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Interstate – 94
Exit 161 Operational Analysis
Bismarck, ND

Final Report

November 2009

Prepared for:
North Dakota Department of Transportation

Prepared by:
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ENGINEERING CERTIFICATION

This document was originally issued and sealed by Shawn C. Birst, Registration Number PE-5438, on 11/19/2009 and the original document is stored at the Advanced Traffic Analysis Center

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of North Dakota.

Shawn C. Birst	November 19, 2009
Name, P.E.	Date

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1.0 BACKGROUND/OVERVIEW

Over the past several years, Bismarck, ND, has seen a significant amount of development primarily in the north and east portions of the city. As a result of the growth, several roadways have experienced an increase in vehicular traffic. One such roadway, Centennial Road/Bismarck Expressway, has experienced a growth in traffic volume due to several residential developments to the north of Interstate 94 (I-94), and industrial/commercial developments to the south of I-94. In addition, Centennial Road acts as a bypass for traffic traveling to/from the northern part of the city. The increased traffic volume has created operational issues in the vicinity of the Centennial Road/Bismarck Expressway and I-94 Interchange (Exit 161). Moreover, the increased traffic volume along the corridor has made the approaches of Trenton Drive experience significant delays during periods of peak traffic. The North Dakota Department of Transportation (NDDOT) contracted the Advanced Traffic Analysis Center (ATAC) to evaluate various traffic control and geometric alternatives to reduce congestion along the corridor for both the near-term and long-term planning horizons. This analysis will focus on five intersections along Centennial Road/Bismarck Expressway between Century Avenue and Divide Avenue (Figure 1).

Figure 1. Study area with existing intersection control

2.0 OBJECTIVES

This study will evaluate the operational performance near the vicinity of the Centennial Rd/Bismarck Expy and I-94 Interchange. Various traffic control and geometric design alternatives will be evaluated using the existing conditions, as well as several planning horizons. The analyses will provide guidance on selecting the most appropriate geometric configuration and traffic control for the short- and long-term planning horizons. The recommendations of this study will primarily focus on the Centennial Rd/Bismarck Expy and the I-94 Interchange.

3.0 ANALYSIS OVERVIEW

This study consists of both transportation planning and traffic operations activities. To get a better understanding of the corridor's future traffic volume, the Bismarck-Mandan Metropolitan Planning Organization's (MPO) regional travel demand model (TDM) will be used, which is an existing Citilab's Cube model. The operational analyses will be conducted using Trafficware's Synchro software program, which is a software program used for analyzing/optimizing traffic signal timing and performing capacity analyses.

This study will analyze the peak-hour conditions of 2009 (base year), as well as several future planning horizons, which include 2024 (15-year forecast), 2035 (26-year forecast), and 2059 (50-year forecast). The study's steering committee, which consists of representatives from the NDDOT, City of Bismarck, and the Bismarck-Mandan MPO, will be used to determine the appropriate roadway network and future level of development east of Exit 161. While the operational activities will focus on the five intersections shown in Figure 1, the planning-level study area encompasses a much larger area, which includes the Centennial Rd/Bismarck Expy corridor from 48th Ave. S. to 71st Ave. N. (7 miles) and east to 80th St. E. (3 miles). The larger planning area is used to account for additional development that will influence the traffic volume along Centennial Rd/Bismarck Expy, as well as adjacent roadways.

The TDM's average daily traffic (ADT) estimates and trends will be incorporated into the Synchro model, which will also include various combinations of traffic control and geometric modifications. These analyses will provide several measures of effectiveness (MOE), including network delay, intersection level of service (LOS), and queue length.

4.0 ANALYSIS SCENARIOS

In terms of the TDM's network geometry, the 2024 scenario will include the existing geometry and proposed improvements that are planned and programmed according to the Bismarck-Mandan MPO's Transportation Improvement Plan (TIP). The 2035 and 2059 scenarios are based on some of the alternatives being evaluated as part Bismarck-Mandan MPO's 2035 Long-Range Transportation Plan. The long-term networks include the existing and committed transportation projects, as well as an interchange at 66th St. E. (2 miles east of Centennial Rd/Bismarck Expy), which will be connected to the north with 71st Ave. N. and to the south with Main Ave. and 48th Ave. S. The 66th St. E. Interchange will serve as a bypass that may improve the traffic operations of the Centennial Rd/Bismarck Expy. The scenarios that will be evaluated in this study are as follows:

Base Year (2009)

- Existing conditions: current traffic control and geometric conditions (AM Peak)
- Existing conditions: current traffic control and geometric conditions (PM Peak)
- Optimized control: optimized timing plans with current control and geometry (AM Peak)
- Optimized control: optimized timing plans with current control and geometry (PM Peak)
- Signal at Trenton Dr. (AM Peak)
- Signal at Trenton Dr. (PM Peak)

15-Year Forecast (2024)

- Existing traffic control and geometric conditions (AM Peak)
- Existing traffic control and geometric conditions (PM Peak)
- Signal at Trenton Dr. (AM Peak)
- Signal at Trenton Dr. (PM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (AM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (PM Peak)

26-Year Forecast (2035 TDM Forecast)

- Existing traffic control and geometric conditions (AM Peak)
- Existing traffic control and geometric conditions (PM Peak)
- Signal at Trenton Dr. (AM Peak)
- Signal at Trenton Dr. (PM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (AM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (PM Peak)
- Signal at Trenton Dr. and NE/SW Loop Ramp (AM Peak)
- Signal at Trenton Dr. and NE/SW Loop Ramp (PM Peak)

50-Year Forecast (2059)

- Existing traffic control and geometric conditions (AM Peak)
- Existing traffic control and geometric conditions (PM Peak)
- Signal at Trenton Dr. (AM Peak)
- Signal at Trenton Dr. (PM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (AM Peak)
- Signal at Trenton Dr. and NE Loop Ramp (PM Peak)
- Signal at Trenton Dr. and NE/SW Loop Ramp (AM Peak)
- Signal at Trenton Dr. and NE/SW Loop Ramp (PM Peak)
- Signal at Trenton Dr. and NE Loop Ramp with a 6-Lane Corridor (AM Peak)
- Signal at Trenton Dr. and NE Loop Ramp with a 6-Lane Corridor (PM Peak)

Note: The two 6-lane scenarios were performed due to congestion that developed with the 4-lane corridor.

5.0 TRAFFIC VOLUME DATA

Traffic counts were obtained from the City of Bismarck for the intersections of Century Ave. & Centennial Rd, Trenton Dr. & Centennial Rd, Bismarck Expy & I-94 North Ramp, Bismarck Expy & I-94 South Ramp, and Bismarck Expy & Divide Ave. The AM and PM peak-hour volumes were obtained from the count data and were used as a basis of comparison for the other scenarios. The AM peak-hour occurred from 7:15 a.m. to 8:15 a.m., while the PM peak-hour occurred from 4:45 p.m. to 5:45 p.m.

The traffic volume projections for the future planning horizons were calculated using the Bismarck-Mandan MPO's TDM. The long-range scenario of the TDM represents the 2035 planning horizon. These scenarios include the transportation network and socio-economic projects (household and employment data), which were provided by the MPO. The ADT data from the 2035 model will be compared to those from the 2007 scenario, which is the calibrated base year of the planning model, to determine an annual growth factor (note Appendix A for ADT information). The corresponding growth factor on each link in the network will be used to determine the volume increase over the existing peak-hour traffic (Figures 2-3). The resulting growth factors will be applied to the links of the 2024 and 2035 scenarios.

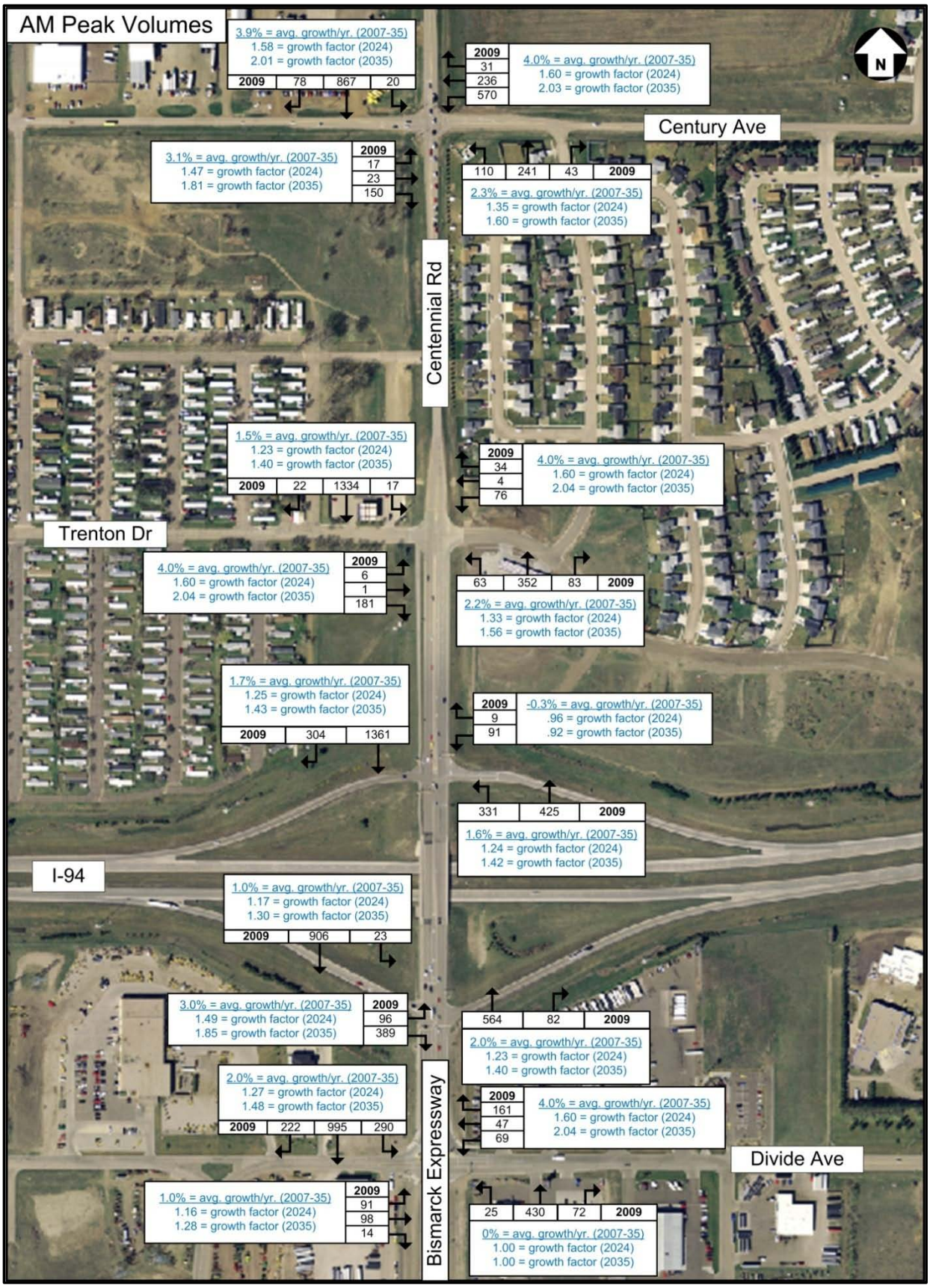


Figure 2. AM Peak Hour Volumes and Growth Factors

Figure 3. PM Peak Hour Volumes and Growth Factors

To obtain 2059 traffic volume estimates, the full build-out information for the planning level analysis area will be provided by the Bismarck-Mandan MPO and incorporated into the TDM. Note that the full build-out information does not represent a specific planning horizon and may not ever be realized; however, it will allow us to estimate the current level of development and will be used to determine potential future levels of development.

The household and employment growth rates of the study area's traffic analysis zones (TAZ) between the 2007 and 2035 planning horizons will be used to estimate the 2059 development. The 2007 planning horizon represents 14% and 4% of the study area's full build-out households and jobs, respectively (Table 1). Based on the 2035 socio-economic projections, these percentages increase to 37% (households) and 23% (jobs) of the full build-out scenario. This level of growth (simple interest) averages 0.8% per year for households and 0.7% for jobs between 2007 and 2035 (shown in Appendix B). To maintain a similar growth trend, the 2059 scenario will include an additional 25% of the available households and jobs to the 2035 data, which are not fully developed by 2035. This process provides an average annual growth of 0.8% (households) and 1.0% (jobs) between 2035 and 2059. Therefore, the 2059 scenario would represent 57% (households) and 47% (jobs) of the study area's full build-out scenario.

Table 1. Full Build-out and Growth Rates for 2007, 2035, and 2059 Planning Horizons.

Planning Horizon	Households (% of Full Build-out)	Total Jobs (% of Full Build-out)	Household (Avg. growth/yr.)	Total Jobs (Avg. growth/yr.)
2007	14%	4%	-	-
2035	37%	23%	0.8%	0.7%
2059	57%	47%	0.8%	1.0%

6.0 OPERATIONAL ANALYSIS

A Synchro network will be created for each of the 30 scenarios, which includes the corresponding traffic volumes and geometric attributes. The optimized timing plans incorporated a 100-second cycle length and the phase split and offset optimization will focus on reducing intersection and network delay. Roadway reconstruction is scheduled in 2010 for Centennial Rd, which will widen the roadway from Trenton Dr. north to Saratoga Rd. These changes will be reflected in the 2024 Synchro networks to provide an accurate basis of comparison.

To provide a realistic representation of future changes to the network, the 2035 and 2059 scenarios will incorporate a significant amount of geometric enhancements to account for the increased traffic volumes. The primary modifications will include changing Century Ave. to a four-lane facility, and adding turning lanes at intersections where turning volumes are significant. In addition, left-turn lanes will be added when the corresponding volumes exceeded 100 vehicles/hour and dual left-turn lanes will be added when volumes exceeded 300 vehicles/hour (e.g., westbound left-turn movement at Century Ave. and eastbound left-turn movement at the I-94 South Ramp). Note that the side-street geometry of the Divide Ave. and Bismarck Expy Intersection will remain unchanged for this analysis.

7.0 ANALYSIS RESULTS

The Centennial Rd/Bismarck Expy (Exit 161) corridor at I-94 was analyzed to evaluate improvements to the intersections adjacent to the interchange, and to evaluate potential impacts on the interchange ramps/intersections. A total of five intersections were analyzed for each of the scenarios, with proposed changes ranging from optimizing existing signal timings to extensive geometric enhancements (note Appendix C for details). Note that, although modifications (such as a signal) may be proposed at an intersection, this study took a systems

approach for evaluating the operations of the facility rather than a detailed study of each individual intersection. Before a signal is installed at an intersection, signal warrants must be met based on the current conditions, or those of the near future. This section will discuss each of the scenarios, and will provide some insight as to how proposed changes impact the corridor.

Based on discussion with the steering committee, a future interchange at 66th St. E. on Centennial Rd/Bismarck Expy would be implemented by 2035. To illustrate the traffic impacts on Centennial Rd/Bismarck Expy, the 2035 TDM was run with and without the 66th St. Interchange. When the 66th St. Interchange is not included into the network, traffic volume along Centennial Rd/Bismarck Expy increases, particularly for the westbound movement at the north ramp and the eastbound movement at the south ramp, which are 56% and 14% higher, respectively for the 2035 planning horizon (Table 2). Since the 66th St. Interchange will be 2 miles east of Centennial Rd/Bismarck Expy, the corridor will not experience a significant change in traffic volume with the additional interchange.

Table 2. 2035 Network Volume Comparison (vehicles per day)

Approach	2035 with 66th St. E. Interchange	2035 without 66th St. E. Interchange
Bismarck Expy & I-94 North Ramp		
Westbound	2,354	3,674
Southbound	13,680	13,902
Northbound	16,914	17,574
Bismarck Expy & I-94 South Ramp		
Eastbound	7,736	8,824
Southbound	13,620	14,346
Northbound	18,279	19,191

Under the existing two-way stop control at Trenton Dr., a significant amount of delay was incurred by the vehicles attempting to turn onto Centennial Rd/Bismarck Expy, which contributes to the network delay. Due to the significant volume on Centennial Rd, the capacity calculation for the side-streets is shown to be zero in Synchro and the Highway Capacity Manual (HCM). Therefore, Synchro's methodology for calculating the delay with this condition is to assign the movement a delay of 9,999 seconds per vehicle. So, the delay of 9,999 seconds is multiplied by the number of vehicles at that approach. Although the approximated value for delay is exaggerated, a high value is used because the delay cannot be defined. The network delay reflects this calculation, which is why there is such a large discrepancy between the unsignalized and signalized scenarios. Based on the provided turning movement counts, some capacity exists for Trenton Dr. during the peak periods. Reasons for this may include more north/south gaps existing in the field, side-street traffic accepts significantly smaller gaps, etc. The addition of a signal will likely increase the network delay due to impacting vehicles on the major street. However, the current values reflect the severity of the current situation at the intersection of Trenton Dr & Centennial Rd. The overestimated network delay values are noted in Tables 3-6.

7.1 Base Year (2009)

Existing conditions along the Exit 161 corridor are considerably worse for the AM peak, which has a network delay of 1,104 hours compared with 511 hours of delay for the PM peak (Table 3). Optimizing the signals along the corridor yields a slight reduction in network delay for the AM peak and a slight increase in network delay for the PM peak.

The intersection of Century Ave. and Centennial Rd is experiencing a LOS of “F” during the AM Peak (Table 3). The two critical movements at this intersection are the southbound through movement and the westbound left-turn movement. The existing westbound left-turn volume at this intersection is approximately 500 vehicles during the AM peak. In addition, both Century Ave. and Centennial Rd are 2-lane facilities, which limit the capacity of the intersection. The PM peak period at this intersection is currently operating with a LOS of “C,” with the critical movements being the northbound and southbound through movements.

