0.28	0.47	0.55	0.44	0.37	
Control Delay	47.2	55.7		52.7	46.9		6.2	10.4	3.9	28.2	32.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.3	0.0	0.0	
Total Delay	47.2	55.7		52.7	46.9		6.2	10.4	4.2	28.2	32.2	
LOS	D	E		D	D		A	B	A	C	C	
Approach Delay		54.5			48.8			7.0			31.1	
Approach LOS		D			D			A			C	
Queue Length 50th (ft)	49	161		227	230		22	57	3	75	120	
Queue Length 95th (ft)	79	175		#334	272		m25	m62	14	93	162	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	372	735		396	803		379	1062	1014	334	1060	
Starvation Cap Reductn	0	0		0	0		0	0	110	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.18	0.56		0.72	0.72		0.28	0.47	0.61	0.44	0.37	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 65 (52%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Natural Cycle: 125

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 30.6

Intersection LOS: C

Intersection Capacity Utilization 79.0%

ICU Level of Service D

Analysis Period (min) 15

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.

Splits and Phases: 1: South Main Street & MLK Jr Way

 φ1	 φ9	 φ2 (R)	 φ4	 φ8
15 s	10 s	35 s	32.5 s	32.5 s
 φ5	 φ10	 φ6 (R)		
15 s	10 s	35 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	48	30	51	40	6	68	94	727	80	101	586	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	120		0	125		0	50		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		0.98			1.00			1.00	
Frt			0.850		0.856			0.986			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	1850	1544	0	1702	3331	0	1686	3396	0
Flt Permitted	0.434			0.727			0.137			0.114		
Satd. Flow (perm)	812	1872	1553	1416	1544	0	245	3331	0	202	3396	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			183									
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	56	40	66	75	8	189	154	845	90	107	732	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	40	66	75	197	0	154	935	0	107	800	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4			2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	26.0	26.0	15.0	26.0		14.0	40.0		14.0	40.0	
Total Split (%)	12.0%	20.8%	20.8%	12.0%	20.8%		11.2%	32.0%		11.2%	32.0%	
Maximum Green (s)	7.6	18.6	18.6	7.6	18.6		7.7	33.7		7.7	33.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	22.3	16.3	16.3	24.1	18.0		45.9	37.5		44.2	36.6	
Actuated g/C Ratio	0.18	0.13	0.13	0.19	0.14		0.37	0.30		0.35	0.29	
v/c Ratio	0.28	0.16	0.18	0.25	0.89		0.82	0.94		0.66	0.80	
Control Delay	39.0	48.3	1.1	38.1	90.0		76.5	57.6		39.4	36.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.0	48.3	1.1	38.1	90.0		76.5	57.6		39.4	36.9	
LOS	D	D	A	D	F		E	E		D	D	
Approach Delay		25.8			75.7			60.3			37.2	
Approach LOS		C			E			E			D	
Queue Length 50th (ft)	34	29	0	46	157		84	~321		66	271	
Queue Length 95th (ft)	66	52	0	50	#234		112	#495		m#95	292	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	120			125			50		
Base Capacity (vph)	204	278	386	299	230		187	999		163	995	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.27	0.14	0.17	0.25	0.86		0.82	0.94		0.66	0.80	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 47 (38%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 115

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	24%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	225
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 51.1 Intersection LOS: D

Intersection Capacity Utilization 54.5% ICU Level of Service A

Analysis Period (min) 15

~ 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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 ø1	 ø2 (R)	 ø9	 ø3	 ø4
14 s	40 s	30 s	15 s	26 s
 ø5	 ø6 (R)		 ø7	 ø8
14 s	40 s		15 s	26 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.92			1.00			0.96	
Frt		0.860			0.900			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1465	0	1770	1546	0	1770	3527	0	1770	3294	0
Flt Permitted	0.671			0.737			0.312			0.313		
Satd. Flow (perm)	1167	1465	0	1373	1546	0	581	3527	0	583	3294	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			30			2			32	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	19	2	29	7	15	30	245	852	13	28	530	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	19	31	0	7	45	0	245	865	0	28	683	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	14.0	33.0		14.0	33.0		29.0	63.0		15.0	49.0	
Total Split (%)	11.2%	26.4%		11.2%	26.4%		23.2%	50.4%		12.0%	39.2%	
Maximum Green (s)	7.5	26.5		7.5	26.5		22.4	56.4		8.4	42.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	22.2	20.7		20.7	17.9		90.8	84.3		79.5	72.4	
Actuated g/C Ratio	0.18	0.17		0.17	0.14		0.73	0.67		0.64	0.58	
v/c Ratio	0.08	0.12		0.03	0.18		0.46	0.36		0.06	0.36	
Control Delay	34.5	14.7		31.7	21.6		11.3	13.1		2.1	2.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.5	14.7		31.7	21.6		11.3	13.1		2.1	2.9	
LOS	C	B		C	C		B	B		A	A	
Approach Delay		22.2			22.9			12.7			2.9	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	13	1		5	10		59	172		1	27	
Queue Length 95th (ft)	29	29		15	43		m111	217		m4	47	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	238	361		255	351		636	2378		456	1922	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.09		0.03	0.13		0.39	0.36		0.06	0.36	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 47 (38%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955						0.982				
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1779	0	1652	1739	0	0	1752	0	0	1863	0
Flt Permitted				0.586				0.958				
Satd. Flow (perm)	0	1779	0	1019	1739	0	0	1752	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		16										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	32	16	21	392	0	125	0	19	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	21	392	0	0	144	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		51.0		16.0	67.0		36.0	36.0			22.0	
Total Split (%)		40.8%		12.8%	53.6%		28.8%	28.8%			17.6%	
Maximum Green (s)		45.4		10.4	61.4		29.7	29.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		23.5		25.4	25.4			11.2				
Actuated g/C Ratio		0.39		0.42	0.42			0.19				
v/c Ratio		0.07		0.04	0.54			0.44				
Control Delay		15.8		16.1	20.5			30.0				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		15.8		16.1	20.5			30.0				
LOS		B		B	C			C				
Approach Delay		15.8			20.3			30.0				
Approach LOS		B			C			C				
Queue Length 50th (ft)		9		6	137			53				
Queue Length 95th (ft)		41		21	245			117				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1395		544	1594			915				
Starvation Cap Reductn		0		0	154			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.03		0.04	0.27			0.16				

Intersection Summary

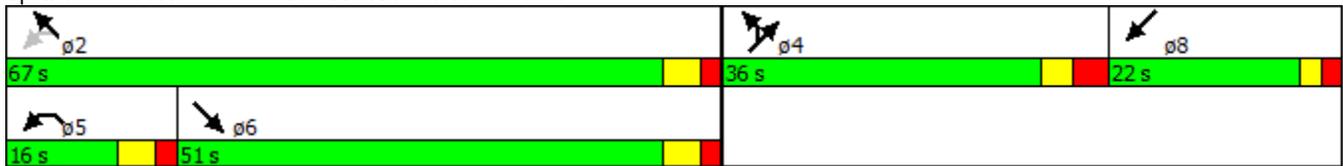
Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	60.5
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	22.2
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.4% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1504	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			293		4				209			161
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	40	498	293	164	335	13	37	246	55	174	251	562
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	498	293	164	348	0	37	246	55	174	251	562
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	37.1	37.1	35.3	57.7		13.6	35.0	35.0	17.6	39.0	35.3
Total Split (%)	11.8%	29.7%	29.7%	28.2%	46.2%		10.9%	28.0%	28.0%	14.1%	31.2%	28.2%
Maximum Green (s)	7.0	31.5	31.5	28.2	52.1		7.1	29.5	29.5	10.7	33.5	28.2
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	52.3	52.3	20.9	68.6		7.1	16.5	16.5	10.2	25.4	44.7
Actuated g/C Ratio	0.06	0.42	0.42	0.17	0.55		0.06	0.13	0.13	0.08	0.20	0.36
v/c Ratio	0.40	0.34	0.35	0.29	0.18		0.40	0.55	0.15	0.63	0.35	0.85
Control Delay	69.5	28.8	5.1	33.8	4.2		70.0	54.3	0.8	65.9	44.3	34.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.5	28.8	5.1	33.8	4.2		70.0	54.3	0.8	65.9	44.3	34.6
LOS	E	C	A	C	A		E	D	A	E	D	C
Approach Delay		22.4			13.7			47.3			42.6	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	32	152	0	30	21		29	101	0	71	99	280
Queue Length 95th (ft)	70	236	68	35	68		67	126	0	109	123	346
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	99	1481	833	797	1927		93	807	514	293	948	756
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.34	0.35	0.21	0.18		0.40	0.30	0.11	0.59	0.26	0.74