The intersection of Trenton Dr. and Centennial Rd currently operates as a two-way stop, which has vehicles on Trenton Dr. yielding to those on Centennial Rd. The two-way stop control creates significant delay and the operational analysis returns an error due to the calculated value exceeding the limitations of Synchro (Table 3). Note that incorporating signalized control at this intersection greatly reduces the overall network delay. Although a signal improves the intersection operations, the LOS was reported to be an “F,” so further geometric enhancements will be needed. In addition, the calculated queue lengths for a signalized intersection should not have negative effects on the I-94 North Ramp due to potential spillback (as long as reasonable signal timing values are used).

The I-94 North Ramp currently experiences a LOS of “F” during the AM peak and a “B” during the PM peak (Table 3). The critical movements for this intersection are the northbound left-turn and the southbound through during the AM peak, and the northbound through and northbound left during the PM peak. Optimizing the current network improves the LOS from a “F” to a “D,” as does the addition of a signal at Trenton Dr. The operations during the PM peak showed an improvement from a LOS “B” to an “A” with the optimization and addition of a signal at Trenton Dr.

The I-94 South Ramp currently has a LOS of “C” during the AM peak and a LOS of “B” during the PM peak (Table 3). Optimizing the current timings improves the AM peak LOS to a “B.” However, no significant changes were observed at this intersection when a signal was implemented at Trenton Dr.

The intersection of Divide Ave. and Bismarck Expy is operating with a LOS of “B” for both the AM and PM peak hours. It should be noted that neither optimizing the current timings nor the addition of a signal at Trenton Dr. and Centennial Rd had any significant impact on this intersection, which continued to operate at a LOS of “B” (Table 3). The complete intersection inputs and outputs for the 2009 scenarios are provided in Appendices D – I.

Table 3. 2009 Synchro Output

Scenario	AM Peak			PM Peak		
	Network Delay (h)	Queue Length (ft)	Int. LOS	Network Delay (h)	Queue Length (ft)	Int. LOS
Base Year (2009) - Century Ave. & Centennial Rd						
Existing Conditions	1,104**	1,002 (SBT), 671 (WBL)	F	511**	683 (NBT), 164 (SBT)	C
Optimized Control	1,031**	952 (SBT), 706 (WBL)	F	517**	560 (NBT), 180 (EBT)	C
Trenton Dr. Signal	295	952 (SBT), 706 (WBL)	F	73	145 (NBT), 180 (EBT)	B
Base Year (2009) - Trenton Dr. & Centennial Rd						
Existing Conditions	1,104**	*	*	511**	282 (EB)	*
Optimized Control	1,031**	*	*	517**	*	*
Trenton Dr. Signal	295	878 (SBT)	F	73	678 (SBT)	D
Base Year (2009) - I-94 North Ramp & Bismarck Expy						
Existing Conditions	1,104**	596 (SBT), 255 (NBL)	F	511**	211 (NBL), 217 (SBT)	B
Optimized Control	1,031**	303 (NBL), 371 (SBT)	D	517**	240 (SBT), 105 (WBL)	A
Trenton Dr. Signal	295	401 (NBL), 205 (SBT)	D	73	156 (SBT)	A
Base Year (2009) - I-94 South Ramp & Bismarck Expy						
Existing Conditions	1,104**	287 (EBR)	C	511**	213 (NBT), 166 (EBL)	B
Optimized Control	1,031**	248 (EBR), 131 (SBT)	B	517**	163 (NBT), 167 (EBL)	B
Trenton Dr. Signal	295	248 (EBR), 206 (NBT)	B	73	169 (NBT), 167 (EBL)	B
Base Year (2009) - Divide Ave. & Bismarck Expy						
Existing Conditions	1,104**	278 (SBT)	B	511**	263 (NBT), 239 (EBL)	B
Optimized Control	1,031**	145 (SBT), 140 (NBT)	B	517**	287 (NBT), 223 (EBL)	B
Trenton Dr. Signal	295	135 (SBT), 129 (NBT)	B	73	287(NBT), 223 (EBL)	B

* - Error in calculation (value is not obtainable), queue length represents Synchro's 95% queue.
** - Overestimated delay due to Synchro's calculation of side-street delay on Trenton Dr.
Note: The signal timing was optimized for each scenario except for the Existing Conditions.

7.2 15-Year Forecast (2024)

At the intersection of Century Ave. and Centennial Rd, the 2024 scenarios provided outputs of a LOS of "F" for all of the AM peaks (Table 4). The PM peak LOS was slightly better, having a LOS of "C" for the Existing Control scenario. The PM LOS remained at a "C" for the scenarios implementing a signal at Trenton Dr. and the addition of a NE loop ramp.

When the 2024 network was analyzed using the existing control at the intersection of Trenton Dr. and Centennial Rd, the resulting output indicated an error due to the excessive side-street delay and queue lengths (Table 4). This trend continued for every scenario utilizing the existing

(two-way stop) control. When signalized control was implemented at this intersection, the analysis reported a LOS of “B” for both the AM and PM peak-hour periods. The critical movement during the AM peak was the eastbound right-turn, while the critical movements for the PM peak were the northbound and westbound through movements.

Using the existing intersection control at the intersection of Bismarck Expy and the I-94 North Ramp, a LOS of “D” (AM peak) and “A” (PM peak) were realized (Table 4). The addition of a traffic signal at Trenton Dr. and Centennial Rd had a slight impact on the operations of the north ramp. The LOS changed to an “E” for the AM and a “B” for the PM peak hours. The addition of a NE loop ramp at this intersection significantly improved the LOS during both the AM and PM peaks, which was reported as an “A” for both.

The analysis results for the I-94 South Ramp remained largely unchanged for each of the three scenarios in the 2024 network (Table 4). The intersection LOS output was a “B” during all of the PM peak hours. The AM peak hour results also reported a LOS of “B” for the existing control, and for the Trenton Dr. signalized scenario. The LOS decreased from a “B” to a “C” when the NE loop on-ramp is implemented, which can be expected due to the large platoon of southbound vehicles travelling through the I-94 North Ramp intersection from Trenton Dr.

The intersection of Divide Ave. and Bismarck Expy did not show a significant change in LOS for any of the scenarios. The AM peak LOS remained at “B” and the PM peak LOS was “C” for each scenario (Table 4). The complete intersection inputs and outputs for the 2024 scenarios are provided in Appendices J – O.

Table 4. 2024 Synchro Output

Scenario	AM Peak			PM Peak		
	Network Delay (h)	Queue Length (ft)	Int. LOS	Network Delay (h)	Queue Length (ft)	Int. LOS
15-Year Forecast (2024) - Century Ave. & Centennial Rd						
Existing Control	768**	1083 WBL, 908 SBT	F	835**	435 NBT, 433 EBT	C
Trenton Dr. Signal	277	1084 WBL, 921 SBT	F	78	433 EBT, 408 NBT	C
Trenton Dr. Signal & NE Loop Ramp	239	1084 WBL, 921 SBT	F	69	433 EBT, 408 NBT	C
15-Year Forecast (2024) - Trenton Dr. & Centennial Rd						
Existing Control	768**	*	*	835**	*	*
Trenton Dr. Signal.	277	207 EBR, 162 NBT	B	78	814 NBT, 213 WBT	B
Trenton Dr. Signal & NE Loop Ramp	239	207 EBR	B	69	796 NBT, 213 WBT	B
15-Year Forecast (2024) - North Ramp & Bismarck Expy						
Existing Control	768**	297 (SBT), 539 (NBL)	D	835**	336 SBT	A
Trenton Dr. Signal	277	1,033 (SBT), 539 (NBL)	E	78	366 SBT, 307 NBT	B
Trenton Dr. Signal & NE Loop Ramp	239	106 (WBL)	A	69	113 WBL	A
15-Year Forecast (2024) - South Ramp & Bismarck Expy						
Existing Control	768**	499 EBR, 176 SBT	B	835**	269 EBL, 260 EBR/NBT	B
Trenton Dr. Signal	277	499 EBR, 175 SBT	B	78	269 EBL, 260 EBR/NBT	B
Trenton Dr. Signal & NE Loop Ramp	239	499 EBR, 387 SBT	C	69	269 EBL, 266 NBT	B
15-Year Forecast (2024) - Divide Ave. & Bismarck Expy						
Existing Control	768**	198 SBT	B	835**	346 NBT, 284 EBL	C
Trenton Dr. Signal	277	198 SBT	B	78	346 NBT, 284 EBL	C
Trenton Dr. Signal & NE Loop Ramp	239	197 SBT	B	69	346 NBT, 284 EBL	C

* - Error in calculation (value is not obtainable), queue length represents Synchro's 95% queue.
** - Overestimated delay due to Synchro's calculation of side-street delay on Trenton Dr.
Note: The signal timing was optimized for each scenario.

7.3 26-Year Forecast (2035)

The intersection of Century Ave. and Centennial Rd experienced a significant amount of vehicles travelling south and west during the AM peak. As a result, the LOS remains a "F" for all four of the analysis scenarios (Table 5). However, the PM peak LOS was reported as a "C" for the existing conditions, which improves to a "B" for the three alternative scenarios.

The analysis of the Trenton Dr./Centennial Rd intersection again provided invalid results for the existing two-way stop control in the 2035 network (Table 5). However, the addition of a traffic signal provided a LOS of "C" during the AM peak and a LOS of "D" during the PM peak. The AM peak LOS improves to a "B" with the addition of the NE and NE/SW loop ramps. It should be noted that the reported 95th percentile queue lengths are approximately 1,029 ft, which may have an effect on I-94 North Ramp (the approximate distance between the North Ramp and the Trenton Dr./Centennial Rd intersection is 780 ft).

The I-94 North Ramp experienced a LOS of "E" for the existing control scenario during the AM peak and a LOS of "B" during the PM peak (Table 5). It should be noted that due to the volume of traffic on Centennial Rd, the NB queue may potentially encroach into the intersection of the North Ramp. Although the LOS remains the same when a signal is added at Trenton Dr., the NB queue lengths at Trenton Dr. may potentially encroach into the intersection of the North Ramp. In addition, the scenarios having the NE loop ramp and the NE/SW loop ramp provide an improved LOS of "A" for both the AM and PM peak hours. However, the NB queues from Trenton Dr. will still potentially exceed the distance between the two intersections.

The I-94 South Ramp (Existing Control) produced a LOS "B" during the AM peak, which remained unchanged when a traffic signal was implemented at Trenton Dr. (Table 5). The LOS for both ramp scenarios during the AM peak was a "B." During the PM peak, all of the scenarios provided a LOS of "B" for the south ramp intersection.

The intersection of Divide Ave. and Bismarck Expy experienced a LOS of "B" for all of the AM peak scenarios (Table 5). In addition, all of the PM peak scenarios reported a LOS of "C." The complete intersection inputs and outputs for the 2035 scenarios are provided in Appendices P – W.

Table 5. 2035 Synchro Output

Scenario	AM Peak			PM Peak		
	Network Delay (h)	Queue Length (ft)	Int. LOS	Network Delay (h)	Queue Length (ft)	Int. LOS
26-Year Forecast (2035) - Century Ave. & Centennial Rd						
Existing Control	1972**	973 SBT, 691 WBL	F	1161**	330 NBT, 173 SBT	C
Trenton Dr. Signal	279	973 SBT, 691 WBL	F	100	155 SBT	B
Signal at Trenton Dr. & NE Loop Ramp	228	948 SBT, 696 WBL	F	94	155 SBT	B
Trenton Dr. Signal & NE/SW Loop Ramps	212	973 SBT, 691 WBL	F	93	155 SBT	B
26-Year Forecast (2035) - Trenton Dr. & Centennial Rd						
Existing Control	1972**	*	*	1161**	*	*
Trenton Signal	279	351 EBR, 320 SBT	C	100	1028 NBT, 300 WBL	D
Trenton Signal & NE Loop Ramp	228	351 EBR, 192 SBT	B	94	1029 NBT, 300 WBL	D
Trenton Dr. Signal & NE/SW Loop Ramps	212	351 EBR, 220 SBT	B	93	1029 NBT, 300 WBL	D
26-Year Forecast (2035) - North Ramp & Bismarck Expy						
Existing Control	1972**	646 SBT, 610 NBL	E	1161**	264 NBL, 350 SBT	B
Trenton Signal	279	951 SBT, 610 NBL	E	100	277 SBT, 239 NBL	B
Trenton Dr. Signal & NE Loop Ramp	228	193 WBL	A	94	204 NBT	A
Trenton Dr. Signal & NE/SW Loop Ramps	212	193 WBL	A	93	204 NBT	A
26-Year Forecast (2035) - South Ramp & Bismarck Expy						
Existing Control	1972**	298 EBR, 173 NBT	B	1161**	216 NBT, 178 EBL	B
Trenton Signal	279	298 EBR, 173 NBT	B	100	201 NBT, 178 EBL	B
Trenton Dr. Signal & NE Loop Ramp	228	319 SBT, 298 EBR	B	94	178 EBL, 162 NBT	B
Trenton Dr. Signal & NE/SW Loop Ramps	212	318 SBT, 298 EBR	B	93	178 EBL, 162 NBT	B
26-Year Forecast (2035) - Divide Ave. & Bismarck Expy						
Existing Control	1972**	356 SBT, 168 SBL	B	1161**	353 NBT, 336 EBL	C
Trenton Signal	279	356 SBT, 168 SBL	B	100	358 NBT, 336 EBL	C
Trenton Dr. Signal & NE Loop Ramp	228	386 SBT, 180 SBL	B	94	358 NBT, 336 EBL	C
Trenton Dr. Signal & NE/SW Loop Ramps	212	386 SBT, 180 SBL	B	93	358 NBT, 336 EBL	C

* - Error in calculation (value is not obtainable), queue length represents Synchro's 95% queue.
** - Overestimated delay due to Synchro's calculation of side-street delay on Trenton Dr.
Note: The signal timing was optimized for each scenario.

7.4 50-Year Forecast (2059)

The 50-year forecast network geometry remained the same as the 2035 network to show the impact of traffic growth due to the modified and additional development over an additional 15-year period. Using the existing intersection control, the network delay was 2,179 hours (AM peak) and 1,416 hours (PM peak), as shown in Table 6.

The scenario implementing the signal at Trenton Dr. and the NE loop ramp provided a network delay for the AM Peak (336 hours) and PM Peak (210 hours). Adding a signal at Trenton Dr. and both the NE and SW loop ramps had no significant effect on network delay for the AM peak hour (336 hours) and PM peak hour (209 hours).

At the intersection of Century Ave. and Centennial Rd, all scenarios returned a LOS of "F" for the AM peak and a "C" during the PM peak (Table 6). The critical movements at this intersection were the southbound through and westbound left-turn which occurred during the AM peak. The results from the analysis at Trenton Dr. and Centennial Rd also remained relatively constant, having a LOS of "E" during the PM peak. The AM peak LOS improved from a "C" for the Trenton Dr. signal scenario to a "B" for the two remaining scenarios. Note that due to the traffic volumes on Centennial Rd. and the relatively limited capacity of the roadway facility, the northbound 95% queue lengths exceed the distance to the North Ramp of I-94 by approximately 400 ft. This potential spillback may affect the operations at the intersection of the North Ramp.

The I-94 North Ramp experienced a LOS of "F" during the AM peak and a "B" during the PM peak (Table 6). The signal at Trenton Dr. may have an effect on the north ramp during the PM peak due to capacity issues on Centennial Rd/Bismarck Expy. The two scenarios utilizing loop ramps at the I-94 interchange showed a significant improvement in LOS, which changed to an "A" for both the AM and PM peak hours.
The I-94 South Ramp experienced a LOS of a "C" during both the AM and PM peak periods when the existing control was used (Table 6). The addition of a signal at Trenton Dr. did not change the operations at the south ramp. The LOS for the AM and PM peak periods remained a "C" for the remaining scenarios.

Although several geometric changes were incorporated into analysis, no modifications were made to the Divide Ave. approaches at the intersection of Bismarck Expy and Divide Ave. (Table 6). As a result the intersection delay calculated for the 2059 horizon was excessive. The LOS during the AM peak remained a "D" for all scenarios, and an "E" for all PM peak hour scenarios. The complete intersection inputs and outputs for the 2059 scenarios are provided in Appendices X – EE.

Table 6. 2059 Network Output

Scenario	AM Peak			PM Peak		
	Network Delay (h)	Queue Length (ft)	Int. LOS	Network Delay (h)	Queue Length (ft)	Int. LOS
50-Year Forecast (2059) - Century Ave. & Centennial Rd						
Existing Control	2,179**	1138 SBT, 643 WBL	F	1,416**	436 NBT, 216 EBT	C
Trenton Dr. Signal	477	1138 SBT, 643 WBL	F	232	218 EBT, 188 SBT	C
Trenton Dr. Signal & NE Loop Ramp	336	1138 SBT, 608 WBL	F	210	218 EBT, 188 SBT	C
Trenton Dr. Signal & NE/SW Loop Ramps	336	1138 SBT, 608 WBL	F	209	218 EBT, 188 SBT	C
50-Year Forecast (2059) - Trenton Dr. & Centennial Rd						
Existing Control	2,179**	*	*	1,416**	*	*
Trenton Dr. Signal	477	457 EBR, 235 SBT	C	232	1196 NBT, 353 WBL	E
Trenton Dr. Signal & NE Loop Ramp	336	396 EBR, 215 SBT	B	210	1170 NBT, 353 WBL	E
Trenton Dr. Signal & NE/SW Loop Ramps	336	396 EBR, 215 SBT	B	209	1170 NBT, 353 WBL	E
50-Year Forecast (2059) - North Ramp & Bismarck Expy						
Existing Control	2,179**	582 NBL, 642 SBT	F	1,416**	333 SBT, 321 NBL	B
Trenton Dr. Signal	477	1091 SBT, 582 NBL	F	232	283 SBT, 318 NBL	B
Trenton Dr. Signal & NE Loop Ramp	336	244 WBL, 161 SBT	A	210	276 NBT, 205 WBL	A
Trenton Dr. Signal & NE/SW Loop Ramps	336	244 WBL, 161 SBT	A	209	276 NBT, 205 WBL	A
50-Year Forecast (2059) - South Ramp & Bismarck Expy						
Existing Control	2,179**	396 EBR, 226 SBT	C	1,416**	235 NBT, 195 EBL	C
Trenton Dr. Signal	477	396 EBR, 226 SBT	C	232	235 NBT, 195 EBL	C
Trenton Dr. Signal & NE Loop Ramp	336	503 SBT, 396 EBR	C	210	275 NBT, 195 EBL	C
Trenton Dr. Signal & NE/SW Loop Ramps	336	503 SBT, 395 EBR	C	209	275 NBT, 195 EBL	C
50-Year Forecast (2059) - Divide Ave. & Bismarck Expy						
Existing Control	2,179**	885 SBT, 435 WBR	D	1,416**	861 WBR, 614 NBT	E
Trenton Dr. Signal	477	885 SBT, 435 WBR	D	232	861 WBR, 614 NBT	E
Trenton Dr. Signal & NE Loop Ramp	336	885 SBT, 435 WBR	D	210	861 WBR, 614 NBT	E
Trenton Dr. Signal & NE/SW Loop Ramps	336	885 SBT, 435 WBR	D	209	861 WBR, 614 NBT	E

* - Error in calculation (value is not obtainable), queue length represents Synchro's 95% queue.
** - Overestimated delay due to Synchro's calculation of side-street delay on Trenton Dr.
Note: The signal timing was optimized for each scenario.

Due to the degradation of the LOS at several intersections during the 2059 output, the corridor was also analyzed as a 6-lane arterial. The 6-lane facility was created several hundred feet prior to Century Ave. and Divide Ave to provide adequate transitions between the 4 and 6-lane facilities. Based on the projected 2059 ADT and LOS thresholds, extending the 6-lanes to Main Ave. would provide additional benefits. Table 7 illustrates the comparison between a 4-lane and 6-lane corridor for the Trenton Dr. signal & NE Loop Ramp scenario, which provided the most long-term benefits. Improvements can be seen in the AM and PM network delays, as well as a majority of the intersection LOS. Detailed comparisons for the I-94 North and South Ramps are discussed in the previous sections. Typical ADT thresholds for a 4-lane facility with left- and right-turn lanes operating at a LOS "D" range from 30,000 to 35,000 vehicles. The projected 2059 ADT for Centennial Rd/Bismarck Expy ranges from 25,800 (just south of Century Ave.) to 42,500 (between Divide Ave. and the I-94 South Ramp), as shown in Appendix A. The complete intersection inputs and outputs for the 6-lane scenarios are provided in Appendices FF – GG.

Table 7. 2059 Synchro Output Comparison (4-Lane & 6-Lane)

Scenario	AM Peak			PM Peak		
	Network Delay (h)	Queue Length (ft)	Int. LOS	Network Delay (h)	Queue Length (ft)	Int. LOS
50-Year Forecast (2059) - Century Ave. & Centennial Rd						
Trenton Dr. Signal & NE Loop Ramp (4-Lane)	336	1138 SBT, 608 WBL	F	210	218 EBT, 188 SBT	C
Trenton Dr. Signal & NE Loop Ramp (6-Lane)	212	786 SBT, 576 WBL	F	116	193 EBT, 162 SBT	B
50-Year Forecast (2059) - Trenton Dr. & Centennial Rd						
Trenton Dr. Signal & NE Loop Ramp (4-Lane)	336	396 EBR, 215 SBT	B	210	1170 NBT, 353 WBL	E
Trenton Dr. Signal & NE Loop Ramp (6-Lane)	212	293 EBR, 180 SBT	B	116	687 NBT, 262 WBL	B
50-Year Forecast (2059) - North Ramp & Bismarck Expy						
Trenton Dr. Signal & NE Loop Ramp (4-Lane)	336	244 WBL, 161 SBT	A	210	276 NBT, 205 WBL	A
Trenton Dr. Signal & NE Loop Ramp (6-Lane)	212	193 WBL 115 SBT	A	116	134 NBT, 205 WBL	A
50-Year Forecast (2059) - South Ramp & Bismarck Expy						
Trenton Dr. Signal & NE Loop Ramp (4-Lane)	336	503 SBT, 396 EBR	C	210	275 NBT, 195 EBL	C
Trenton Dr. Signal & NE Loop Ramp (6-Lane)	212	259 SBT, 322 EBR	B	116	121 NBT, 189 EBL	B
50-Year Forecast (2059) - Divide Ave. & Bismarck Expy						
Trenton Dr. Signal & NE Loop Ramp (4-Lane)	336	885 SBT, 435 WBR	D	210	861 WBR, 614 NBT	E
Trenton Dr. Signal & NE Loop Ramp (6-Lane)	212	247 SBT, 389 WBR	C	116	808 WBR, 426 NBT	D

7.5 I-94 Interchange Ramp Operations

This section illustrates the detailed output for the intersections at the north and south ramps of the I-94 and Centennial Rd/Bismarck Expy Interchange. One of the main objectives of this study was to determine if and when loop ramps will be needed at these intersections to facilitate traffic accessing I-94.

7.5.1 I-94 North Ramp

During the AM peak-hour period, the I-94 North Ramp illustrated LOS ranging from “D” to “F” during the 2009 base case (Table 8). The existing optimized and Trenton Dr. signal scenarios provide a LOS of “D.” It should be pointed out that some of the intersection improvements are a

result of increasing the green time for the southbound phase, which increases the delay for the northbound left-turn phase. For the 2035 and 2059 planning horizons, the scenarios incorporating NE and NE/SW loop ramps provide LOS of "A."

The northbound left-turn movement had AM peak traffic volume for the 2009, 2024, 2035, and 2059 planning horizons of 331, 412, 471, and 447 vehicles, respectively. Due to the large number of traffic traveling southbound, the northbound left-turn movement is only able to turn during the protected portion of the northbound protected/permitted phase. For the 2009 horizon, the LOS for the northbound left-turn movement ranges from a "C" to an "F" and the addition of the Trenton Dr. signal does not significantly affect the north ramp's operation compared to the Existing Optimized scenario (Table 8). The LOS for the northbound left-turn phase remains an "F" unless a NE loop ramp is incorporated, which eliminates delay for this movement and improves the southbound delay since the left-turn phase is removed. Therefore, the intersection delay is significantly reduced with the NE loop ramp, which would be realized at the present time.

During the PM peak-hour period, the I-94 North Ramp exhibited LOS ranging from "A" to "B" for the 2009 base case (Table 9). A signal installation at Trenton Dr. improved the intersection to a LOS of "A." The 2024, 2035, and 2059 planning horizons incorporating NE and NE/SW loop ramps provide intersection LOS of "A."

The northbound left-turn movement had PM peak traffic volume for the 2009, 2024, 2035, and 2059 planning horizons of 371, 462, 528, and 501 vehicles, respectively (Table 9). Because the southbound movement has significantly less traffic during the PM peak compared to the AM peak, the northbound left-turn movement does not experience significant delay time. The signal installation at Trenton Dr. creates additional gaps for the northbound left-turn movement, resulting in lower delay time. As expected, incorporating NE and NE/SW loop ramps eliminates delay time for this movement.

Table 8. I-94 North Ramp (AM Peak)

	Scenario	MOE	WB Approach		NB Approach			SB Approach		Int. Summary
			L	R	L	T	R	T	R	
2009 AM	Existing Conditions	Delay (s)	47.5	16.7	34.1	2.3	-	223.4	223.4	157.4
		Volume	91	9	331	425	-	1,361	304	2,521
		LOS	D	B	C	A	-	F	F	F
	Existing Optimized	Delay (s)	48.1	16.8	156.1	2.6	-	44.4	44.4	49.3
		Volume	91	9	331	425	-	1,361	304	2,521
		LOS	D	B	F	A	-	D	D	D
	Trenton Dr. Signal	Delay (s)	48.1	16.8	154.6	1.8	-	37.7	37.7	44.4
		Volume	91	9	331	425	-	1,361	304	2,521
		LOS	D	B	F	A	-	D	D	D
2024 AM	Existing Control	Delay (s)	53.9	21.9	157.1	1.6	-	40.4	40.4	49.5
		Volume	87	9	412	529	-	1,700	380	3,117
		LOS	D	C	F	A	-	D	D	D
	Trenton Dr. Signal	Delay (s)	53.9	21.9	157.1	1.6	-	49.2	49.2	55.4
		Volume	87	9	412	529	-	1,700	380	3,117
		LOS	D	C	F	A		D	D	E
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	53.9	21.9	-	3.5	.4	3.3	3.3	4.5
		Volume	87	9	-	529	412	1,700	380	3,117
		LOS	D	C	-	A	A	A	A	A
2035 AM	Existing Control	Delay (s)	64.2	16.9	177.2	2.8	-	87.3	4.9	73.6
		Volume	175	17	471	605	-	1,949	435	3,652
		LOS	E	B	F	A	-	F	A	E
	Trenton Dr. Signal	Delay (s)	64.2	16.9	177.2	2.8	-	85.7	2.8	72.5
		Volume	175	17	471	605	-	1,949	435	3,652
		LOS	E	B	F	A		F	A	E
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	61.4	16.5	-	2.5	0.6	2.6	0.4	4.9
		Volume	175	17	-	605	471	1,949	435	3,652
		LOS	E	B	-	A	A	A	A	A
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	61.4	16.5	-	2.5	0.6	2.6	0.4	4.9
		Volume	175	17	-	605	471	1,949	435	3,652
		LOS	E	B		A	A	A	A	A
2059 AM	Existing Control	Delay (s)	69.3	16.1	195	3.8	-	117.6	5.1	92.8
		Volume	193	19	447	573	-	2,128	475	3,835
		LOS	E	B	F	A	-	F	A	F
	Trenton Dr. Signal	Delay (s)	69.3	16.1	195	3.8	-	118.8	4.6	93.3
		Volume	193	19	447	573	-	2,128	475	3,835
		LOS	E	B	F	A	-	F	A	F
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	69.3	16.1	-	5.4	0.5	5.7	0.6	7.7
		Volume	193	19	-	573	447	2,128	475	3,835
		LOS	E	B	-	A	A	A	A	A
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	69.3	16.1	-	5.4	0.5	5.7	0.6	7.7
		Volume	193	19	-	573	447	2,128	475	3,835
		LOS	E	B	-	A	A	A	A	A
2059 AM (6-Lane)	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	54.2	13.8	-	4.9	1.1	3.6	0.8	5.7
		Volume	193	19	-	573	447	2,128	475	3,835
		LOS	D	B	-	A	A	A	A	A

Table 9. I-94 North Ramp (PM Peak)

	Scenario	MOE	WB Approach		NB Approach			SB Approach		Int. Summary
			L	R	L	T	R	T	R	
2009 PM	Existing Conditions	Delay (s)	48.6	12.7	20.1	5.3	-	21.1	21.1	15.0
		Volume	99	21	371	1,055	-	536	149	2,231
		LOS	D	B	C	A	-	C	C	B
	Existing Optimized	Delay (s)	49.1	12.8	10.4	2.2	-	13.6	13.6	9.4
		Volume	99	21	371	1,055	-	536	149	2,231
		LOS	D	B	B	A	-	B	B	A
	Trenton Dr. Signal	Delay (s)	49.1	12.8	10.8	1.6	-	13.5	13.5	9.2
		Volume	99	21	371	1,055	-	536	149	2,231
		LOS	D	B	B	A	-	B	B	A
2024 PM	Existing Control	Delay (s)	54.2	17.3	13.0	1.9	-	15.2	15.2	9.8
		Volume	95	20	462	1,313	-	670	186	2,746
		LOS	D	B	B	A	-	B	B	A
	Trenton Dr. Signal	Delay (s)	54.2	17.3	12.1	7.6	-	18.9	18.9	13.6
		Volume	95	20	462	1,313	-	670	186	2,746
		LOS	D	B	B	A	-	B	B	B
	Trenton Drive Signal & NE Loop Ramp	Delay (s)	54.2	17.3	-	2.3	0.4	1.6	1.6	3.7
		Volume	95	20	-	1,313	462	670	186	2,746
		LOS	D	B	-	A	A	A	A	A
2035 PM	Existing Control	Delay (s)	54.1	17.3	17.8	3.1	-	20.6	3.4	11.6
		Volume	92	19	528	1,502	-	767	213	3,121
		LOS	D	B	B	A	-	C	A	B
	Trenton Dr. Signal	Delay (s)	54.1	17.3	16.7	3.6	-	20.9	7.1	11.9
		Volume	92	19	528	1,502	-	767	213	3,121
		LOS	D	B	B	A	-	C	A	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	54.1	17.3	-	4.2	0.5	3.5	1.5	4.8
		Volume	92	19	-	1,502	528	767	213	3,121
		LOS	D	B	-	A	A	A	A	A
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	54.1	17.3	-	4.2	0.5	3.5	1.5	4.8
		Volume	92	19	-	1,502	528	767	213	3,121
		LOS	D	B	-	A	A	A	A	A
2059 PM	Existing Control	Delay (s)	64.5	12.3	27.4	6.3	-	26.5	4.0	18.4
		Volume	210	45	501	1,424	-	838	233	3,251
		LOS	E	B	C	A	-	C	A	B
	Trenton Dr. Signal	Delay (s)	64.5	12.4	27.6	7.1	-	24.7	6.9	18.6
		Volume	210	45	501	1,424	-	838	233	3,251
		LOS	E	B	C	A	-	C	A	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	53.9	12.0	-	6.3	0.3	6.4	2.2	8.3
		Volume	210	45	-	1,424	501	838	233	3,251
		LOS	D	B	-	A	A	A	A	A
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	53.9	12.0	-	6.3	0.3	6.4	2.2	8.3
		Volume	210	45	-	1,424	501	838	233	3,251
		LOS	D	B	-	A	A	A	A	A
2059 PM (6-Lane)	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	53.1	18.1	-	4.6	0.5	5.7	2.5	7.4
		Volume	210	45	-	1,424	501	838	233	3,251
		LOS	D	B	-	A	A	A	A	A

7.5.2 I-94 South Ramp

During the AM peak-hour period, the I-94 South Ramp illustrated LOS ranging from “B” to “C” during the 2009 base case (Table 10). The signal installation at Trenton Dr. provides a LOS of “B” for the 2009 planning horizon, which is the same as the existing conditions. The

southbound left-turn movement has a low number of vehicles (23 to 39 vehicles), resulting in lower delay time for all planning horizons and scenarios.

The critical movement for the I-94 South Ramp during the AM peak period is the eastbound right-turn movement (Table 10). To bring the LOS to at least a "D" for all planning horizons, two right-turn lanes were incorporated into the 2035 and 2059 planning horizons to serve the forecasted traffic (720 vehicles in 2035 and 764 vehicles in 2059).

During the PM peak-hour period, the I-94 South Ramp illustrated LOS ranging from "B" to "C" among all analysis scenarios (Table 10). For the 2009 base case, the signal installation at Trenton Dr. provides a LOS of "B," which is the same as the existing conditions. The southbound left-turn movement has a low number of vehicles (27 to 46 vehicles); however, the opposing northbound through traffic ranges from 1,134 to 1,862. Therefore, delay time increases for each planning horizon. Note that the delay for the southbound left-turn phase could be decreased with the addition of a left-turn phase (when the turning traffic exceeds 100 vehicles per hour).

Similar to the AM peak, the critical movement for PM peak at the I-94 South Ramp was the eastbound movement (Table 11). The eastbound left-turn movement incurred the highest delay during the PM Peak. Incorporating two left-turns achieved a LOS of "D" for all planning horizons to serve the forecasted traffic (529 vehicles for 2035 and 561 vehicles for 2059).