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 114 (91%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	30	421	217	115	384	13	76	10	22	31	37	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.84			0.80	
Frt		0.949			0.995			0.897			0.878	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3190	0	1841	3557	0	1778	1398	0	1596	1232	0
Flt Permitted	0.950			0.281			0.386			0.617		
Satd. Flow (perm)	1751	3190	0	545	3557	0	722	1398	0	1036	1232	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		78			3			24			159	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			2			81			89
Confl. Bikes (#/hr)			4			4			4			40
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	32	458	233	124	409	14	82	11	24	33	40	172
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	691	0	124	423	0	82	35	0	33	212	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	48.0		19.0	52.0		14.0	34.0		14.0	34.0	
Total Split (%)	12.0%	38.4%		15.2%	41.6%		11.2%	27.2%		11.2%	27.2%	
Maximum Green (s)	9.6	42.6		12.1	45.1		7.7	27.7		7.7	27.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		6			1			74			81	
Act Effct Green (s)	8.2	60.1		72.8	66.3		21.8	15.6		23.3	15.6	
Actuated g/C Ratio	0.07	0.48		0.58	0.53		0.17	0.12		0.19	0.12	
v/c Ratio	0.28	0.44		0.30	0.22		0.43	0.18		0.15	0.72	
Control Delay	72.0	8.9		14.8	19.0		38.5	24.8		30.3	29.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.0	8.9		14.8	19.0		38.5	24.8		30.3	29.1	
LOS	E	A		B	B		D	C		C	C	
Approach Delay		11.7			18.0			34.4			29.2	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	25	58		44	104		47	8		19	40	
Queue Length 95th (ft)	m51	183		85	163		80	37		40	123	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	136	1574		448	1889		191	328		227	396	
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	0.24	0.44		0.28	0.22		0.43	0.11		0.15	0.54	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 86 (69%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 18.1

Intersection LOS: B

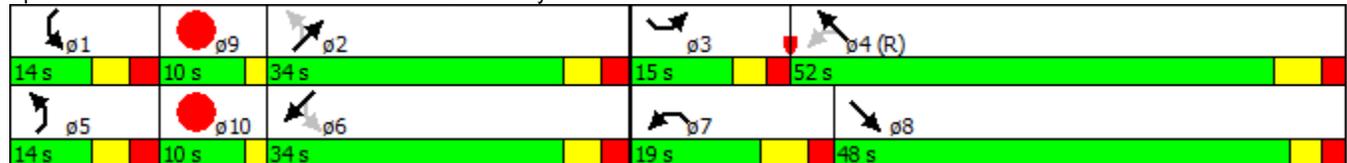
Intersection Capacity Utilization 68.2%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way



Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	0	186	3	2	100	0	12	0	13	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998						0.929				
Flt Protected					0.999			0.977				
Satd. Flow (prot)	0	1878	0	0	1898	1900	0	1725	0	0	1900	0
Flt Permitted					0.999			0.977				
Satd. Flow (perm)	0	1878	0	0	1898	1900	0	1725	0	0	1900	0
Link Speed (mph)		25			25			25				25
Link Distance (ft)		736			244			273				546
Travel Time (s)		20.1			6.7			7.4				14.9
Confl. Peds. (#/hr)	23		35	35		23	201		124	124		201
Confl. Bikes (#/hr)			7			7			5			21
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	255	4	3	137	0	16	0	18	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	259	0	0	140	0	0	34	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0				0
Link Offset(ft)		0			10			3				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop				Stop

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 44.2%

ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	47	356	47	543	410	98	191	575	415	124	488	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%				-2%
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			0.99				0.92		0.99	
Frt		0.980			0.977				0.850		0.961	
Flt Protected	0.950			0.950	0.988		0.950			0.950		
Satd. Flow (prot)	1841	3594	0	1684	3353	0	1728	3362	1623	1770	3264	0
Flt Permitted	0.950			0.950	0.988		0.123			0.123		
Satd. Flow (perm)	1841	3594	0	1684	3353	0	224	3362	1500	229	3264	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			12				233		31	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			35			22
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	59	451	70	662	526	138	197	728	553	175	555	198
Shared Lane Traffic (%)				34%								
Lane Group Flow (vph)	59	521	0	437	889	0	197	728	553	175	753	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	39.0	39.0		42.0	42.0		19.0	40.0	42.0	19.0	40.0	
Total Split (%)	26.0%	26.0%		28.0%	28.0%		12.7%	26.7%	28.0%	12.7%	26.7%	
Maximum Green (s)	31.8	31.8		34.8	34.8		11.6	32.6	34.8	11.6	32.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	11	11		13	13			42	13		52	
Act Effct Green (s)	26.4	26.4		40.2	40.2		44.2	32.6	73.0	44.2	32.6	
Actuated g/C Ratio	0.18	0.18		0.27	0.27		0.29	0.22	0.49	0.29	0.22	
v/c Ratio	0.18	0.81		0.97	0.98		1.08	1.00	0.63	0.94	1.03	
Control Delay	52.5	68.7		89.2	78.8		93.2	58.8	11.4	91.0	94.6	
Queue Delay	0.0	0.0		12.4	6.0		0.0	0.0	0.4	0.0	32.5	
Total Delay	52.5	68.7		101.6	84.8		93.2	58.8	11.8	91.0	127.0	
LOS	D	E		F	F		F	E	B	F	F	
Approach Delay		67.0			90.3			45.8			120.2	
Approach LOS		E			F			D			F	
Queue Length 50th (ft)	50	256		468	473		~164	321	138	120	~399	
Queue Length 95th (ft)	80	265		#670	#539		m108	m202	m101	#164	#511	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	390	769		451	906		182	730	882	186	733	
Starvation Cap Reductn	0	0		0	0		0	0	75	0	0	
Spillback Cap Reductn	0	1		23	24		0	0	0	0	380	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.15	0.68		1.02	1.01		1.08	1.00	0.69	0.94	2.13	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 91 (61%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

1: South Main Street & MLK Jr Way

2/27/2015

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 78.4

Intersection LOS: E

Intersection Capacity Utilization 90.9%

ICU Level of Service E

Analysis Period (min) 15

~ 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.

Splits and Phases: 1: South Main Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2 (R)$	 $\phi 4$	 $\phi 8$
19 s	10 s	40 s	39 s	42 s
 $\phi 5$	 $\phi 10$	 $\phi 6 (R)$		
19 s	10 s	40 s		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	70	26	117	140	43	133	64	1075	97	84	959	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	120		0	125		0	50		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.97		0.98			1.00				1.00
Frt			0.850		0.869			0.988				0.991
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	1850	1574	0	1702	3337	0	1686	3408	0
Flt Permitted	0.244			0.506			0.085			0.086		
Satd. Flow (perm)	457	1872	1538	985	1574	0	152	3337	0	153	3408	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			207									
Link Speed (mph)		25			25			30				30
Link Distance (ft)		1460			736			1028				515
Travel Time (s)		39.8			20.1			23.4				11.7
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	81	35	152	264	54	369	105	1250	109	89	1199	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	81	35	152	264	423	0	105	1359	0	89	1278	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			15			12				12
Link Offset(ft)		-2			12			0				0
Crosswalk Width(ft)		30			18			30				25
Two way Left Turn Lane								Yes				Yes
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25				25
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4			2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	20.0	20.0	33.0	38.0		14.0	53.0		14.0	53.0	
Total Split (%)	10.0%	13.3%	13.3%	22.0%	25.3%		9.3%	35.3%		9.3%	35.3%	
Maximum Green (s)	7.6	12.6	12.6	25.6	30.6		7.7	46.7		7.7	46.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	23.8	16.4	16.4	45.6	30.7		54.5	46.8		54.3	46.7	
Actuated g/C Ratio	0.16	0.11	0.11	0.30	0.20		0.36	0.31		0.36	0.31	
v/c Ratio	0.59	0.17	0.43	0.62	1.31		0.78	1.31		0.67	1.20	
Control Delay	58.6	65.4	5.7	49.6	206.6		80.5	178.8		42.4	132.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.4	
Total Delay	58.6	65.4	5.7	49.6	206.6		80.5	178.8		42.4	133.3	
LOS	E	E	A	D	F		F	F		D	F	
Approach Delay		29.5			146.3			171.8			127.4	
Approach LOS		C			F			F			F	
Queue Length 50th (ft)	58	32	0	210	~532		58	~885		61	~786	
Queue Length 95th (ft)	#101	59	0	161	#618		82	#949		m68	m#755	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	120			125			50		
Base Capacity (vph)	140	204	352	447	322		134	1039		134	1061	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	80	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.58	0.17	0.43	0.59	1.31		0.78	1.31		0.66	1.30	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 84 (56%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 145