Table 10. I-94 South Ramp (AM Peak)

	Scenario	MOE	EB Approach		NB Approach		SB Approach			Int. Summary
			L	R	T	R	L	T	R	
2009 AM	Existing Conditions	Delay (s)	22.6	62.0	10.3	2.5	8.4	10.9	-	21.6
		Volume	96	389	564	82	23	906	-	2,060
		LOS	C	E	B	A	A	B	-	C
	Existing Optimized	Delay (s)	17.0	39.0	12.4	2.5	3.9	5.9	-	14.7
		Volume	96	389	564	82	23	906	-	2,060
		LOS	B	D	B	A	A	A	-	B
	Trenton Dr. Signal	Delay (s)	17.0	39.0	13.4	2.4	5.4	7.9	-	15.9
		Volume	96	389	564	82	23	906	-	2,060
		LOS	B	D	B	A	A	A	-	B
2024 AM	Existing Control	Delay (s)	16.7	40.8	19.3	3.6	4.4	8.2	-	18.7
		Volume	143	580	693	101	27	1,063	-	2,607
		LOS	B	D	B	A	A	A	-	B
	Trenton Dr. Signal	Delay (s)	16.7	40.8	19.3	3.6	4.4	7.4	-	18.3
		Volume	143	580	693	101	27	1,063	-	2,607
		LOS	B	D	B	A	A	A	-	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	16.7	40.8	19.3	3.6	12.6	19.2	-	23.2
		Volume	143	580	693	101	27	1,063	-	2,607
		LOS	B	D	B	A	B	B	-	C
2035 AM	Existing Control	Delay (s)	24.2	37.6	12.2	3.4	2.6	5.3	-	15.9
		Volume	178	720	788	115	30	1,178	-	3,009
		LOS	C	D	B	A	A	A	-	B
	Trenton Dr. Signal	Delay (s)	24.2	37.6	12.2	3.4	2.6	5.2	-	15.8
		Volume	178	720	788	115	30	1,178	-	3,009
		LOS	C	D	B	A	A	A	-	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	24.2	37.8	12.4	3.9	7.2	10.6	-	18.1
		Volume	178	720	788	115	30	1,178	-	3,009
		LOS	C	D	B	A	A	B	-	B
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	24.2	37.8	12.4	3.9	-	10.9	0	18.2
		Volume	178	720	788	115	-	1,178	30	3,009
		LOS	C	D	B	A	-	B	A	B
2059 AM	Existing Control	Delay (s)	25.1	52.1	13.5	3.1	3.2	29	-	28.4
		Volume	188	764	926	135	39	1,528	-	3,580
		LOS	C	D	B	A	A	C	-	C
	Trenton Dr. Signal	Delay (s)	25.1	52.1	13.5	3.1	3.2	29	-	28.4
		Volume	188	764	926	135	39	1,528	-	3,580
		LOS	C	D	B	A	A	C	-	C
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	25.1	52.1	13.5	3.1	6.6	35.0	-	31.0
		Volume	188	764	926	135	39	1,528	-	3,580
		LOS	C	D	B	A	A	C	-	C
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	25.1	52.1	13.5	3.1	-	35.1	0	31.0
		Volume	188	764	926	135	-	1,528	39	3,580
		LOS	C	D	B	A	-	D	A	C
2059 AM (6-Lane)	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	21.7	37.1	13.2	3.6	9.1	12.7	-	18.1
		Volume	188	764	926	135	39	1,528	-	3,580
		LOS	C	D	B	A	A	B	-	B

Table 11. I-94 South Ramp (PM Peak)

	Scenario	MOE	EB Approach		NB Approach		SB Approach			Int. Summary
			L	R	T	R	L	T	R	
2009 PM	Existing Conditions	Delay (s)	42.3	13.9	8.6	1.6	7.6	3.0	-	11.3
		Volume	213	286	1,134	111	27	557	-	2,328
		LOS	D	B	A	A	A	A	-	B
	Existing Optimized	Delay (s)	42.6	12.5	7.9	1.9	6.1	3.9	-	11.0
		Volume	213	286	1,134	111	27	557	-	2,328
		LOS	D	B	A	A	A	A	-	B
	Trenton Dr. Signal	Delay (s)	42.6	12.5	7.6	0.5	7.5	4.6	-	10.9
		Volume	213	286	1,134	111	27	557	-	2,328
		LOS	D	B	A	A	A	A	-	B
2024 PM	Existing Control	Delay (s)	44.5	32.3	13.2	3.0	9.0	2.8	-	16.5
		Volume	318	426	1,394	136	32	654	-	2,960
		LOS	D	C	B	A	A	A	-	B
	Trenton Dr. Signal	Delay (s)	44.5	32.3	13.2	3.0	23.1	13.6	-	19.0
		Volume	318	426	1,394	136	32	654	-	2,960
		LOS	D	C	B	A	C	B	-	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	44.5	32.3	13.0	2.9	14.6	7.1	-	17.4
		Volume	318	426	1,394	136	32	654	-	2,960
		LOS	D	C	B	A	B	A	-	B
2035 PM	Existing Control	Delay (s)	44.1	13.5	8.8	1.4	16.6	4.3	-	12.4
		Volume	394	529	1,584	155	35	724	-	3,421
		LOS	D	B	A	A	B	A	-	B
	Trenton Dr. Signal	Delay (s)	44.1	13.5	8.3	1.2	16.5	4.1	-	12.1
		Volume	394	529	1,584	155	35	724	-	3,421
		LOS	D	B	A	A	B	A	-	B
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	44.1	13.5	8.0	0.8	13.7	3.5	-	11.8
		Volume	394	529	1,584	155	35	724	-	3,421
		LOS	D	B	A	A	B	A	-	B
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	44.1	13.5	8.0	0.8	-	3.5	0.0	11.6
		Volume	394	529	1,584	155	-	724	35	3,421
		LOS	D	B	A	A	-	A	A	B
2059 PM	Existing Control	Delay (s)	47.4	32.2	21.6	0.1	57.9	0.6	-	20.3
		Volume	418	561	1,862	182	46	939	-	4,008
		LOS	D	C	C	A	E	A	-	C
	Trenton Dr. Signal	Delay (s)	47.4	32.3	21.6	0.1	57.4	0.7	-	20.3
		Volume	418	561	1,862	182	46	939	-	4,008
		LOS	D	C	C	A	E	A	-	C
	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	47.4	32.4	20.8	0.8	67.1	7.6	-	21.7
		Volume	418	561	1,862	182	46	939	-	4,008
		LOS	D	C	C	A	E	A	-	C
	Trenton Dr. Signal & NE/SW Loop Ramps	Delay (s)	47.4	32.4	20.8	0.8	-	7.6	0.0	21.0
		Volume	418	561	1,862	182	-	939	46	4,008
		LOS	D	C	C	A	-	A	A	C
2059 PM (6-Lane)	Trenton Dr. Signal & NE Loop Ramp	Delay (s)	44.3	31.0	6.0	0.4	38.9	4.2	-	13.2
		Volume	418	561	1,862	182	46	939	-	4,008
		LOS	D	C	A	A	D	A	-	B

8.0 SUMMARY/RECOMMENDATIONS

The purpose of this study was to evaluate the operational performance of Centennial Rd/Bismarck Expy and I-94 Interchange and surrounding intersections between Divide Ave. and Century Ave. This study evaluated a total of 30 different scenarios using various intersection controls and geometric alternatives.

Currently, the corridor experiences significant traffic volume and congestion during the AM and PM peak-hour periods. The congestion along this corridor will continue to increase as development continues on the east side of Bismarck, ND. Although an additional interchange at 66th St. E. will assist the eastern portion of the city, traffic forecasts estimate that this interchange will not significantly relieve traffic volume along the Centennial Rd/Bismarck Expy corridor.

To assist the traffic operations in the near- and long- term planning horizons, several traffic control and geometric improvements could be incorporated. Although a signal warrant was not conducted at Trenton Dr. (as a part of this study), it was observed that the installation of a traffic signal at this intersection would benefit the traffic operations for the existing and future conditions, although there is a potential for spillback into the I-94 North Ramp in the 2035 and 2059 4-lane network scenarios. Signalizing this intersection was also recommended by a previous traffic study that was conducted by Kadrmas, Lee, and Jackson, Inc. [*1*].

A comparison was conducted for the 2059 network which modeled Centennial Rd/Bismarck Expy as both a 4-lane and a 6-lane corridor. The results of the comparison showed several benefits to expanding the corridor to six lanes, such as reducing overall network delay and improving several intersection LOS. In addition, the ADT along Centennial Rd/Bismarck Expy ranges from 25,800 to 42,500 vehicles. The threshold ADT for a 4-lane arterial with turning lanes to maintain a LOS “D” can range from 30,000 to 35,000 vehicles. Another benefit of increasing the corridor to 6-lanes is the potential for eliminating any spillback of vehicles into adjacent intersections.

Although geometric changes (the addition of turn lanes) were made to Century Ave. for the 2035 and 2059 scenarios, the LOS remained at an “F.” The LOS at this intersection was also reported as an “F” for the 6-lane 2059 network. Since Century Ave. is the only route for drivers to the northwest of the study area, the geometric changes do little to alleviate the delays at the intersection of Centennial Rd and Century Ave. The delays experienced at this intersection may force drivers to alter their routes or departure times.

The long-term improvements relate to geometric modifications of the corridor. Based on the planning and operational analyses conducting in this study, several geometric improvements could be incorporated to accommodate the current and future traffic volume. The main improvements relate to incorporating a NE loop ramp, and expanding Centennial Rd/Bismarck Expy to a six-lane roadway by 2059. Due to the low southbound left-turn traffic (current and projected) at the I-94 South Ramp, a SW loop ramp is not recommended at this time. However, a southbound left-turn phase may be incorporated if traffic volume increases. The modifications that will enhance the study area along with the planning horizon that receives significant benefits include the following:

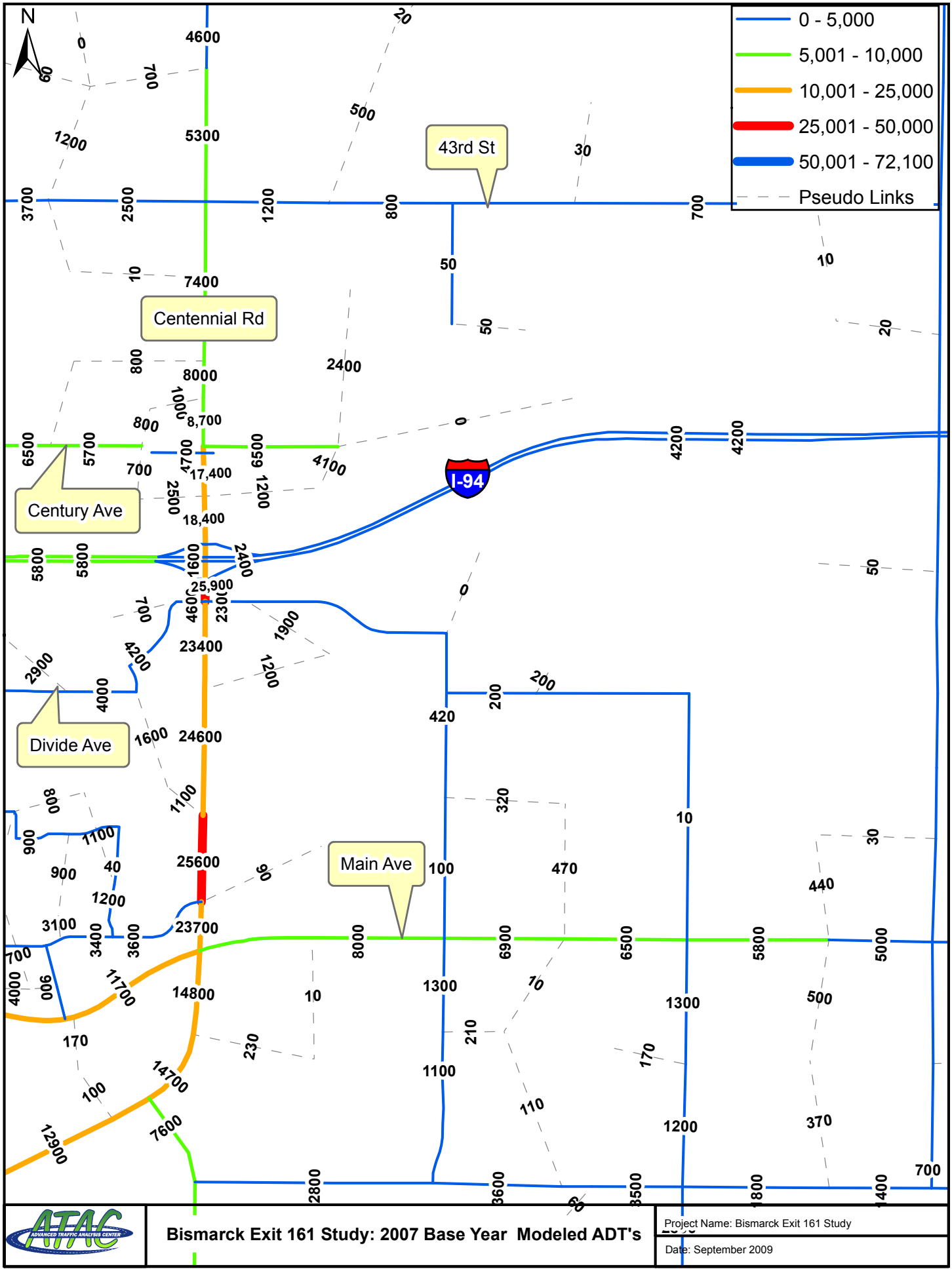
- Widen Century Ave. to a four-lane cross section with turn lanes (2009)
- Add a dual westbound left-turn at Century Ave. (2009)
- Install a traffic signal at the intersection of Trenton Dr. & Centennial Rd with turn lanes (2009)
- Add a NE loop ramp at the I-94 North Ramp (2009)

- Widen the eastbound off-ramp of the I-94 South Ramp to accommodate dual left-turn and dual right-turn lanes (2035)
- Widen the Centennial Rd/Bismarck Expy to a six-lane cross section with left and right turn lanes (2059)

REFERENCES

1. Kadrmas, Lee & Jackson, Inc. "Traffic Operations Study – East Century Avenue/Centennial Road." SU-1-981(085)095, PCN 17369. Bismarck, ND, May 2009.

Appendix A: ADT Data

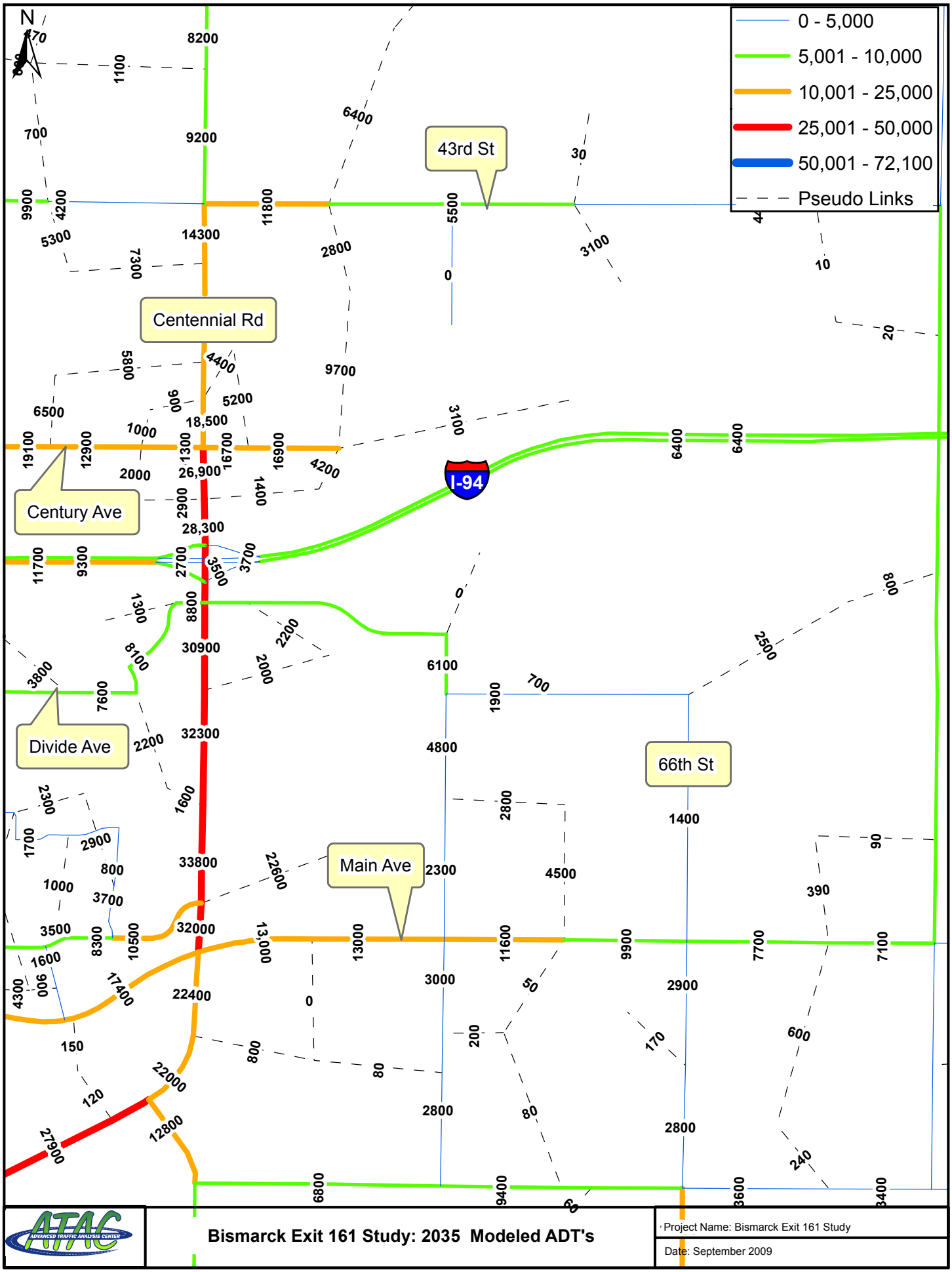


ATAC ADVANCED TRAFFIC ANALYSIS CENTER

Bismarck Exit 161 Study: 2007 Base Year Modeled ADT's

Project Name: Bismarck Exit 161 Study

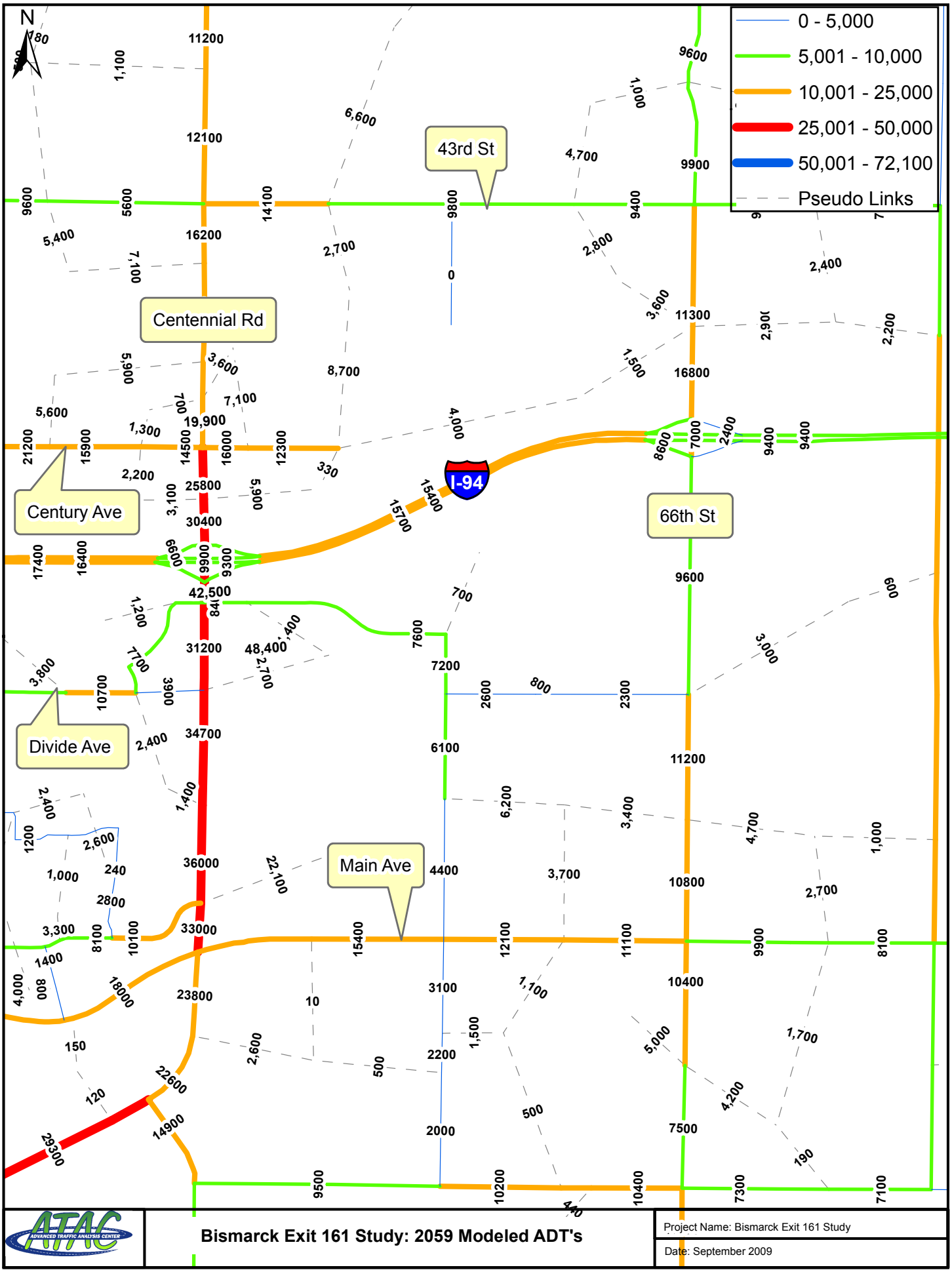
Date: September 2009



Bismarck Exit 161 Study: 2035 Modeled ADT's

Project Name: Bismarck Exit 161 Study

Date: September 2009

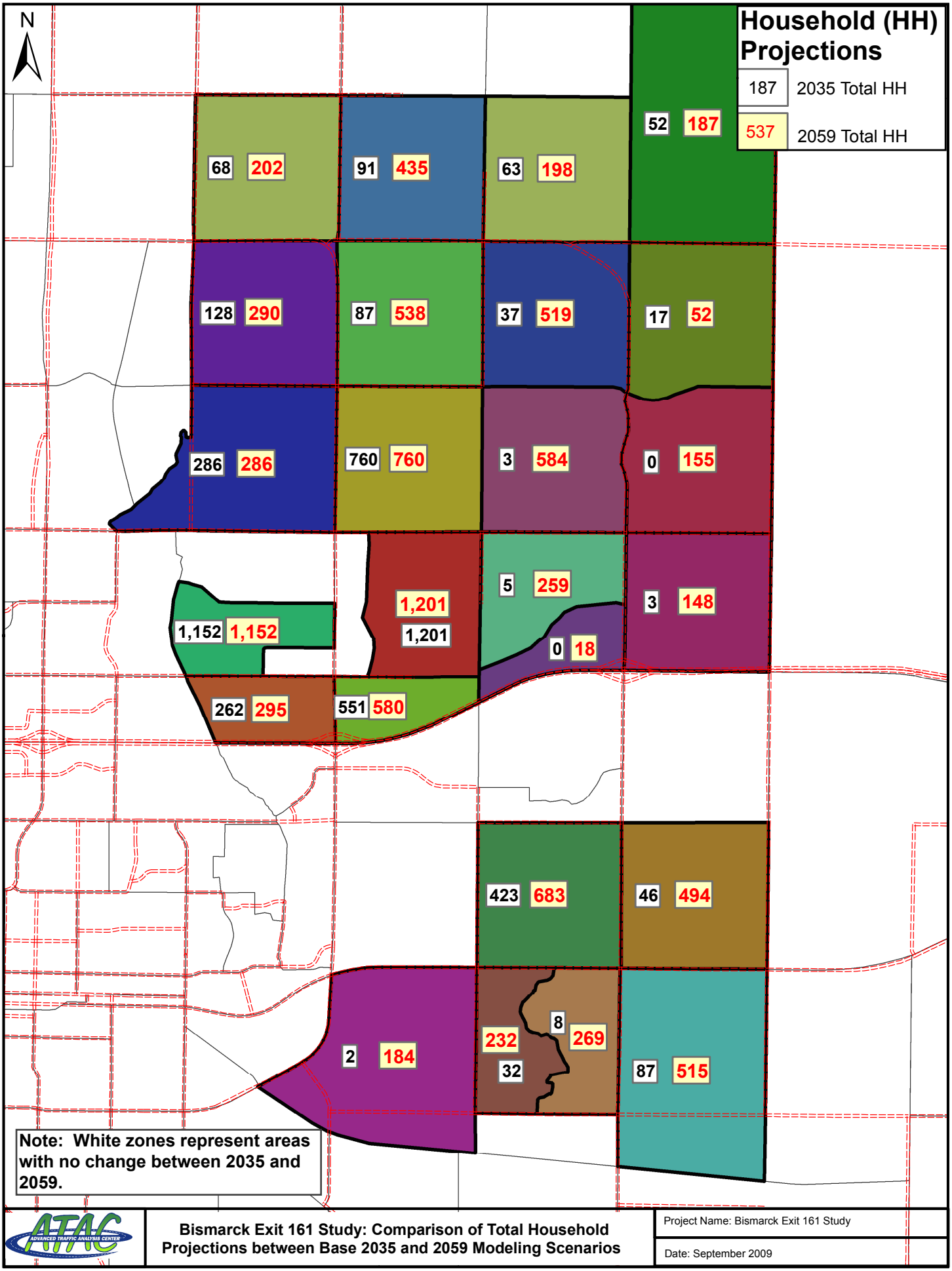


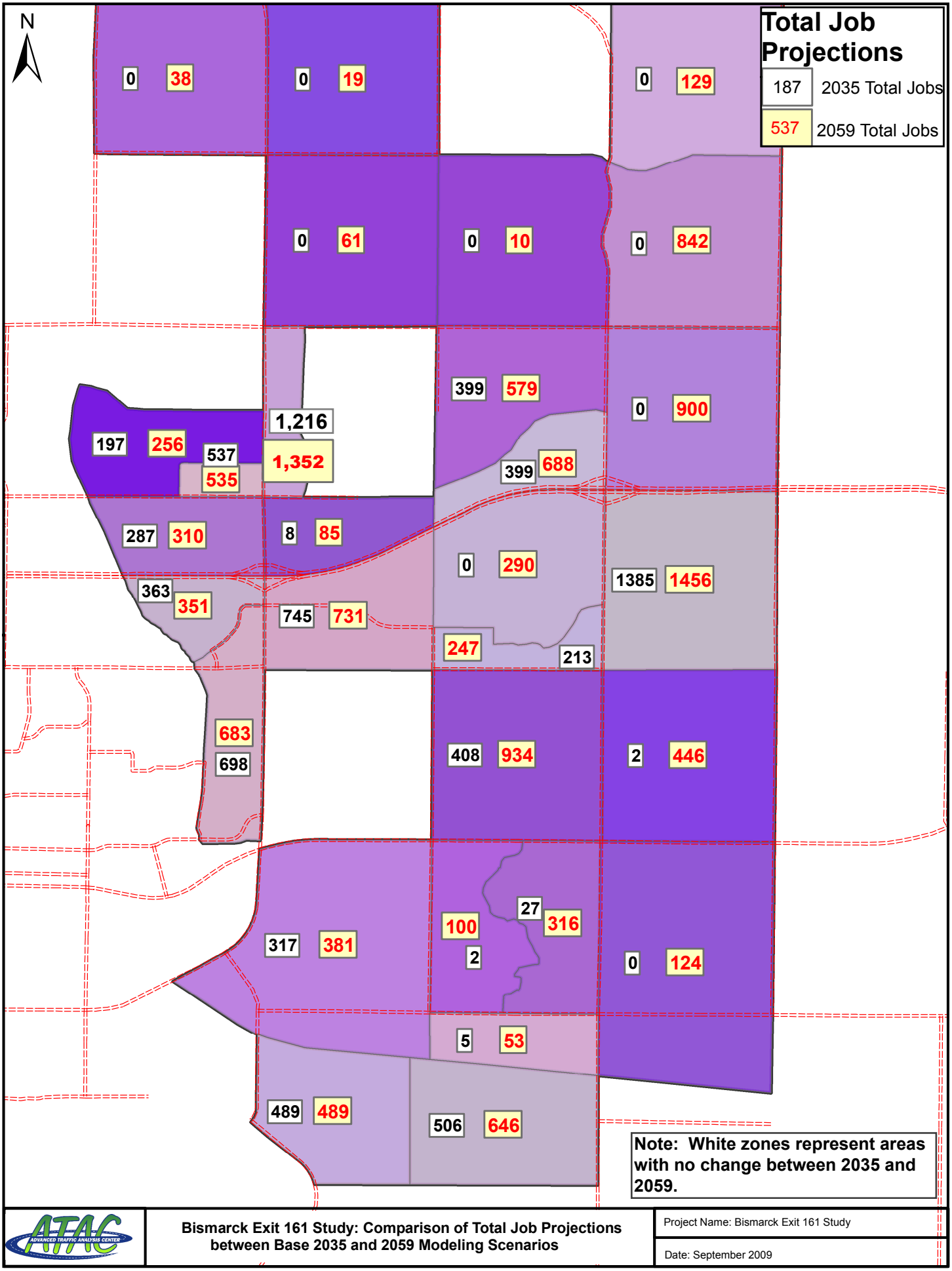
Bismarck Exit 161 Study: 2059 Modeled ADT's

Project Name: Bismarck Exit 161 Study

Date: September 2009

Appendix B: Household/Job Data


N
Household (HH) Projections
187 2035 Total HH
537 2059 Total HH
68 202
91 435
63 198
52 187
128 290
87 538
37 519
17 52
286 286
760 760
3 584
0 155
1,152 1,152
1,201
1,201
5 259
0 18
3 148
262 295
551 580
423 683
46 494
2 184
232
32
8
269
87 515
Note: White zones represent areas with no change between 2035 and 2059.
ATAC
ADVANCED TRAFFIC ANALYSIS CENTER
Bismarck Exit 161 Study: Comparison of Total Household Projections between Base 2035 and 2059 Modeling Scenarios
Project Name: Bismarck Exit 161 Study
Date: September 2009



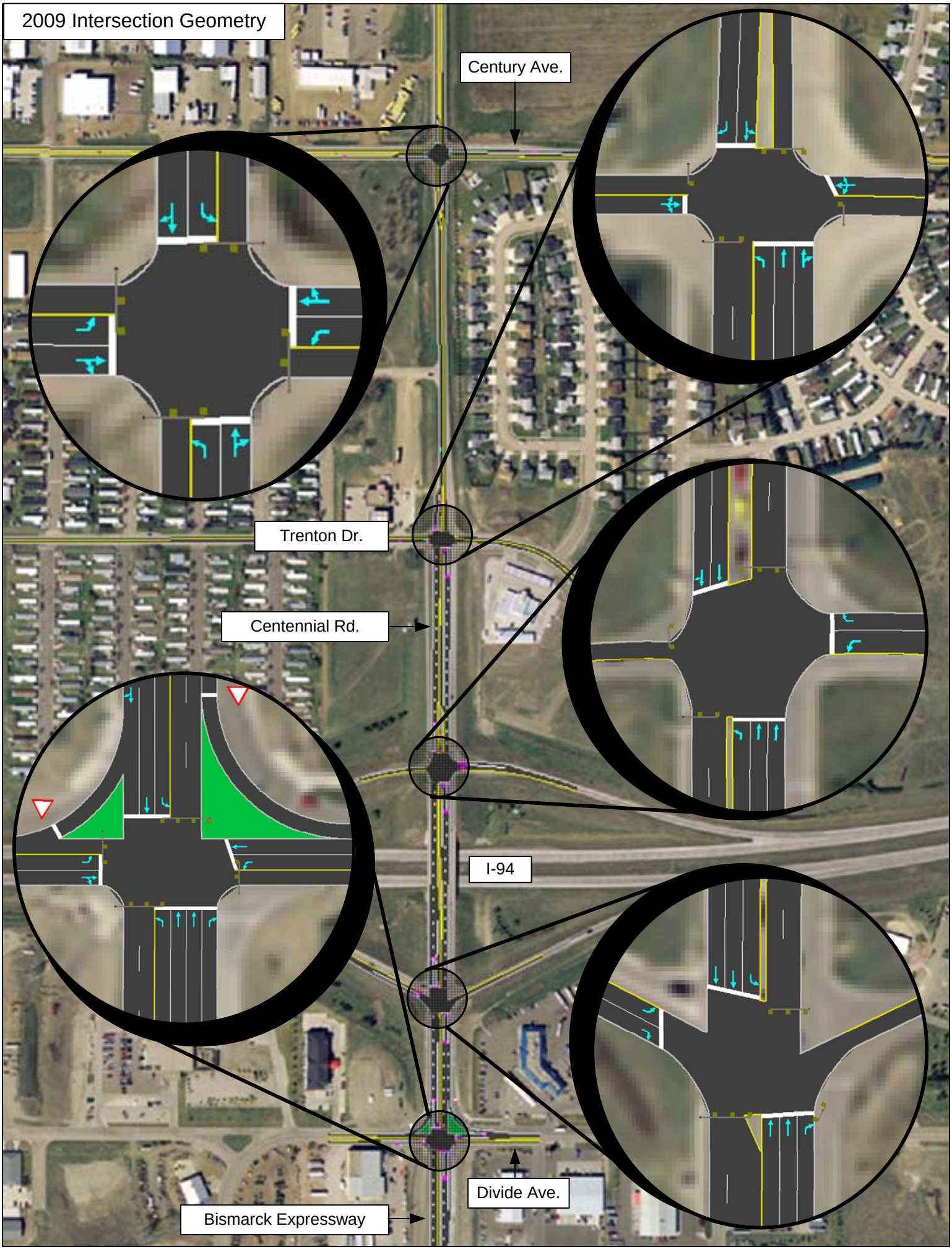
ATAC ADVANCED TRAFFIC ANALYSIS CENTER

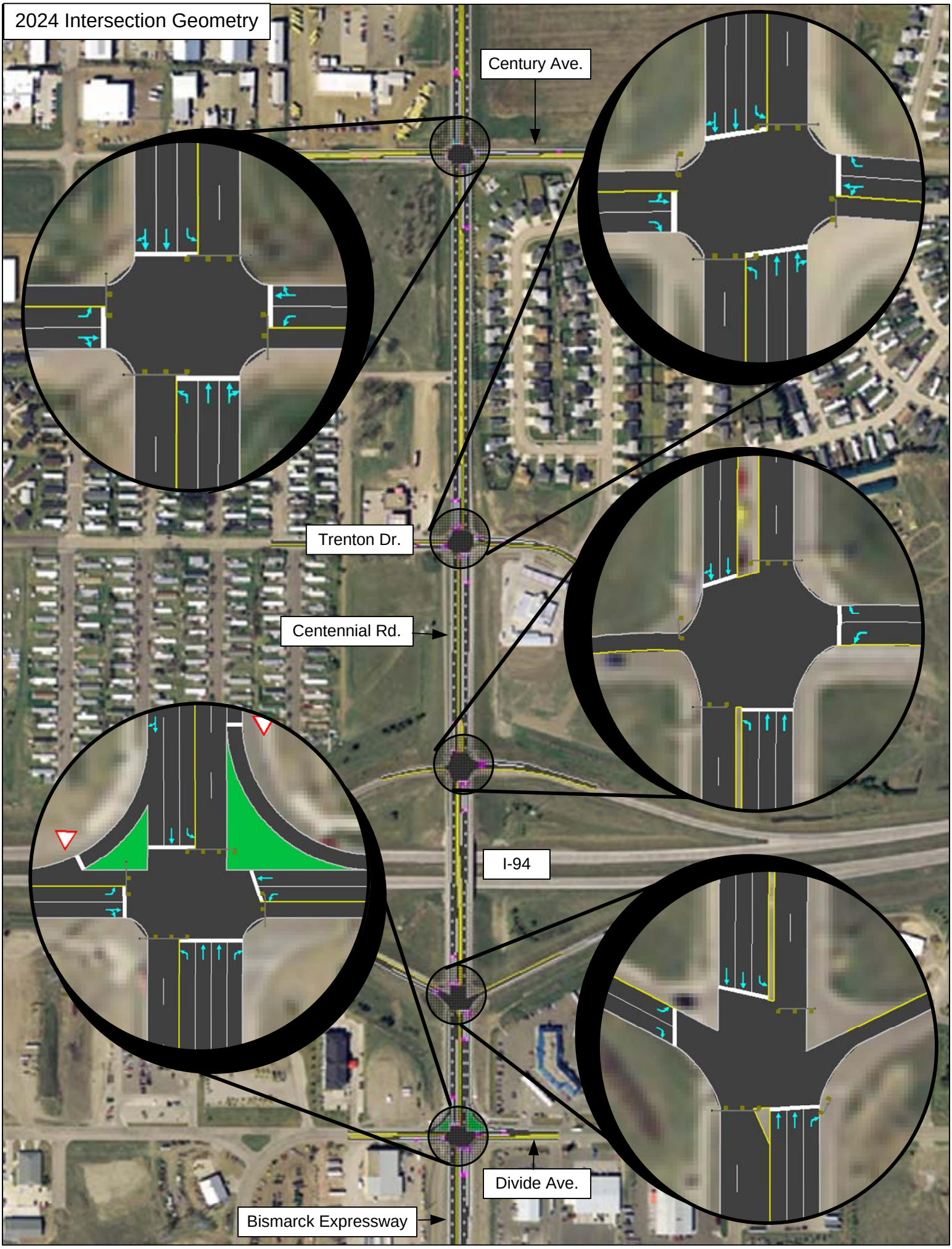
Bismarck Exit 161 Study: Comparison of Total Job Projections between Base 2035 and 2059 Modeling Scenarios