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	250
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 141.0 Intersection LOS: F

Intersection Capacity Utilization 77.8% ICU Level of Service D

Analysis Period (min) 15

~ 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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 ø1	 ø2 (R)	 ø9	 ø3	 ø4
14 s	53 s	30 s	15 s	38 s
 ø5	 ø6 (R)		 ø7	 ø8
14 s	53 s		33 s	20 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.861			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1422	0	1770	1515	0	1770	3525	0	1770	3491	0
Flt Permitted	0.551			0.626			0.166			0.200		
Satd. Flow (perm)	958	1422	0	1166	1515	0	309	3525	0	373	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		201			26			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	114	1	201	17	2	26	50	1096	17	13	1096	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	202	0	17	28	0	50	1113	0	13	1156	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	19.0	38.0		15.0	34.0		16.0	82.0		15.0	81.0	
Total Split (%)	12.7%	25.3%		10.0%	22.7%		10.7%	54.7%		10.0%	54.0%	
Maximum Green (s)	12.5	31.5		8.5	27.5		9.4	75.4		8.4	74.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	32.8	27.8		23.7	17.8		101.2	98.0		97.6	92.0	
Actuated g/C Ratio	0.22	0.19		0.16	0.12		0.67	0.65		0.65	0.61	
v/c Ratio	0.43	0.47		0.08	0.14		0.18	0.48		0.04	0.54	
Control Delay	50.5	10.3		40.2	20.8		9.9	11.6		2.4	4.6	
Queue Delay	6.9	2.6		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	57.3	12.8		40.2	20.8		9.9	11.6		2.4	4.6	
LOS	E	B		D	C		A	B		A	A	
Approach Delay		28.9			28.1			11.6			4.6	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	85	1		12	2		13	168		2	127	
Queue Length 95th (ft)	140	73		32	32		m22	214		m2	m118	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	271	477		227	298		301	2302		323	2143	
Starvation Cap Reductn	113	172		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	0.72	0.66		0.07	0.09		0.17	0.48		0.04	0.54	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 79 (53%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.453								
Satd. Flow (perm)	0	1807	0	788	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	0	189	54	58	57	0	0	0	116	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	243	0	58	57	0	0	116	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		63.0		21.0	84.0		44.0	44.0			22.0	
Total Split (%)		42.0%		14.0%	56.0%		29.3%	29.3%			14.7%	
Maximum Green (s)		57.4		15.4	78.4		37.7	37.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		24.6		32.7	35.2			11.8				
Actuated g/C Ratio		0.39		0.52	0.56			0.19				
v/c Ratio		0.34		0.11	0.06			0.39				
Control Delay		25.8		14.2	13.9			33.5				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		25.8		14.2	13.9			33.5				
LOS		C		B	B			C				
Approach Delay		25.8			14.1			33.5				
Approach LOS		C			B			C				
Queue Length 50th (ft)		97		16	16			49				
Queue Length 95th (ft)		187		41	40			110				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1503		659	1696			1038				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.16		0.09	0.03			0.11				

Intersection Summary

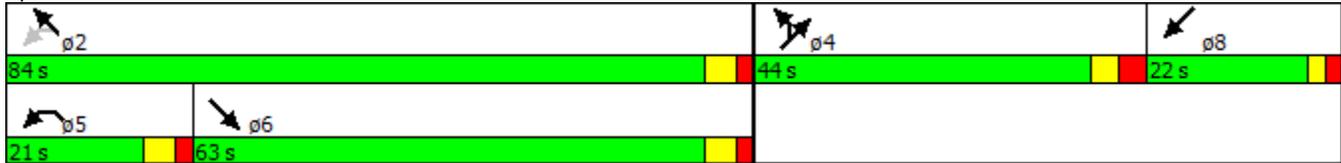
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	63.2
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.39
Intersection Signal Delay:	24.9
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 37.5% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242		5				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%	112%
Adj. Flow (vph)	124	718	402	593	649	46	37	341	72	385	432	452
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	718	402	593	695	0	37	341	72	385	432	452
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	25.5	45.0	45.0	40.0	59.5		14.0	35.0	35.0	30.0	51.0	40.0
Total Split (%)	17.0%	30.0%	30.0%	26.7%	39.7%		9.3%	23.3%	23.3%	20.0%	34.0%	26.7%
Maximum Green (s)	17.8	39.4	39.4	32.9	53.9		7.5	29.5	29.5	23.1	45.5	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	17.8	51.9	51.9	31.1	64.6		7.4	21.0	21.0	20.9	37.6	67.1
Actuated g/C Ratio	0.12	0.35	0.35	0.21	0.43		0.05	0.14	0.14	0.14	0.25	0.45
v/c Ratio	0.59	0.59	0.57	0.83	0.46		0.46	0.71	0.18	0.80	0.49	0.59
Control Delay	75.0	44.6	20.4	44.2	21.1		87.7	69.8	1.0	75.8	49.7	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	44.6	20.4	44.2	21.1		87.7	69.8	1.0	75.8	49.7	21.5
LOS	E	D	C	D	C		F	E	A	E	D	C
Approach Delay		39.8			31.7			60.3			47.6	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	117	308	126	222	247		36	171	0	189	195	220
Queue Length 95th (ft)	190	421	270	375	415		77	212	0	246	230	276
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1225	706	764	1505		82	672	475	528	1073	786
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.59	0.57	0.78	0.46		0.45	0.51	0.15	0.73	0.40	0.58

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 16 (11%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	68	660	95	73	593	45	245	35	75	80	20	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.85			0.77	
Frt		0.981			0.989			0.898			0.866	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3301	0	1841	3535	0	1778	1406	0	1596	1167	0
Flt Permitted	0.950			0.199			0.309			0.618		
Satd. Flow (perm)	1751	3301	0	386	3535	0	578	1406	0	1038	1167	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			7			71			186	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			2			79			87
Confl. Bikes (#/hr)			4			4			4			40
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	73	717	102	78	631	48	263	38	81	86	22	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	819	0	78	679	0	263	119	0	86	208	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	50.0		15.0	50.0		27.0	23.0		27.0	23.0	
Total Split (%)	12.0%	40.0%		12.0%	40.0%		21.6%	18.4%		21.6%	18.4%	
Maximum Green (s)	9.6	44.6		8.1	43.1		20.7	16.7		20.7	16.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		11			4			105			57	
Act Effct Green (s)	9.2	48.5		53.5	46.9		36.4	15.7		36.4	15.7	
Actuated g/C Ratio	0.07	0.39		0.43	0.38		0.29	0.13		0.29	0.13	
v/c Ratio	0.57	0.64		0.30	0.51		0.72	0.50		0.22	0.67	
Control Delay	73.0	34.3		21.9	32.6		40.2	30.0		24.6	21.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	73.0	34.3		21.9	32.6		40.2	30.0		24.6	21.5	
LOS	E	C		C	C		D	C		C	C	
Approach Delay		37.5			31.5			37.0			22.4	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	58	288		34	230		142	36		42	16	
Queue Length 95th (ft)	109	365		64	292		228	98		76	101	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	138	1289		262	1331		367	249		395	317	
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	0.53	0.64		0.30	0.51		0.72	0.48		0.22	0.66	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 0 (0%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 33.5

Intersection LOS: C

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: S Mason Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2$	 $\phi 3$	 $\phi 4 (R)$
27 s	10 s	23 s	15 s	50 s
 $\phi 5$	 $\phi 10$	 $\phi 6$	 $\phi 7$	 $\phi 8$
27 s	10 s	23 s	15 s	50 s

Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	204	2	1	236	0	9	0	22	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.999						0.904				
Flt Protected								0.986				
Satd. Flow (prot)	0	1880	0	0	1900	1900	0	1694	0	0	1900	0
Flt Permitted								0.986				
Satd. Flow (perm)	0	1880	0	0	1900	1900	0	1694	0	0	1900	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	65		9	9		65	97		261	261		97
Confl. Bikes (#/hr)			6			6			4			19
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	279	3	1	323	0	12	0	30	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	282	0	0	324	0	0	42	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	47.2%
Analysis Period (min)	15
	ICU Level of Service A

APPENDIX J

Total 2022 Closed S Mason Synchro Analysis Results

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	49	249	42	378	220	39	95	363	342	102	242	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%				-2%
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			1.00				0.93		0.99	
Frt		0.975			0.985				0.850		0.966	
Flt Protected	0.950			0.950	0.982		0.950			0.950		
Satd. Flow (prot)	1841	3573	0	1684	3379	0	1728	3362	1623	1770	3282	0
Flt Permitted	0.950			0.950	0.982		0.513			0.417		
Satd. Flow (perm)	1841	3573	0	1684	3379	0	933	3362	1514	777	3282	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			8				355		29	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			36			23
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	61	315	63	461	282	55	98	459	456	144	275	82
Shared Lane Traffic (%)				43%								
Lane Group Flow (vph)	61	378	0	263	535	0	98	459	456	144	357	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	32.5	32.5		32.5	32.5		15.0	35.0	32.5	15.0	35.0	
Total Split (%)	26.0%	26.0%		26.0%	26.0%		12.0%	28.0%	26.0%	12.0%	28.0%	
Maximum Green (s)	25.3	25.3		25.3	25.3		7.6	27.6	25.3	7.6	27.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	8	8		8	8			33	8		21	
Act Effct Green (s)	18.4	18.4		28.3	28.3		48.7	41.1	69.6	49.5	41.5	
Actuated g/C Ratio	0.15	0.15		0.23	0.23		0.39	0.33	0.56	0.40	0.33	
v/c Ratio	0.23	0.70		0.69	0.69		0.24	0.42	0.45	0.39	0.32	
Control Delay	47.4	55.1		52.7	47.2		4.6	8.4	1.5	26.1	30.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.2	0.0	0.0	
Total Delay	47.4	55.1		52.7	47.2		4.6	8.4	1.7	26.1	30.6	
LOS	D	E		D	D		A	A	A	C	C	
Approach Delay		54.1			49.0			5.0			29.3	
Approach LOS		D			D			A			C	
Queue Length 50th (ft)	44	148		205	206		19	46	0	72	108	
Queue Length 95th (ft)	72	163		297	251		m21	52	0	91	148	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	372	736		386	781		413	1105	1028	372	1109	
Starvation Cap Reductn	0	0		0	0		0	0	130	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.16	0.51		0.68	0.69		0.24	0.42	0.51	0.39	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 63 (50%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	None	None
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	46	24	47	37	17	62	86	679	72	90	542	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	120		0	125		0	50		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.98		0.98			1.00			1.00	
Frt			0.850		0.867			0.986			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	1850	1569	0	1702	3331	0	1686	3396	0
Flt Permitted	0.441			0.732			0.180			0.111		
Satd. Flow (perm)	825	1872	1555	1426	1569	0	322	3331	0	197	3396	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			183									
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			7			4			4			3
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	53	32	61	70	22	172	141	790	81	96	678	63
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	32	61	70	194	0	141	871	0	96	741	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4			2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	26.0	26.0	15.0	26.0		14.0	40.0		14.0	40.0	
Total Split (%)	12.0%	20.8%	20.8%	12.0%	20.8%		11.2%	32.0%		11.2%	32.0%	
Maximum Green (s)	7.6	18.6	18.6	7.6	18.6		7.7	33.7		7.7	33.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	22.2	16.3	16.3	24.0	17.9		45.5	37.6		45.0	37.4	
Actuated g/C Ratio	0.18	0.13	0.13	0.19	0.14		0.36	0.30		0.36	0.30	
v/c Ratio	0.26	0.13	0.17	0.23	0.87		0.69	0.87		0.60	0.73	
Control Delay	38.5	47.7	1.0	37.8	86.0		55.9	46.5		35.3	34.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.5	47.7	1.0	37.8	86.0		55.9	46.5		35.3	34.1	
LOS	D	D	A	D	F		E	D		D	C	
Approach Delay		24.8			73.2			47.8			34.2	
Approach LOS		C			E			D			C	
Queue Length 50th (ft)	32	23	0	43	155		51	290		57	252	
Queue Length 95th (ft)	64	45	0	47	#224		89	#439		m79	267	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	120			125			50		
Base Capacity (vph)	206	278	387	299	234		203	1003		162	1015	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.26	0.12	0.16	0.23	0.83		0.69	0.87		0.59	0.73	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 45 (36%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 115

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	24%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	225
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings

2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 44.3

Intersection LOS: D

Intersection Capacity Utilization 52.8%

ICU Level of Service A

Analysis Period (min) 15

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.

Splits and Phases: 2: South Main Street & E Grace Street/W Grace Street

 $\phi 1$	 $\phi 2 (R)$	 $\phi 9$	 $\phi 3$	 $\phi 4$
14 s	40 s	30 s	15 s	26 s
 $\phi 5$	 $\phi 6 (R)$		 $\phi 7$	 $\phi 8$
14 s	40 s		15 s	26 s

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	16	2	24	6	12	25	201	700	11	23	435	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.98			0.92			1.00			0.96	
Frt		0.860			0.898			0.998			0.966	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1465	0	1770	1540	0	1770	3527	0	1770	3294	0
Flt Permitted	0.674			0.738			0.339			0.342		
Satd. Flow (perm)	1172	1465	0	1375	1540	0	631	3527	0	637	3294	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			28			2			32	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			7			71			26			54
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	18	2	27	7	13	28	225	784	12	26	487	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	29	0	7	41	0	225	796	0	26	628	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	14.0	33.0		14.0	33.0		29.0	63.0		15.0	49.0	
Total Split (%)	11.2%	26.4%		11.2%	26.4%		23.2%	50.4%		12.0%	39.2%	
Maximum Green (s)	7.5	26.5		7.5	26.5		22.4	56.4		8.4	42.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	22.2	20.7		20.7	17.9		90.7	84.3		80.1	73.0	
Actuated g/C Ratio	0.18	0.17		0.17	0.14		0.73	0.67		0.64	0.58	
v/c Ratio	0.08	0.11		0.03	0.17		0.40	0.33		0.06	0.32	
Control Delay	34.3	15.0		31.8	21.3		9.0	11.1		4.1	4.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.3	15.0		31.8	21.3		9.0	11.1		4.1	4.7	
LOS	C	B		C	C		A	B		A	A	
Approach Delay		22.4			22.9			10.7			4.7	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	12	1		5	9		51	157		1	25	
Queue Length 95th (ft)	29	28		15	41		100	210		m7	69	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	238	359		255	348		664	2379		491	1938	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.08		0.03	0.12		0.34	0.33		0.05	0.32	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 125
 Offset: 42 (34%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↙	↑			↕			↑	
Volume (vph)	0	26	13	17	322	0	103	0	16	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954						0.982				
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	1777	0	1652	1739	0	0	1754	0	0	1863	0
Flt Permitted				0.591				0.959				
Satd. Flow (perm)	0	1777	0	1027	1739	0	0	1754	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		15										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	29	15	19	360	0	115	0	18	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	44	0	19	360	0	0	133	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0				0
Link Offset(ft)		0			5			-5				0
Crosswalk Width(ft)		30			30			40				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA		Split	NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		51.0		16.0	67.0		36.0	36.0			22.0	
Total Split (%)		40.8%		12.8%	53.6%		28.8%	28.8%			17.6%	
Maximum Green (s)		45.4		10.4	61.4		29.7	29.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		26.1		25.8	28.0			10.9				
Actuated g/C Ratio		0.47		0.46	0.50			0.19				
v/c Ratio		0.05		0.03	0.41			0.39				
Control Delay		16.0		16.1	18.6			28.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		16.0		16.1	18.6			28.1				
LOS		B		B	B			C				
Approach Delay		16.0			18.5			28.1				
Approach LOS		B			B			C				
Queue Length 50th (ft)		8		5	121			46				
Queue Length 95th (ft)		37		19	219			105				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1423		605	1634			1045				
Starvation Cap Reductn		0		0	126			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.03		0.03	0.24			0.13				