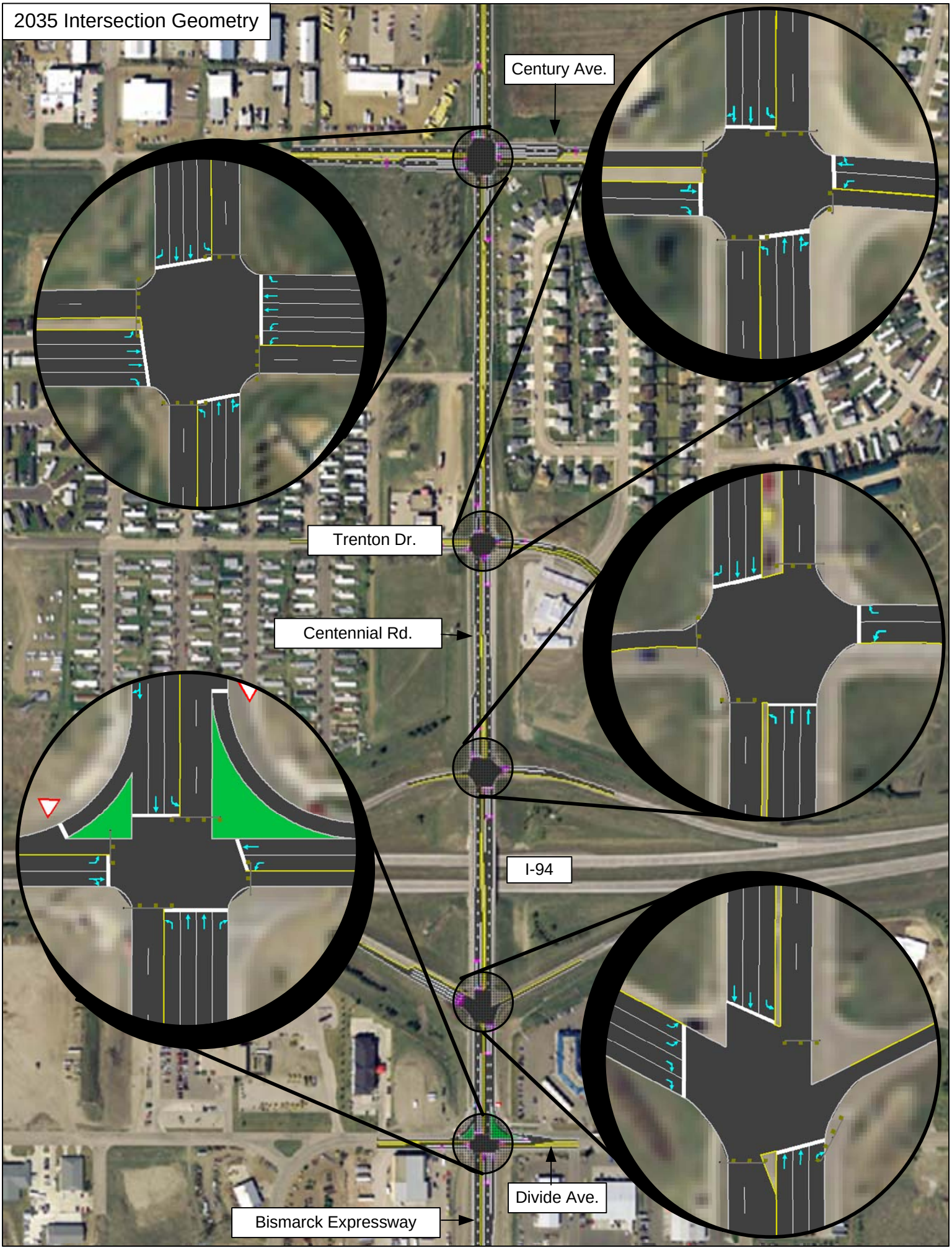
Project Name: Bismarck Exit 161 Study

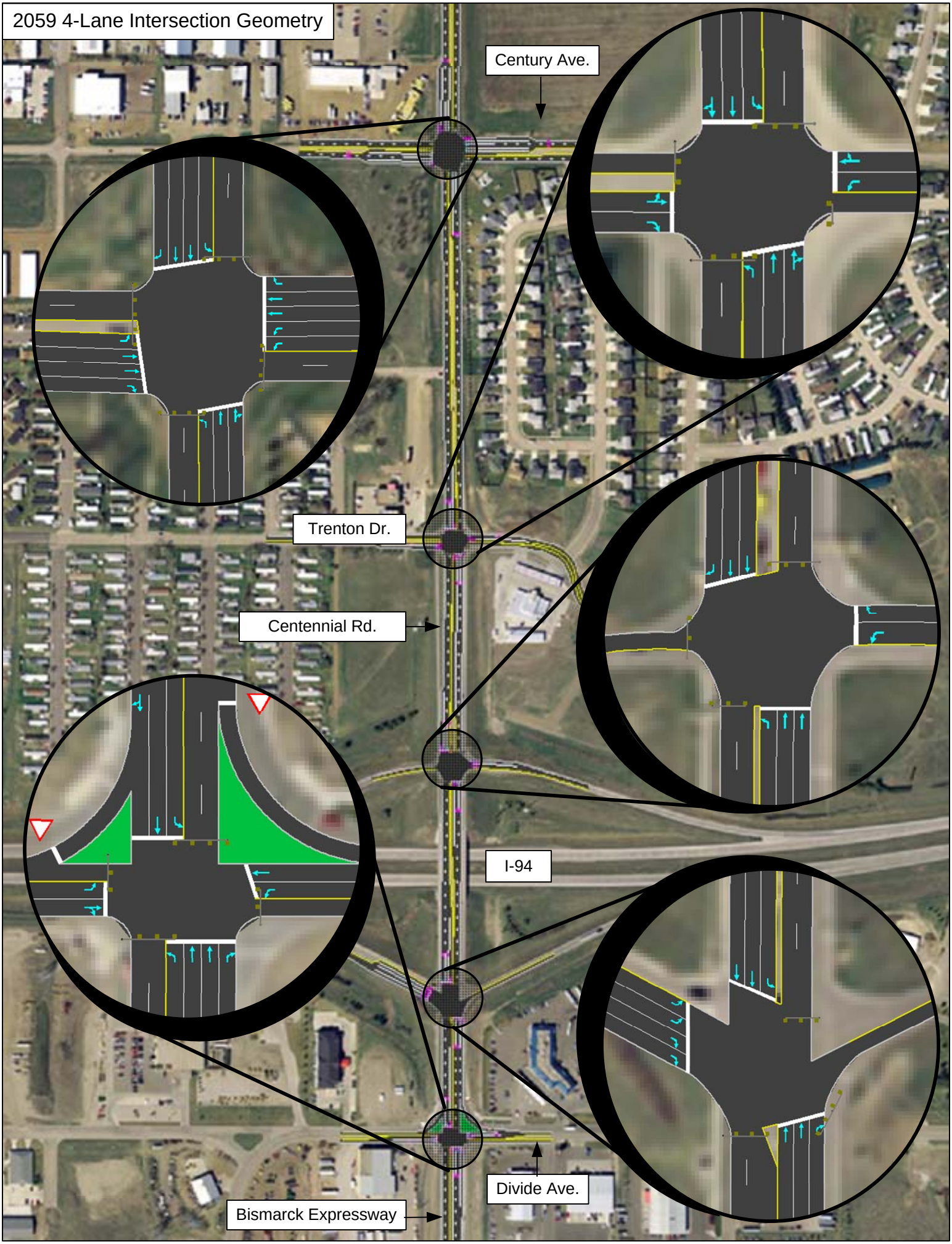
Date: September 2009

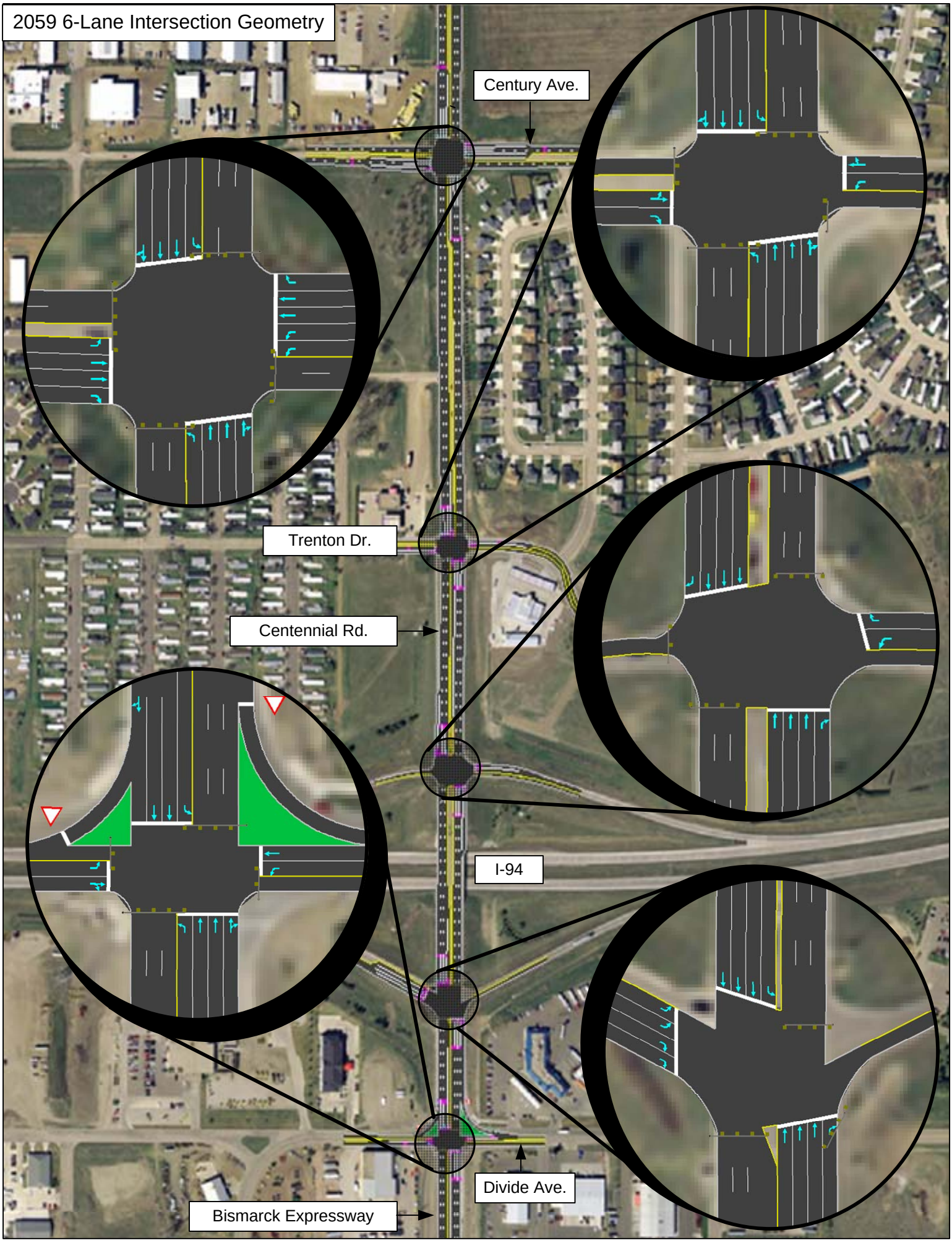
Appendix C: Synchro Network Intersection Geometry


2009 Intersection Geometry
Century Ave.
Trenton Dr.
Centennial Rd.
I-94
Divide Ave.
Bismarck Expressway

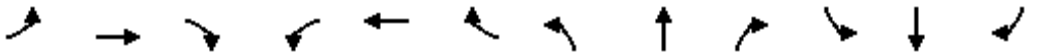

2024 Intersection Geometry
Century Ave.
Trenton Dr.
Centennial Rd.
I-94
Divide Ave.
Bismarck Expressway


2035 Intersection Geometry
Century Ave.
Trenton Dr.
Centennial Rd.
I-94
Divide Ave.
Bismarck Expressway


2059 4-Lane Intersection Geometry
Century Ave.
Trenton Dr.
Centennial Rd.
I-94
Divide Ave.
Bismarck Expressway


2059 6-Lane Intersection Geometry
Century Ave.
Trenton Dr.
Centennial Rd.
I-94
Divide Ave.
Bismarck Expressway

Appendix D: 2009 - Existing Conditions AM (1A1)

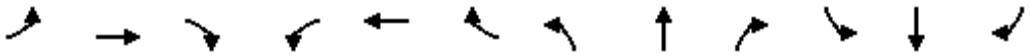


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	98	14	69	47	161	25	430	72	290	995	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.61	0.58	0.86	0.69	0.81	0.63	0.90	0.75	0.68	0.71	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	185	0	80	68	199	40	478	96	426	1723	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	14.0	46.0	46.0	46.0	14.0	60.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	15.6%	51.1%	51.1%	51.1%	15.6%	66.7%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	14.6	14.6		14.6	14.6	33.1	47.2	47.2	47.2	65.4	63.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.37	0.52	0.52	0.52	0.73	0.71	
v/c Ratio	0.60	0.62		0.52	0.26	0.33	0.33	0.28	0.13	0.59	0.70	
Control Delay	47.0	42.1		45.6	33.5	4.0	25.8	13.7	3.7	9.7	11.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
Total Delay	47.0	42.1		45.6	33.5	4.0	25.8	13.7	3.7	9.8	11.3	
LOS	D	D		D	C	A	C	B	A	A	B	
Approach Delay		44.0			19.4			12.9			11.0	
Approach LOS		D			B			B			B	
Queue Length 50th (ft)	63	95		42	34	0	12	75	0	74	245	
Queue Length 95th (ft)	92	93		77	49	26	29	125	17	111	278	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	320	482		251	433	601	120	1736	763	720	2471	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	10	112	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38		0.32	0.16	0.33	0.33	0.28	0.13	0.60	0.73	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Divide Ave & N Bismarck Expy

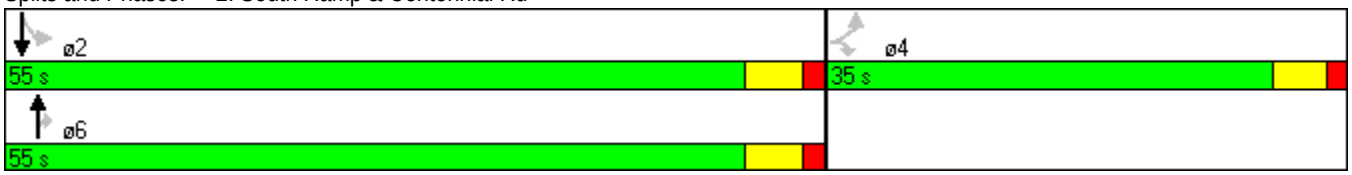


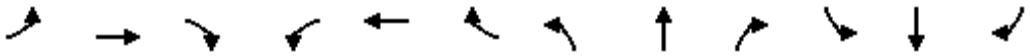
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	0	389	0	0	0	0	564	82	23	906	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.92	0.71	0.92	0.92	0.92	0.87	0.87	0.82	0.52	0.78	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	0	548	0	0	0	0	648	100	44	1162	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	35.0	0.0	35.0	0.0	0.0	0.0	0.0	55.0	55.0	55.0	55.0	0.0
Total Split (%)	38.9%	0.0%	38.9%	0.0%	0.0%	0.0%	0.0%	61.1%	61.1%	61.1%	61.1%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	30.2		30.2					49.3	49.3	49.3	49.3	
Actuated g/C Ratio	0.34		0.34					0.55	0.55	0.55	0.55	
v/c Ratio	0.20		0.96					0.37	0.14	0.13	0.60	
Control Delay	22.6		57.7					10.3	2.5	8.4	10.8	
Queue Delay	0.0		4.3					0.0	0.0	0.0	0.1	
Total Delay	22.6		62.0					10.3	2.5	8.4	10.9	
LOS	C		E					B	A	A	B	
Approach Delay								9.3			10.8	
Approach LOS								A			B	
Queue Length 50th (ft)	47		275					54	1	6	88	
Queue Length 95th (ft)	80		287					81	11	m5	m69	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	582		568					1761	735	344	1950	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		13					0	0	0	73	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.20		0.99					0.37	0.14	0.13	0.62	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 2 (2%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 21.6		Intersection LOS: C	
Intersection Capacity Utilization 82.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



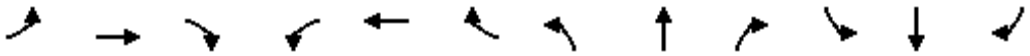


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	91	0	9	331	425	0	0	1361	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			779	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.73	0.92	0.56	0.94	0.76	0.92	0.92	0.77	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	125	0	16	352	559	0	0	2215	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	33.0	0.0	33.0	15.0	57.0	0.0	0.0	42.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	36.7%	0.0%	36.7%	16.7%	63.3%	0.0%	0.0%	46.7%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.5		10.5	70.3	68.9			39.4	
Actuated g/C Ratio				0.12		0.12	0.78	0.77			0.44	
v/c Ratio				0.58		0.10	0.63	0.21			1.44	
Control Delay				47.5		16.7	34.1	2.3			223.4	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				47.5		16.7	34.1	2.3			223.4	
LOS				D		B	C	A			F	
Approach Delay								14.6			223.4	
Approach LOS								B			F	
Queue Length 50th (ft)				68		0	164	26			~879	
Queue Length 95th (ft)				93		8	255	28			m#596	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			699	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				575		386	560	2657			1540	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.22		0.04	0.63	0.21			1.44	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 9 (10%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.44			
Intersection Signal Delay: 157.4		Intersection LOS: F	
Intersection Capacity Utilization 82.9%		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.			