Intersection Summary

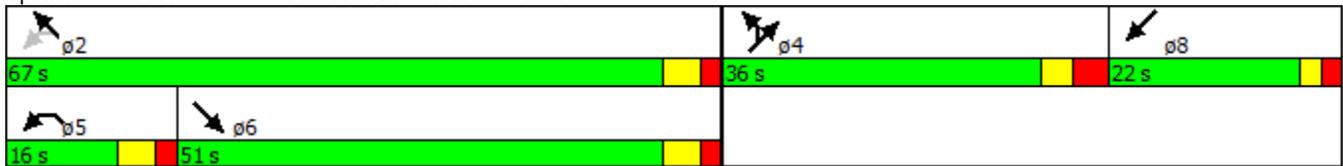
Area Type:	Other
Cycle Length:	125
Actuated Cycle Length:	55.9
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.41
Intersection Signal Delay:	20.6
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 34.3% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue



Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	33	409	241	135	275	11	30	202	45	143	206	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.98
Frt			0.850		0.994				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3508	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3508	0	1652	3421	1504	3433	3539	1554
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270		4				209			182
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			11			47			4			4
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	37	458	270	151	308	12	34	226	50	160	231	517
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	458	270	151	320	0	34	226	50	160	231	517
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	14.7	37.1	37.1	35.3	57.7		13.6	35.0	35.0	17.6	39.0	35.3
Total Split (%)	11.8%	29.7%	29.7%	28.2%	46.2%		10.9%	28.0%	28.0%	14.1%	31.2%	28.2%
Maximum Green (s)	7.0	31.5	31.5	28.2	52.1		7.1	29.5	29.5	10.7	33.5	28.2
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	7.0	56.5	56.5	17.5	72.2		7.1	15.9	15.9	10.0	24.7	40.5
Actuated g/C Ratio	0.06	0.45	0.45	0.14	0.58		0.06	0.13	0.13	0.08	0.20	0.32
v/c Ratio	0.37	0.29	0.31	0.32	0.16		0.37	0.52	0.13	0.58	0.33	0.82
Control Delay	68.0	24.9	4.5	27.6	7.4		68.3	54.0	0.7	64.4	44.4	32.4
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	24.9	4.5	27.6	7.4		68.3	54.0	0.7	64.4	44.4	32.4
LOS	E	C	A	C	A		E	D	A	E	D	C
Approach Delay		19.8			13.9			47.0			41.1	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	29	125	0	22	20		27	93	0	64	91	245
Queue Length 95th (ft)	67	201	61	69	146		63	117	0	102	114	314
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	99	1599	863	774	2029		93	807	514	293	948	751
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.29	0.31	0.20	0.16		0.37	0.28	0.10	0.55	0.24	0.69

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Offset: 121 (97%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	30	421	217	115	368	12	76	10	22	29	37	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.84			0.81	
Frt		0.949			0.995			0.897			0.880	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3191	0	1841	3557	0	1778	1399	0	1596	1240	0
Flt Permitted	0.950			0.281			0.435			0.616		
Satd. Flow (perm)	1751	3191	0	545	3557	0	814	1399	0	1035	1240	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		78			3			24			146	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			1			81			89
Confl. Bikes (#/hr)			3			3			3			40
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	32	458	233	124	391	13	82	11	24	31	40	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	691	0	124	404	0	82	35	0	31	198	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
 10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	48.0		19.0	52.0		14.0	34.0		14.0	34.0	
Total Split (%)	12.0%	38.4%		15.2%	41.6%		11.2%	27.2%		11.2%	27.2%	
Maximum Green (s)	9.6	42.6		12.1	45.1		7.7	27.7		7.7	27.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		6			1			74			81	
Act Effct Green (s)	8.2	60.4		73.0	66.5		21.6	15.4		23.1	15.4	
Actuated g/C Ratio	0.07	0.48		0.58	0.53		0.17	0.12		0.18	0.12	
v/c Ratio	0.28	0.44		0.30	0.21		0.41	0.18		0.14	0.70	
Control Delay	74.2	7.2		14.6	18.7		37.9	25.1		30.4	29.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	74.2	7.2		14.6	18.7		37.9	25.1		30.4	29.2	
LOS	E	A		B	B		D	C		C	C	
Approach Delay		10.2			17.7			34.0			29.4	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	25	57		44	99		47	8		17	39	
Queue Length 95th (ft)	m59	148		83	154		80	38		38	118	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	136	1581		449	1894		200	328		226	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	0.24	0.44		0.28	0.21		0.41	0.11		0.14	0.51	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 84 (67%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 17.2

Intersection LOS: B

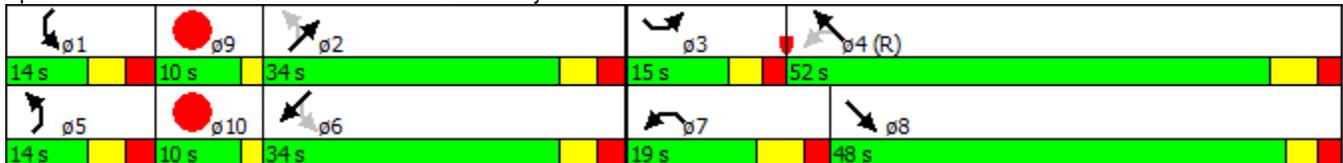
Intersection Capacity Utilization 67.3%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 10: S Mason Street & MLK Jr Way



Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	168	3	2	92	0	11	0	12	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998						0.930				
Flt Protected					0.999			0.976				
Satd. Flow (prot)	0	1878	0	0	1898	1900	0	1725	0	0	1900	0
Flt Permitted					0.999			0.976				
Satd. Flow (perm)	0	1878	0	0	1898	1900	0	1725	0	0	1900	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	23		35	35		23	201		124	124		201
Confl. Bikes (#/hr)			7			7			5			21
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	230	4	3	126	0	15	0	16	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	234	0	0	129	0	0	31	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.9%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	43	329	42	509	381	94	176	528	387	117	448	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			-5%			-3%			-2%	
Storage Length (ft)	250		0	200		0	100		200	150		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	50			100			50			200		
Lane Util. Factor	1.00	0.95	0.95	0.91	0.91	0.95	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor		1.00			0.99				0.92		0.99	
Frt		0.980			0.976				0.850		0.960	
Flt Protected	0.950			0.950	0.987		0.950			0.950		
Satd. Flow (prot)	1841	3594	0	1684	3345	0	1728	3362	1623	1770	3260	0
Flt Permitted	0.950			0.950	0.987		0.123			0.140		
Satd. Flow (perm)	1841	3594	0	1684	3345	0	224	3362	1500	261	3260	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			13				249		31	
Link Speed (mph)		30			33			30			30	
Link Distance (ft)		730			745			515			505	
Travel Time (s)		16.6			15.4			11.7			11.5	
Confl. Peds. (#/hr)			6			9			35			22
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.80	0.79	0.67	0.82	0.78	0.71	0.97	0.79	0.75	0.71	0.88	0.56
Heavy Vehicles (%)	0%	0%	0%	0%	1%	6%	6%	9%	1%	3%	8%	0%
Adj. Flow (vph)	54	416	63	621	488	132	181	668	516	165	509	182
Shared Lane Traffic (%)				34%								
Lane Group Flow (vph)	54	479	0	410	831	0	181	668	516	165	691	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		15			18			12			12	
Link Offset(ft)		2			0			4			-2	
Crosswalk Width(ft)		24			20			20			26	
Two way Left Turn Lane								Yes				
Headway Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left						Left		Right	Left		
Leading Detector (ft)	20	31		20	160		20	31	20	20	31	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		25			150			25			25	
Detector 2 Size(ft)		6			10			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		
Detector 2 Channel		

Lanes, Volumes, Timings
1: South Main Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0	7.0	7.0	15.0	
Minimum Split (s)	32.2	32.2		32.2	32.2		14.4	34.4	32.2	14.4	34.4	
Total Split (s)	39.0	39.0		42.0	42.0		19.0	40.0	42.0	19.0	40.0	
Total Split (%)	26.0%	26.0%		28.0%	28.0%		12.7%	26.7%	28.0%	12.7%	26.7%	
Maximum Green (s)	31.8	31.8		34.8	34.8		11.6	32.6	34.8	11.6	32.6	
Yellow Time (s)	4.1	4.1		4.1	4.1		3.8	3.8	4.1	3.8	3.8	
All-Red Time (s)	3.1	3.1		3.1	3.1		3.6	3.6	3.1	3.6	3.6	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		7.2	7.2		7.4	7.4	7.2	7.4	7.4	
Lead/Lag							Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max	None	None	C-Max	
Walk Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0			22.0	20.0		22.0	
Pedestrian Calls (#/hr)	11	11		13	13			42	13		52	
Act Effct Green (s)	25.0	25.0		41.6	41.6		44.2	32.6	74.4	44.2	32.6	
Actuated g/C Ratio	0.17	0.17		0.28	0.28		0.29	0.22	0.50	0.29	0.22	
v/c Ratio	0.18	0.79		0.88	0.89		0.99	0.92	0.57	0.85	0.94	
Control Delay	53.4	68.3		72.5	63.4		69.2	56.0	11.9	71.0	76.9	
Queue Delay	0.0	0.0		0.2	0.1		0.0	0.0	0.3	0.0	48.7	
Total Delay	53.4	68.3		72.7	63.5		69.2	56.0	12.2	71.0	125.6	
LOS	D	E		E	E		E	E	B	E	F	
Approach Delay		66.8			66.6			41.2			115.1	
Approach LOS		E			E			D			F	
Queue Length 50th (ft)	46	235		423	424		136	271	152	104	340	
Queue Length 95th (ft)	74	243		#604	#473		m108	m199	m121	130	#445	
Internal Link Dist (ft)		650			665			435			425	
Turn Bay Length (ft)	250			200			100		200	150		
Base Capacity (vph)	390	769		467	937		182	730	903	193	732	
Starvation Cap Reductn	0	0		0	0		0	0	73	0	0	
Spillback Cap Reductn	0	0		2	2		0	0	0	0	370	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.14	0.62		0.88	0.89		0.99	0.92	0.62	0.85	1.91	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 87 (58%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
 1: South Main Street & MLK Jr Way

2/27/2015

Lane Group	ø9	ø10
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	7%	7%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	65	24	108	127	39	123	59	994	86	75	892	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		3%			-5%			2%				2%
Storage Length (ft)	400		200	120		0	125		0	50		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor			0.97		0.98			1.00			1.00	
Frt			0.850		0.869			0.988			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1778	1872	1591	1850	1574	0	1702	3337	0	1686	3405	0
Flt Permitted	0.227			0.518			0.085			0.086		
Satd. Flow (perm)	425	1872	1538	1009	1574	0	152	3337	0	153	3405	0
Right Turn on Red			Yes			No			No			No
Satd. Flow (RTOR)			207									
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		1460			736			1028			515	
Travel Time (s)		39.8			20.1			23.4			11.7	
Confl. Bikes (#/hr)			8			5			5			4
Peak Hour Factor	0.86	0.75	0.77	0.53	0.79	0.36	0.61	0.86	0.89	0.94	0.80	0.62
Heavy Vehicles (%)	0%	0%	0%	0%	5%	6%	5%	6%	1%	6%	4%	0%
Adj. Flow (vph)	76	32	140	240	49	342	97	1156	97	80	1115	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	76	32	140	240	391	0	97	1253	0	80	1191	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			15			12			12	
Link Offset(ft)		-2			12			0			0	
Crosswalk Width(ft)		30			18			30			25	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.02	1.02	1.02	0.97	0.97	0.97	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left		Right	Left			Left			Left		
Leading Detector (ft)	20	31	20	20	31		20	31		20	31	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4			2			6		
Detector Phase	3	8	8	7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	14.4	14.4	14.4	14.4	14.4		13.3	21.3		13.3	21.3	
Total Split (s)	15.0	20.0	20.0	33.0	38.0		14.0	53.0		14.0	53.0	
Total Split (%)	10.0%	13.3%	13.3%	22.0%	25.3%		9.3%	35.3%		9.3%	35.3%	
Maximum Green (s)	7.6	12.6	12.6	25.6	30.6		7.7	46.7		7.7	46.7	
Yellow Time (s)	3.8	3.8	3.8	3.8	3.8		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.6	3.6	3.6	3.6	3.6		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	25.1	17.6	17.6	45.6	30.7		54.5	46.8		54.3	46.7	
Actuated g/C Ratio	0.17	0.12	0.12	0.30	0.20		0.36	0.31		0.36	0.31	
v/c Ratio	0.55	0.15	0.39	0.57	1.21		0.72	1.20		0.61	1.12	
Control Delay	56.1	64.1	3.7	47.8	170.1		73.3	136.1		40.7	101.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.4	
Total Delay	56.1	64.1	3.7	47.8	170.1		73.3	136.1		40.7	101.6	
LOS	E	E	A	D	F		E	F		D	F	
Approach Delay		27.6			123.6			131.6			97.8	
Approach LOS		C			F			F			F	
Queue Length 50th (ft)	54	29	0	188	~467		50	~792		49	~704	
Queue Length 95th (ft)	#93	56	0	147	#557		74	#838		m61	#677	
Internal Link Dist (ft)		1380			656			948			435	
Turn Bay Length (ft)	400		200	120			125			50		
Base Capacity (vph)	140	219	363	450	322		134	1041		134	1060	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	80	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.54	0.15	0.39	0.53	1.21		0.72	1.20		0.60	1.22	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 84 (56%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green
 Natural Cycle: 145

Lanes, Volumes, Timings
 2: South Main Street & E Grace Street/W Grace Street

2/27/2015

Lane Group	ø9
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	20%
Maximum Green (s)	26.0
Yellow Time (s)	2.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Minimum Gap (s)	3.0
Time Before Reduce (s)	0.0
Time To Reduce (s)	1.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	275
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	94	1	165	14	2	21	41	900	14	11	900	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	12	12	12	12	12	12
Storage Length (ft)	100		0	75		0	100		0	105		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		0.96			0.94			1.00			0.99	
Frt		0.851			0.862			0.998			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1422	0	1770	1517	0	1770	3525	0	1770	3491	0
Flt Permitted	0.552			0.640			0.195			0.229		
Satd. Flow (perm)	960	1422	0	1192	1517	0	363	3525	0	427	3491	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		185			24			1			5	
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		272			1399			1557			1028	
Travel Time (s)		7.4			38.2			35.4			23.4	
Confl. Peds. (#/hr)			16			27			34			28
Confl. Bikes (#/hr)									9			11
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	105	1	185	16	2	24	46	1008	16	12	1008	55
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	186	0	16	26	0	46	1024	0	12	1063	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		10			12			12			12	
Link Offset(ft)		7			-3			0			2	
Crosswalk Width(ft)		27			30			30			30	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.09	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left			Left			Left			Left		
Leading Detector (ft)	20	31		20	31		20	31		20	31	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings
 3: South Main Street & Bluestone Drive/Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA										
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	15.0		7.0	15.0	
Minimum Split (s)	13.5	32.5		13.5	31.5		13.6	31.6		13.6	31.6	
Total Split (s)	19.0	38.0		15.0	34.0		16.0	82.0		15.0	81.0	
Total Split (%)	12.7%	25.3%		10.0%	22.7%		10.7%	54.7%		10.0%	54.0%	
Maximum Green (s)	12.5	31.5		8.5	27.5		9.4	75.4		8.4	74.4	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.4	3.4		3.4	3.4	
All-Red Time (s)	3.5	3.5		3.5	3.5		3.2	3.2		3.2	3.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		5.0			5.0			7.0			7.0	
Flash Dont Walk (s)		21.0			20.0			18.0			18.0	
Pedestrian Calls (#/hr)		15			20			15			10	
Act Effct Green (s)	32.7	27.7		23.6	17.8		101.4	98.2		97.9	92.3	
Actuated g/C Ratio	0.22	0.18		0.16	0.12		0.68	0.65		0.65	0.62	
v/c Ratio	0.40	0.45		0.07	0.13		0.15	0.44		0.04	0.49	
Control Delay	49.5	10.3		40.2	21.2		9.2	11.0		2.6	4.7	
Queue Delay	5.4	2.5		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	54.9	12.8		40.2	21.2		9.2	11.0		2.6	4.7	
LOS	D	B		D	C		A	B		A	A	
Approach Delay		28.0			28.4			11.0			4.7	
Approach LOS		C			C			B			A	
Queue Length 50th (ft)	78	1		11	2		11	140		2	114	
Queue Length 95th (ft)	131	70		31	30		m21	182		m2	m110	
Internal Link Dist (ft)		192			1319			1477			948	
Turn Bay Length (ft)	100			75			100			105		
Base Capacity (vph)	271	465		230	297		334	2307		357	2150	
Starvation Cap Reductn	114	174		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	0.67	0.64		0.07	0.09		0.14	0.44		0.03	0.49	