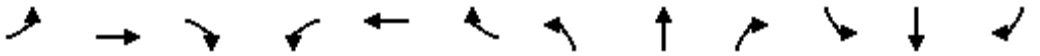
Splits and Phases: 3: North Ramp & Centennial Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	1	181	76	4	34	63	352	83	17	1334	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.38	0.25	0.71	0.63	0.50	0.77	0.79	0.73	0.55	0.71	0.78	0.79
Hourly flow rate (vph)	16	4	255	121	8	44	80	482	151	24	1710	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								779			1314	
pX, platoon unblocked	0.25	0.25	0.23	0.25	0.25	0.97	0.23			0.97		
vC, conflicting volume	2426	2551	1710	2402	2428	482	1738			633		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	4891	5389	2399	4795	4898	447	2518			603		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.3			2.3		
p0 queue free %	0	0	0	0	0	93	0			97		
cM capacity (veh/h)	0	0	10	0	0	595	39			896		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	275	173	80	482	151	1734	28
Volume Left	16	121	80	0	0	24	0
Volume Right	255	44	0	0	151	0	28
cSH	0	0	39	1700	1700	896	1700
Volume to Capacity	Err	Err	2.04	0.28	0.09	0.03	0.02
Queue Length 95th (ft)	Err	Err	214	0	0	2	0
Control Delay (s)	Err	Err	704.8	0.0	0.0	0.1	0.0
Lane LOS	F	F	F			A	
Approach Delay (s)	Err	Err	78.8			0.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	101.5%	ICU Level of Service	G	
Analysis Period (min)	15			

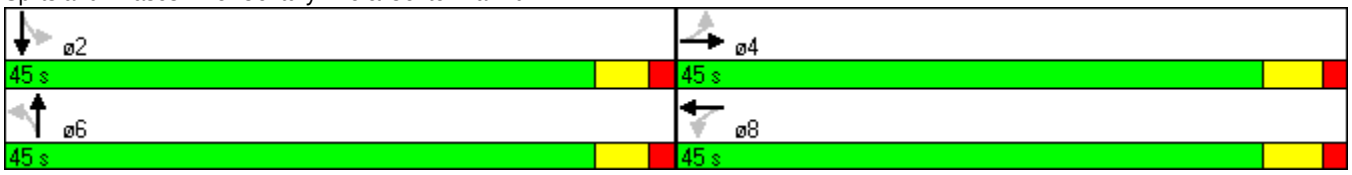


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	23	150	570	236	31	110	241	43	20	867	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		1317			1255			274			497	
Travel Time (s)		25.7			24.4			4.7			8.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.47	0.72	0.66	0.80	0.62	0.48	0.76	0.71	0.60	0.71	0.81	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	259	0	712	446	0	145	411	0	28	1170	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	39.3	39.3		39.3	39.3		39.5	39.5		39.5	39.5	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.44	0.44		0.44	0.44	
v/c Ratio	0.12	0.35		1.54	0.55		1.81	0.52		0.08	1.44	
Control Delay	16.5	15.6		279.9	21.5		435.1	25.6		15.7	231.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.5	15.6		279.9	21.5		435.1	25.6		15.7	231.7	
LOS	B	B		F	C		F	C		B	F	
Approach Delay		15.7			180.4			132.4			226.7	
Approach LOS		B			F			F			F	
Queue Length 50th (ft)	12	78		~575	177		~130	166		9	~922	
Queue Length 95th (ft)	15	99		#671	160		#203	184		20	#1002	

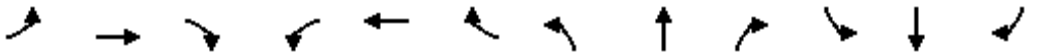
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1237			1175			194			417	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	301	744		461	808		80	788		331	810	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.35		1.54	0.55		1.81	0.52		0.08	1.44	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.81	
Intersection Signal Delay: 174.2	Intersection LOS: F
Intersection Capacity Utilization 117.2%	ICU Level of Service H
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.	

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix E: 2009 - Existing Conditions PM (1A2)

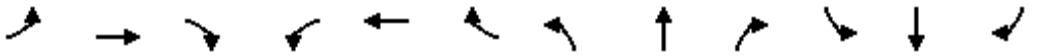


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	45	20	55	45	201	24	854	60	183	779	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			468	
Travel Time (s)		10.1			9.3			10.5			8.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.80	0.63	0.63	0.56	0.75	0.75	0.80	0.83	0.88	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	18%	7%	14%	8%	2%	10%	10%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	88	0	87	80	268	32	1068	72	208	1031	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	14.0	46.0	46.0	46.0	14.0	60.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	15.6%	51.1%	51.1%	51.1%	15.6%	66.7%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	21.6	21.6		21.6	21.6	36.9	43.4	43.4	43.4	58.4	56.7	
Actuated g/C Ratio	0.24	0.24		0.24	0.24	0.41	0.48	0.48	0.48	0.65	0.63	
v/c Ratio	0.85	0.20		0.32	0.19	0.44	0.14	0.63	0.10	0.65	0.48	
Control Delay	57.3	18.8		30.7	27.2	17.6	16.6	20.1	4.1	23.4	7.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	
Total Delay	57.3	18.8		30.7	27.2	17.6	16.6	20.2	4.1	23.4	7.6	
LOS	E	B		C	C	B	B	C	A	C	A	
Approach Delay		47.9			22.0			19.1			10.3	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	143	25		39	35	82	10	244	0	52	127	
Queue Length 95th (ft)	#239	53		54	43	111	24	263	19	108	133	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			388	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	354	496		301	474	618	236	1708	745	329	2154	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	356	
Spillback Cap Reductn	0	0		0	0	0	0	54	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.77	0.18		0.29	0.17	0.43	0.14	0.65	0.10	0.63	0.57	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 1 (1%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 19.3		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		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.			

Splits and Phases: 1: Divide Ave & N Bismarck Expy

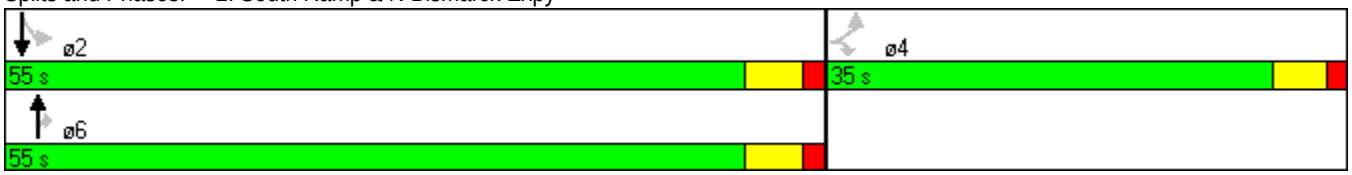


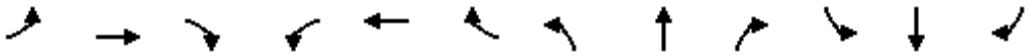
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	213	0	286	0	0	0	0	1134	111	27	557	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			468			759	
Travel Time (s)		13.1			8.7			8.0			12.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.73	0.92	0.78	0.92	0.92	0.92	0.92	0.83	0.79	0.61	0.97	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	12%	2%	2%	2%	2%	2%	16%	7%	10%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	292	0	367	0	0	0	0	1366	141	44	574	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	35.0	0.0	35.0	0.0	0.0	0.0	0.0	55.0	55.0	55.0	55.0	0.0
Total Split (%)	38.9%	0.0%	38.9%	0.0%	0.0%	0.0%	0.0%	61.1%	61.1%	61.1%	61.1%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	20.6		20.6					58.9	58.9	58.9	58.9	
Actuated g/C Ratio	0.23		0.23					0.65	0.65	0.65	0.65	
v/c Ratio	0.73		0.67					0.59	0.15	0.26	0.27	
Control Delay	42.3		13.9					8.2	1.6	7.6	3.0	
Queue Delay	0.0		0.0					0.3	0.0	0.0	0.0	
Total Delay	42.3		13.9					8.6	1.6	7.6	3.0	
LOS	D		B					A	A	A	A	
Approach Delay								7.9			3.3	
Approach LOS								A			A	
Queue Length 50th (ft)	155		40					111	0	1	4	
Queue Length 95th (ft)	166		72					213	m11	7	39	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			388			679	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	582		667					2317	960	171	2149	
Starvation Cap Reductn	0		0					381	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	0.50		0.55					0.71	0.15	0.26	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 9 (10%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 11.3		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & N Bismarck Expy



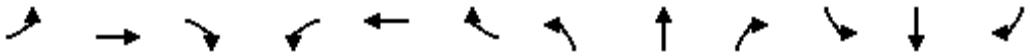


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	99	0	21	371	1055	0	0	536	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			759			795	
Travel Time (s)		6.1			10.6			12.9			13.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.85	0.25	0.48	0.69	0.93	0.92	0.92	0.96	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	20%	0%	0%	3%	1%	2%	2%	4%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	116	0	44	538	1134	0	0	718	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	33.0	0.0	33.0	15.0	57.0	0.0	0.0	42.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	36.7%	0.0%	36.7%	16.7%	63.3%	0.0%	0.0%	46.7%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.5		10.5	72.5	72.2			36.9	
Actuated g/C Ratio				0.12		0.12	0.81	0.80			0.41	
v/c Ratio				0.58		0.19	0.66	0.40			0.51	
Control Delay				48.6		12.7	20.1	5.3			21.1	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				48.6		12.7	20.1	5.3			21.1	
LOS				D		B	C	A			C	
Approach Delay								10.1			21.1	
Approach LOS								B			C	
Queue Length 50th (ft)				64		0	187	113			158	
Queue Length 95th (ft)				105		5	211	201			217	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			679			715	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				527		529	810	2866			1417	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.22		0.08	0.66	0.40			0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 2 (2%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 15.0		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			

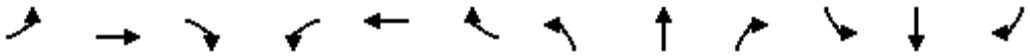
Splits and Phases: 3: North Ramp & Centennial Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	2	73	101	0	64	115	1193	216	39	608	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.50	0.70	0.74	0.25	0.64	0.74	0.65	0.84	0.65	0.76	0.43
Hourly flow rate (vph)	17	4	104	136	0	100	155	1835	257	60	800	40
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								795			1292	
pX, platoon unblocked	0.92	0.92	0.98	0.92	0.92	0.91	0.98			0.91		
vC, conflicting volume	2199	3323	800	3197	3234	1046	840			2093		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2076	3294	788	3157	3198	863	828			2007		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	21	69	0	100	63	81			77		
cM capacity (veh/h)	13	5	333	1	6	272	798			264		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	125	236	155	1224	869	860	40
Volume Left	17	136	155	0	0	60	0
Volume Right	104	100	0	0	257	0	40
cSH	69	1	798	1700	1700	264	1700
Volume to Capacity	1.83	179.86	0.19	0.72	0.51	0.23	0.02
Queue Length 95th (ft)	282	Err	18	0	0	21	0
Control Delay (s)	193.0	Err	10.6	0.0	0.0	10.6	0.0
Lane LOS	F	F	B			B	
Approach Delay (s)	193.0	Err	0.7			10.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	683.8			
Intersection Capacity Utilization	96.3%	ICU Level of Service	F	
Analysis Period (min)	15			

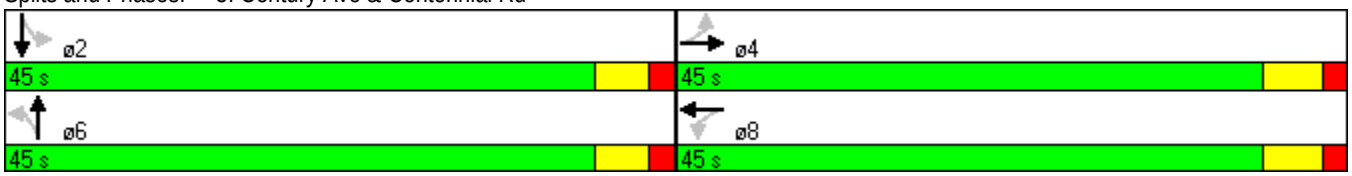


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	166	140	117	94	23	152	482	207	35	241	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		1306			1256			268			441	
Travel Time (s)		25.4			24.5			4.6			7.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.84	0.68	0.90	0.79	0.84	0.58	0.76	0.92	0.78	0.80	0.96	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	1%	3%	2%	0%	4%	2%	3%	1%	3%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	400	0	148	152	0	200	789	0	44	287	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0	45.0	45.0	0.0
Total Split (%)	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%	50.0%	50.0%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	39.3	39.3		39.3	39.3		39.5	39.5		39.5	39.5	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.44	0.44		0.44	0.44	
v/c Ratio	0.12	0.50		0.44	0.19		0.47	0.99		0.54	0.37	
Control Delay	15.9	18.8		23.1	13.7		21.4	55.8		47.5	17.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.9	18.8		23.1	13.7		21.4	55.8		47.5	17.9	
LOS	B	B		C	B		C	E		D	B	
Approach Delay		18.4			18.3			48.9			21.9	
Approach LOS		B			B			D			C	
Queue Length 50th (ft)	21	140		57	42		80	429		18	102	
Queue Length 95th (ft)	42	147		94	74		88	#683		#59	164	

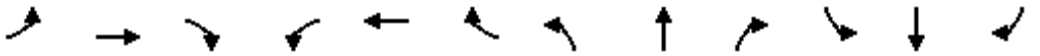
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1226			1176			188			361	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	537	793		333	803		428	794		82	786	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.50		0.44	0.19		0.47	0.99		0.54	0.37	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 33.4		Intersection LOS: C	
Intersection Capacity Utilization 87.3%		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: 5: Century Ave & Centennial Rd



Appendix F: 2009 – Existing Conditions Optimized AM (1A1.5)

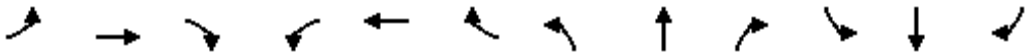


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	98	14	69	47	161	25	430	72	290	995	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.61	0.58	0.86	0.69	0.81	0.63	0.90	0.75	0.68	0.71	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	185	0	80	68	199	40	478	96	426	1723	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		12.0	12.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	19.0	41.0	41.0	41.0	19.0	60.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	21.1%	45.6%	45.6%	45.6%	21.1%	66.7%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	14.6	14.6		14.6	14.6	34.1	46.2	46.2	46.2	65.4	63.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.38	0.51	0.51	0.51	0.73	0.71	
v/c Ratio	0.60	0.62		0.52	0.26	0.33	0.33	0.28	0.13	0.59	0.70	
Control Delay	47.0	42.1		45.6	33.5	3.6	27.4	14.7	4.2	7.4	6.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
Total Delay	47.0	42.1		45.6	33.5	3.6	27.4	14.7	4.2	7.4	6.2	
LOS	D	D		D	C	A	C	B	A	A	A	
Approach Delay		44.0			19.1			13.9			6.4	
Approach LOS		D			B			B			A	
Queue Length 50th (ft)	63	95		42	34	0	12	75	0	51	167	
Queue Length 95th (ft)	92	93		77	49	23	32	140	19	62	145	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	320	482		251	433	638	120	1702	750	750	2471	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	91	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38		0.32	0.16	0.31	0.33	0.28	0.13	0.57	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 6 (7%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 12.4		Intersection LOS: B	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Divide Ave & Bismarck Expy

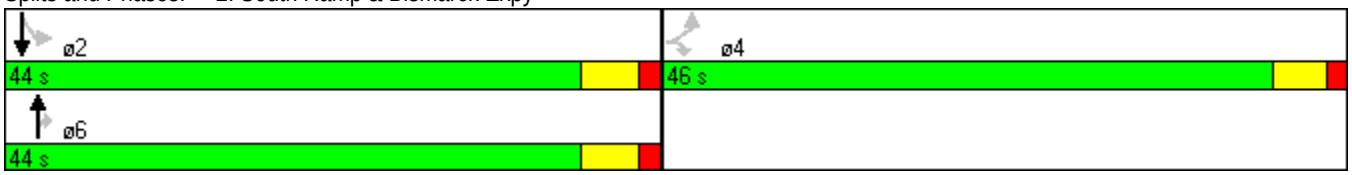


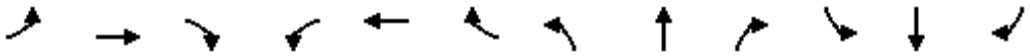
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	0	389	0	0	0	0	564	82	23	906	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.92	0.71	0.92	0.92	0.92	0.87	0.87	0.82	0.52	0.78	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	0	548	0	0	0	0	648	100	44	1162	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	46.0	0.0	46.0	0.0	0.0	0.0	0.0	44.0	44.0	44.0	44.0	0.0
Total Split (%)	51.1%	0.0%	51.1%	0.0%	0.0%	0.0%	0.0%	48.9%	48.9%	48.9%	48.9%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	35.1		35.1					44.4	44.4	44.4	44.4	
Actuated g/C Ratio	0.39		0.39					0.49	0.49	0.49	0.49	
v/c Ratio	0.17		0.87					0.41	0.15	0.15	0.67	
Control Delay	17.0		39.0					12.4	2.5	3.9	5.9	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	17.0		39.0					12.4	2.5	3.9	5.9	
LOS	B		D					B	A	A	A	
Approach Delay								11.1			5.8	
Approach LOS								B			A	
Queue Length 50th (ft)	41		262					77	1	5	125	
Queue Length 95th (ft)	64		248					107	10	m5	m131	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	789		728					1576	668	297	1745	
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	0.15		0.75					0.41	0.15	0.15	0.67	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 88 (98%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 14.7		Intersection LOS: B	
Intersection Capacity Utilization 82.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Bismarck Expy