Intersection Summary

Area Type: Other
 Cycle Length: 150
 Actuated Cycle Length: 150
 Offset: 79 (53%), Referenced to phase 2:NETL and 6:SWTL, Start of 1st Green

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑		↖	↑			↕			↑	
Volume (vph)	0	155	44	48	47	0	0	0	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	10	10	12	12	12	12	12	12	12
Storage Length (ft)	0		0	50		0	0		0	0		0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (ft)	50			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.970						0.865				
Flt Protected				0.950								
Satd. Flow (prot)	0	1807	0	1652	1739	0	0	1611	0	0	1863	0
Flt Permitted				0.490								
Satd. Flow (perm)	0	1807	0	852	1739	0	0	1611	0	0	1863	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		11										
Link Speed (mph)		25			25			25				30
Link Distance (ft)		272			272			383				119
Travel Time (s)		7.4			7.4			10.4				2.7
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	0	174	49	54	53	0	0	0	106	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	0	54	53	0	0	106	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			10			0			0	
Link Offset(ft)		0			5			-5			0	
Crosswalk Width(ft)		30			30			40			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.09	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	30		9	15		9	15		9
Number of Detectors		2		1	2		1	2				2
Detector Template		Thru		Left			Left	Thru				Thru
Leading Detector (ft)		100		20	60		20	100				100
Trailing Detector (ft)		0		0	0		0	0				0
Detector 1 Position(ft)		0		0	0		0	0				0
Detector 1 Size(ft)		6		20	20		20	6				6
Detector 1 Type		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Queue (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 1 Delay (s)		0.0		0.0	0.0		0.0	0.0				0.0
Detector 2 Position(ft)		94			54			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type		NA		pm+pt	NA			NA				
Protected Phases		6		5	2		4	4				8

Lanes, Volumes, Timings
4: Harrison Street & Warsaw Avenue

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Permitted Phases				2								
Detector Phase		6		5	2		4	4			8	
Switch Phase												
Minimum Initial (s)		7.0		5.0	7.0		7.0	7.0			7.0	
Minimum Split (s)		12.6		12.5	12.6		21.5	21.5			22.0	
Total Split (s)		63.0		21.0	84.0		44.0	44.0			22.0	
Total Split (%)		42.0%		14.0%	56.0%		29.3%	29.3%			14.7%	
Maximum Green (s)		57.4		15.4	78.4		37.7	37.7			18.0	
Yellow Time (s)		3.6		3.6	3.6		3.0	3.0			2.0	
All-Red Time (s)		2.0		2.0	2.0		3.3	3.3			2.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)		5.6		5.6	5.6			6.3			4.0	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Minimum Gap (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Time Before Reduce (s)		0.0		0.0	0.0		0.0	0.0			0.0	
Time To Reduce (s)		0.0		0.0	0.0		1.0	1.0			1.0	
Recall Mode		Min		None	Min		None	None			None	
Walk Time (s)											5.0	
Flash Dont Walk (s)											13.0	
Pedestrian Calls (#/hr)											45	
Act Effct Green (s)		25.7		30.2	32.7			11.3				
Actuated g/C Ratio		0.43		0.50	0.54			0.19				
v/c Ratio		0.29		0.10	0.06			0.35				
Control Delay		24.1		14.3	14.0			32.1				
Queue Delay		0.0		0.0	0.0			0.0				
Total Delay		24.1		14.3	14.0			32.1				
LOS		C		B	B			C				
Approach Delay		24.1			14.1			32.1				
Approach LOS		C			B			C				
Queue Length 50th (ft)		86		15	14			44				
Queue Length 95th (ft)		169		38	37			99				
Internal Link Dist (ft)		192			192			303			39	
Turn Bay Length (ft)				50								
Base Capacity (vph)		1529		672	1712			1092				
Starvation Cap Reductn		0		0	0			0				
Spillback Cap Reductn		0		0	0			0				
Storage Cap Reductn		0		0	0			0				
Reduced v/c Ratio		0.15		0.08	0.03			0.10				

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	60.3
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.35
Intersection Signal Delay:	23.6
Intersection LOS:	C

Lanes, Volumes, Timings
 4: Harrison Street & Warsaw Avenue

2/27/2015

Intersection Capacity Utilization 36.0% ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 4: Harrison Street & Warsaw Avenue

 ø2	 ø4	 ø8
84 s	44 s	22 s
 ø5	 ø6	
21 s	63 s	

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Volume (vph)	102	590	330	487	533	38	30	280	59	316	355	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	11	11	12	12	12
Storage Length (ft)	200		150	250		0	0		75	250		150
Storage Lanes	1		1	2		0	0		2	2		1
Taper Length (ft)	50			50			50			100		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor					1.00				0.98			0.97
Frt			0.850		0.990				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	3433	3488	0	1652	3421	1531	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3539	1583	3433	3488	0	1652	3421	1505	3433	3539	1533
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242		5				224			122
Link Speed (mph)		35			30			30			35	
Link Distance (ft)		681			1557			637			1182	
Travel Time (s)		13.3			35.4			14.5			23.0	
Confl. Peds. (#/hr)			21			33			3			12
Confl. Bikes (#/hr)			4			8						3
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
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Adj. Flow (vph)	114	661	369	545	597	43	34	313	66	354	397	415
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	661	369	545	640	0	34	313	66	354	397	415
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			24			10			24	
Link Offset(ft)		-3			-5			3			0	
Crosswalk Width(ft)		30			16			28			30	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.04	1.04	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left		Right	Left			Left		Right	Left		Right
Leading Detector (ft)	20	31	20	20	31		20	31	20	20	31	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		25			25			25			25	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												

Lanes, Volumes, Timings

5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	5	2	2	1	6		3	8		7	4	1
Permitted Phases									8			4
Detector Phase	5	2	2	1	6		3	8	8	7	4	1
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0		7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.7	37.0	37.0	14.1	34.0		13.5	35.0	35.0	13.9	35.0	14.1
Total Split (s)	25.5	45.0	45.0	40.0	59.5		14.0	35.0	35.0	30.0	51.0	40.0
Total Split (%)	17.0%	30.0%	30.0%	26.7%	39.7%		9.3%	23.3%	23.3%	20.0%	34.0%	26.7%
Maximum Green (s)	17.8	39.4	39.4	32.9	53.9		7.5	29.5	29.5	23.1	45.5	32.9
Yellow Time (s)	3.1	3.6	3.6	3.0	3.6		3.0	3.5	3.5	3.0	3.5	3.0
All-Red Time (s)	4.6	2.0	2.0	4.1	2.0		3.5	2.0	2.0	3.9	2.0	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.7	5.6	5.6	7.1	5.6		6.5	5.5	5.5	6.9	5.5	7.1
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag	Lag	Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None	None	None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0	5.0		5.0	
Flash Dont Walk (s)		26.0	26.0		23.0			24.0	24.0		24.0	
Pedestrian Calls (#/hr)		15	15		55			4	4		5	
Act Effct Green (s)	17.8	55.5	55.5	29.2	66.3		7.3	20.0	20.0	20.1	35.9	63.6
Actuated g/C Ratio	0.12	0.37	0.37	0.19	0.44		0.05	0.13	0.13	0.13	0.24	0.42
v/c Ratio	0.54	0.50	0.50	0.82	0.41		0.42	0.69	0.17	0.77	0.47	0.57
Control Delay	72.7	40.6	16.4	48.8	17.7		85.5	69.4	0.9	74.2	50.4	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	40.6	16.4	48.8	17.7		85.5	69.4	0.9	74.2	50.4	21.5
LOS	E	D	B	D	B		F	E	A	E	D	C
Approach Delay		36.0			32.0			59.8			47.4	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	107	263	89	211	166		33	157	0	174	182	203
Queue Length 95th (ft)	176	383	224	314	363		72	195	0	226	211	241
Internal Link Dist (ft)		601			1477			557			1102	
Turn Bay Length (ft)	200		150	250					75	250		150
Base Capacity (vph)	210	1310	738	755	1545		82	672	475	528	1073	766
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.50	0.50	0.72	0.41		0.41	0.47	0.14	0.67	0.37	0.54

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

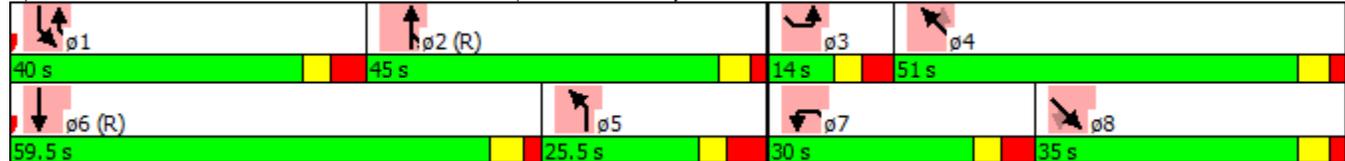
Offset: 13 (9%), Referenced to phase 2:NBT and 6:SBT, Start of 1st Green

Lanes, Volumes, Timings
 5: South Main Street & Port Republic Road/Maryland Avenue

2/27/2015

Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 40.7
 Intersection LOS: D
 Intersection Capacity Utilization 81.3%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 5: South Main Street & Port Republic Road/Maryland Avenue



Lanes, Volumes, Timings
10: S Mason Street & MLK Jr Way

2/27/2015

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	60	609	95	73	546	41	245	35	75	74	20	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	10	10	10
Grade (%)		6%			-4%			3%			3%	
Storage Length (ft)	250		0	250		0	0		0	180		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			1.00			0.85			0.77	
Frt		0.980			0.989			0.898			0.867	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1751	3297	0	1841	3535	0	1778	1406	0	1596	1171	0
Flt Permitted	0.950			0.226			0.360			0.618		
Satd. Flow (perm)	1751	3297	0	438	3535	0	674	1406	0	1038	1171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			7			71			171	
Link Speed (mph)		30			35			25			25	
Link Distance (ft)		745			1580			546			570	
Travel Time (s)		16.9			30.8			14.9			15.5	
Confl. Peds. (#/hr)			7			2			79			87
Confl. Bikes (#/hr)			4			4			4			40
Peak Hour Factor	0.93	0.92	0.93	0.93	0.94	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	2%	4%	0%	0%
Adj. Flow (vph)	65	662	102	78	581	44	263	38	81	80	22	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	764	0	78	625	0	263	119	0	80	193	0
Enter Blocked Intersection	No	No	No	No	No	No						
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		16			16			12			10	
Link Offset(ft)		0			-1			0			5	
Crosswalk Width(ft)		30			34			37			20	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	0.97	0.97	0.97	1.02	1.02	1.02	1.11	1.11	1.11
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	

Lane Group	ø9	ø10
Lane Configurations		
Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Enter Blocked Intersection		
Lane Alignment		
Median Width(ft)		
Link Offset(ft)		
Crosswalk Width(ft)		
Two way Left Turn Lane		
Headway Factor		
Turning Speed (mph)		
Number of Detectors		
Detector Template		
Leading Detector (ft)		
Trailing Detector (ft)		
Detector 1 Position(ft)		
Detector 1 Size(ft)		
Detector 1 Type		
Detector 1 Channel		
Detector 1 Extend (s)		
Detector 1 Queue (s)		
Detector 1 Delay (s)		
Detector 2 Position(ft)		
Detector 2 Size(ft)		
Detector 2 Type		

Lanes, Volumes, Timings
10: S Mason Street & MLK Jr Way

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases				4			2			6		
Detector Phase	3	8		7	4		15	2		15	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		6.4	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	13.3	27.5		13.3	28.9		13.3	23.0		13.3	23.0	
Total Split (s)	15.0	50.0		15.0	50.0		27.0	23.0		27.0	23.0	
Total Split (%)	12.0%	40.0%		12.0%	40.0%		21.6%	18.4%		21.6%	18.4%	
Maximum Green (s)	9.6	44.6		8.1	43.1		20.7	16.7		20.7	16.7	
Yellow Time (s)	3.0	3.0		4.5	4.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.4	2.4		2.4	2.4		2.8	2.8		2.8	2.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.4	5.4		6.9	6.9		6.3	6.3		6.3	6.3	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Recall Mode	None	Max		None	C-Max		None	None		None	None	
Walk Time (s)		5.0			5.0			0.0			0.0	
Flash Dont Walk (s)		17.0			17.0			14.0			16.0	
Pedestrian Calls (#/hr)		11			4			105			57	
Act Effct Green (s)	9.1	48.5		53.6	47.1		36.4	15.7		36.4	15.7	
Actuated g/C Ratio	0.07	0.39		0.43	0.38		0.29	0.13		0.29	0.13	
v/c Ratio	0.51	0.59		0.28	0.47		0.69	0.50		0.20	0.65	
Control Delay	70.1	33.2		21.4	31.6		37.3	30.0		24.4	21.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.1	33.2		21.4	31.6		37.3	30.0		24.4	21.4	
LOS	E	C		C	C		D	C		C	C	
Approach Delay		36.1			30.5			35.1			22.3	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	51	263		34	207		142	36		39	16	
Queue Length 95th (ft)	100	334		64	266		215	98		71	97	
Internal Link Dist (ft)		665			1500			466			490	
Turn Bay Length (ft)	250			250						180		
Base Capacity (vph)	137	1288		281	1335		379	249		395	304	
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	0.47	0.59		0.28	0.47		0.69	0.48		0.20	0.63	

Intersection Summary

Area Type: Other

Cycle Length: 125

Actuated Cycle Length: 125

Lane Group	ø9	ø10
Detector 2 Channel		
Detector 2 Extend (s)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	1.0	1.0
Minimum Split (s)	10.0	10.0
Total Split (s)	10.0	10.0
Total Split (%)	8%	8%
Maximum Green (s)	8.0	8.0
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes
Vehicle Extension (s)	3.0	3.0
Minimum Gap (s)	3.0	3.0
Time Before Reduce (s)	0.0	0.0
Time To Reduce (s)	1.0	1.0
Recall Mode	Max	Max
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

Lanes, Volumes, Timings

10: S Mason Street & MLK Jr Way

2/27/2015

Offset: 0 (0%), Referenced to phase 4:NWTL, Start of 1st Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 32.4

Intersection LOS: C

Intersection Capacity Utilization 75.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: S Mason Street & MLK Jr Way

 $\phi 1$	 $\phi 9$	 $\phi 2$	 $\phi 3$	 $\phi 4 (R)$
27 s	10 s	23 s	15 s	50 s
 $\phi 5$	 $\phi 10$	 $\phi 6$	 $\phi 7$	 $\phi 8$
27 s	10 s	23 s	15 s	50 s

Lanes, Volumes, Timings

24: Madison Drive/S Mason Street & E Grace Street

2/27/2015



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕	↕		↕			↕	
Volume (vph)	0	184	2	1	217	0	8	0	21	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		25	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.998						0.902				
Flt Protected								0.986				
Satd. Flow (prot)	0	1878	0	0	1900	1900	0	1690	0	0	1900	0
Flt Permitted								0.986				
Satd. Flow (perm)	0	1878	0	0	1900	1900	0	1690	0	0	1900	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		736			244			273			546	
Travel Time (s)		20.1			6.7			7.4			14.9	
Confl. Peds. (#/hr)	71		10	10		71	107		287	287		107
Confl. Bikes (#/hr)			7			7			5			21
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	252	3	1	297	0	11	0	29	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	255	0	0	298	0	0	40	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			10			3			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 46.7%

ICU Level of Service A

Analysis Period (min) 15

APPENDIX K

Collision Reports