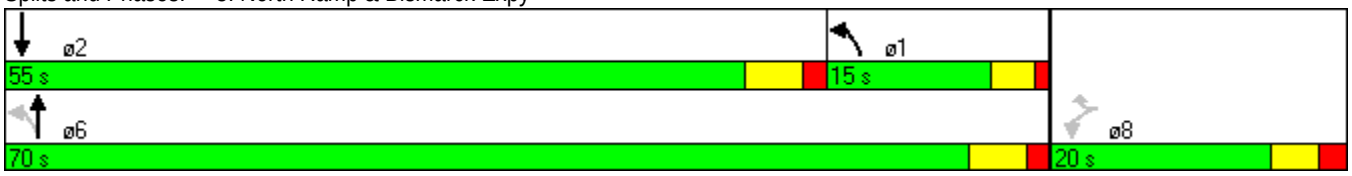


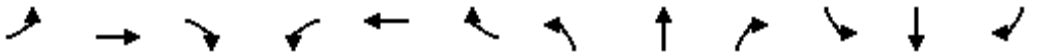
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	91	0	9	331	425	0	0	1361	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			779	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.73	0.92	0.56	0.94	0.76	0.92	0.92	0.77	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	125	0	16	352	559	0	0	2215	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	15.0	70.0	0.0	0.0	55.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	22.2%	0.0%	22.2%	16.7%	77.8%	0.0%	0.0%	61.1%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.4		10.4	70.4	69.0			54.0	
Actuated g/C Ratio				0.12		0.12	0.78	0.77			0.60	
v/c Ratio				0.58		0.10	1.24	0.21			1.05	
Control Delay				48.1		16.8	156.1	2.6			44.4	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				48.1		16.8	156.1	2.6			44.4	
LOS				D		B	F	A			D	
Approach Delay								61.9			44.4	
Approach LOS								E			D	
Queue Length 50th (ft)				69		0	~206	19			~723	
Queue Length 95th (ft)				94		8	#303	43			m371	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			699	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				306		213	285	2662			2103	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.41		0.08	1.24	0.21			1.05	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 64 (71%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.24			
Intersection Signal Delay: 49.3		Intersection LOS: D	
Intersection Capacity Utilization 82.9%		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: 3: North Ramp & Bismarck Expy

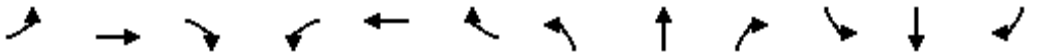




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	1	181	76	4	34	63	352	83	17	1334	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.38	0.25	0.71	0.63	0.50	0.77	0.79	0.73	0.55	0.71	0.78	0.79
Hourly flow rate (vph)	16	4	255	121	8	44	80	482	151	24	1710	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								779			1314	
pX, platoon unblocked	0.23	0.23	0.21	0.23	0.23	0.97	0.21			0.97		
vC, conflicting volume	2426	2551	1710	2402	2428	482	1738			633		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	5222	5768	2491	5117	5230	447	2623			603		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.3			2.3		
p0 queue free %	0	0	0	0	0	93	0			97		
cM capacity (veh/h)	0	0	8	0	0	595	32			896		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	275	173	80	482	151	1734	28
Volume Left	16	121	80	0	0	24	0
Volume Right	255	44	0	0	151	0	28
cSH	0	0	32	1700	1700	896	1700
Volume to Capacity	Err	Err	2.48	0.28	0.09	0.03	0.02
Queue Length 95th (ft)	Err	Err	230	0	0	2	0
Control Delay (s)	Err	Err	936.2	0.0	0.0	0.1	0.0
Lane LOS	F	F	F			A	
Approach Delay (s)	Err	Err	104.7			0.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	101.5%	ICU Level of Service	G	
Analysis Period (min)	15			

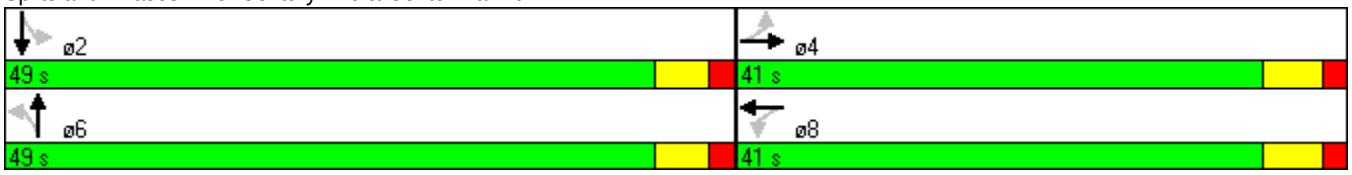


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	23	150	570	236	31	110	241	43	20	867	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		602			733			274			497	
Travel Time (s)		11.7			14.3			4.7			8.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.47	0.72	0.66	0.80	0.62	0.48	0.76	0.71	0.60	0.71	0.81	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	259	0	712	446	0	145	411	0	28	1170	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	41.0	41.0	0.0	41.0	41.0	0.0	49.0	49.0	0.0	49.0	49.0	0.0
Total Split (%)	45.6%	45.6%	0.0%	45.6%	45.6%	0.0%	54.4%	54.4%	0.0%	54.4%	54.4%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	35.3	35.3		35.3	35.3		43.5	43.5		43.5	43.5	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.48	0.48		0.48	0.48	
v/c Ratio	0.15	0.38		1.77	0.61		1.81	0.47		0.07	1.31	
Control Delay	19.7	17.0		380.5	25.8		430.6	10.9		13.2	172.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.7	17.0		380.5	25.8		430.6	10.9		13.2	172.6	
LOS	B	B		F	C		F	B		B	F	
Approach Delay		17.3			243.9			120.4			168.8	
Approach LOS		B			F			F			F	
Queue Length 50th (ft)	13	79		~610	194		~128	87		8	~871	
Queue Length 95th (ft)	17	101		#706	175		#195	102		18	#952	

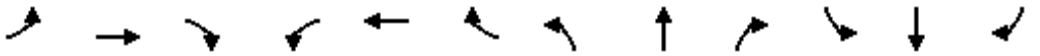
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		522			653			194			417	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	245	682		402	726		80	867		388	892	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.38		1.77	0.61		1.81	0.47		0.07	1.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 35 (39%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.81			
Intersection Signal Delay: 173.6		Intersection LOS: F	
Intersection Capacity Utilization 117.2%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix G: 2009 – Existing Conditions Optimized PM (1A2.5)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	45	20	55	45	201	24	854	60	183	779	118
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			468	
Travel Time (s)		10.1			9.3			10.5			8.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.80	0.63	0.63	0.56	0.75	0.75	0.80	0.83	0.88	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	18%	7%	14%	8%	2%	10%	10%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	88	0	87	80	268	32	1068	72	208	1031	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	31.0	31.0	0.0	31.0	31.0	17.0	42.0	42.0	42.0	17.0	59.0	0.0
Total Split (%)	34.4%	34.4%	0.0%	34.4%	34.4%	18.9%	46.7%	46.7%	46.7%	18.9%	65.6%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	22.0	22.0		22.0	22.0	38.4	41.9	41.9	41.9	58.0	56.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24	0.43	0.47	0.47	0.47	0.64	0.63	
v/c Ratio	0.84	0.19		0.32	0.18	0.43	0.14	0.65	0.10	0.64	0.48	
Control Delay	55.1	18.2		30.1	26.7	17.2	18.7	22.0	4.8	22.1	5.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
Total Delay	55.1	18.2		30.1	26.7	17.2	18.7	22.0	4.8	22.1	5.8	
LOS	E	B		C	C	B	B	C	A	C	A	
Approach Delay		46.1			21.5			20.9			8.5	
Approach LOS		D			C			C			A	
Queue Length 50th (ft)	143	24		39	35	87	11	247	0	28	82	
Queue Length 95th (ft)	#223	51		53	42	107	26	287	21	113	115	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			388	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	368	516		313	493	661	228	1647	722	367	2142	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	349	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.17		0.28	0.16	0.41	0.14	0.65	0.10	0.57	0.58	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 26 (29%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		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.			

Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	213	0	286	0	0	0	0	1134	111	27	557	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			468			759	
Travel Time (s)		13.1			8.7			8.0			12.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.73	0.92	0.78	0.92	0.92	0.92	0.92	0.83	0.79	0.61	0.97	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	12%	2%	2%	2%	2%	2%	16%	7%	10%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	292	0	367	0	0	0	0	1366	141	44	574	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	33.0	0.0	33.0	0.0	0.0	0.0	0.0	57.0	57.0	57.0	57.0	0.0
Total Split (%)	36.7%	0.0%	36.7%	0.0%	0.0%	0.0%	0.0%	63.3%	63.3%	63.3%	63.3%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	20.5		20.5					59.0	59.0	59.0	59.0	
Actuated g/C Ratio	0.23		0.23					0.66	0.66	0.66	0.66	
v/c Ratio	0.73		0.66					0.59	0.15	0.26	0.27	
Control Delay	42.6		12.5					7.8	1.9	6.1	3.9	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.0	
Total Delay	42.6		12.5					7.9	1.9	6.1	3.9	
LOS	D		B					A	A	A	A	
Approach Delay								7.3			4.1	
Approach LOS								A			A	
Queue Length 50th (ft)	155		33					147	3	5	35	
Queue Length 95th (ft)	167		63					163	m13	1	4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			388			679	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	543		652					2320	961	171	2152	
Starvation Cap Reductn	0		0					155	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	0.54		0.56					0.63	0.15	0.26	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 15 (17%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 11.0		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

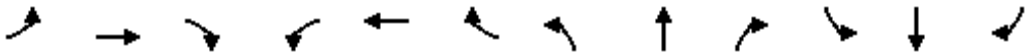
Splits and Phases: 2: South Ramp & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	99	0	21	371	1055	0	0	536	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			759			795	
Travel Time (s)		6.1			10.6			12.9			13.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.85	0.25	0.48	0.69	0.93	0.92	0.92	0.96	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	20%	0%	0%	3%	1%	2%	2%	4%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	116	0	44	538	1134	0	0	718	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	38.0	70.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	22.2%	0.0%	22.2%	42.2%	77.8%	0.0%	0.0%	35.6%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.4		10.4	72.6	72.3			48.9	
Actuated g/C Ratio				0.12		0.12	0.81	0.80			0.54	
v/c Ratio				0.59		0.19	0.73	0.40			0.39	
Control Delay				49.1		12.8	10.4	2.2			13.6	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				49.1		12.8	10.4	2.2			13.6	
LOS				D		B	B	A			B	
Approach Delay								4.8			13.6	
Approach LOS								A			B	
Queue Length 50th (ft)				64		0	31	45			103	
Queue Length 95th (ft)				105		5	53	71			240	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			679			715	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				280		302	996	2870			1853	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.41		0.15	0.54	0.40			0.39	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 16 (18%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			

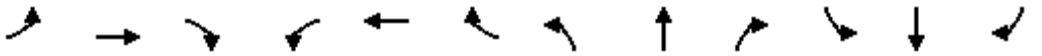
Splits and Phases: 3: North Ramp & Centennial Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	2	73	101	0	64	115	1193	216	39	608	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.70	0.50	0.70	0.74	0.25	0.64	0.74	0.65	0.84	0.65	0.76	0.43
Hourly flow rate (vph)	20	4	104	136	0	100	155	1835	257	60	800	40
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								795			1292	
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91				0.91		
vC, conflicting volume	2199	3323	800	3197	3234	1046	840			2093		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2124	3353	800	3215	3256	865	840			2008		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	13	69	0	100	63	81			77		
cM capacity (veh/h)	12	5	332	1	5	272	804			264		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	128	236	155	1224	869	860	40
Volume Left	20	136	155	0	0	60	0
Volume Right	104	100	0	0	257	0	40
cSH	56	1	804	1700	1700	264	1700
Volume to Capacity	2.30	266.07	0.19	0.72	0.51	0.23	0.02
Queue Length 95th (ft)	320	Err	18	0	0	21	0
Control Delay (s)	752.3	Err	10.5	0.0	0.0	10.6	0.0
Lane LOS	F	F	B			B	
Approach Delay (s)	752.3	Err	0.7			10.1	
Approach LOS	F	F					

Intersection Summary				
Average Delay	703.8			
Intersection Capacity Utilization	96.3%	ICU Level of Service	F	
Analysis Period (min)	15			

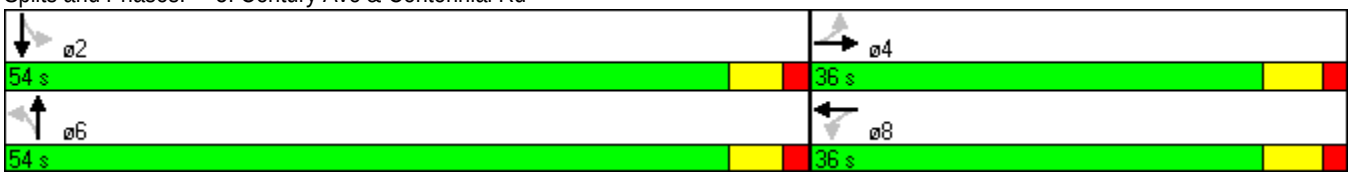


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	166	140	117	94	23	152	482	207	35	241	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		624			819			268			441	
Travel Time (s)		12.2			16.0			4.6			7.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.84	0.68	0.90	0.79	0.84	0.58	0.76	0.92	0.78	0.80	0.96	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	1%	3%	2%	0%	4%	2%	3%	1%	3%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	400	0	148	152	0	200	789	0	44	287	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	54.0	54.0	0.0	54.0	54.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	0.0%	60.0%	60.0%	0.0%	60.0%	60.0%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	30.3	30.3		30.3	30.3		48.5	48.5		48.5	48.5	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.54	0.54		0.54	0.54	
v/c Ratio	0.15	0.65		0.72	0.24		0.36	0.81		0.27	0.30	
Control Delay	22.3	28.5		48.4	19.6		14.0	25.5		16.7	11.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.3	28.5		48.4	19.6		14.0	25.5		16.7	11.9	
LOS	C	C		D	B		B	C		B	B	
Approach Delay		27.7			33.8			23.2			12.5	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	25	172		73	52		56	369		13	80	
Queue Length 95th (ft)	51	180		#136	90		81	#560		32	130	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		544			739			188			361	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	414	617		206	623		557	971		163	964	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.65		0.72	0.24		0.36	0.81		0.27	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 77 (86%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 24.0		Intersection LOS: C	
Intersection Capacity Utilization 87.3%		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: 5: Century Ave & Centennial Rd



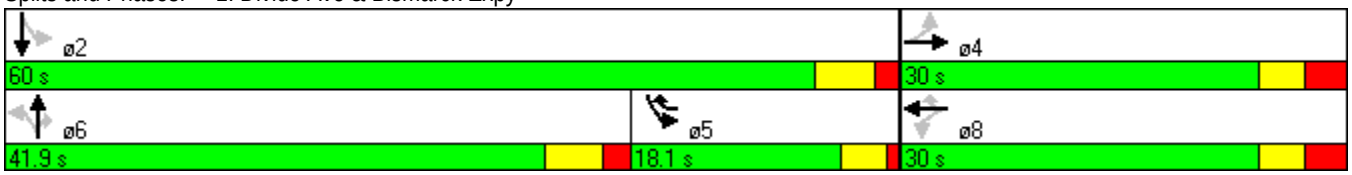
Appendix H: 2009 - Signal at Trenton AM (1B1)

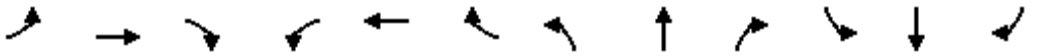
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	98	14	69	47	161	25	430	72	290	995	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.61	0.58	0.86	0.69	0.81	0.63	0.90	0.75	0.68	0.71	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	185	0	80	68	199	40	478	96	426	1723	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	18.1	41.9	41.9	41.9	18.1	60.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	20.1%	46.6%	46.6%	46.6%	20.1%	66.7%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lag	Lead	Lead	Lead	Lag		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	14.6	14.6		14.6	14.6	42.9	37.4	37.4	37.4	65.4	63.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.48	0.42	0.42	0.42	0.73	0.71	
v/c Ratio	0.60	0.62		0.52	0.26	0.28	0.49	0.35	0.15	0.51	0.70	
Control Delay	47.0	42.1		45.6	33.5	3.4	43.6	18.9	4.0	7.4	5.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
Total Delay	47.0	42.1		45.6	33.5	3.4	43.6	18.9	4.0	7.4	5.9	
LOS	D	D		D	C	A	D	B	A	A	A	
Approach Delay		44.0			19.0			18.1			6.2	
Approach LOS		D			B			B			A	
Queue Length 50th (ft)	63	95		42	34	0	17	98	0	55	162	
Queue Length 95th (ft)	92	93		77	49	26	32	129	17	63	135	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	320	482		251	433	715	84	1434	647	837	2471	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	12	91	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38		0.32	0.16	0.28	0.48	0.33	0.15	0.52	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 10 (11%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Divide Ave & Bismarck Expy



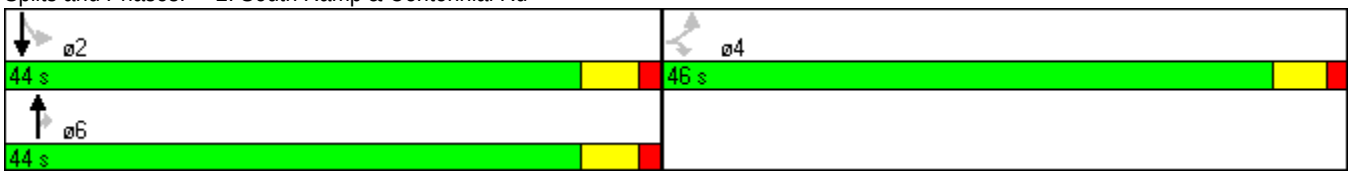


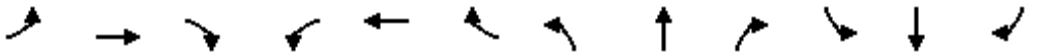
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	96	0	389	0	0	0	0	564	82	23	906	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.92	0.71	0.92	0.92	0.92	0.87	0.87	0.82	0.52	0.78	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	116	0	548	0	0	0	0	648	100	44	1162	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	46.0	0.0	46.0	0.0	0.0	0.0	0.0	44.0	44.0	44.0	44.0	0.0
Total Split (%)	51.1%	0.0%	51.1%	0.0%	0.0%	0.0%	0.0%	48.9%	48.9%	48.9%	48.9%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	35.1		35.1					44.4	44.4	44.4	44.4	
Actuated g/C Ratio	0.39		0.39					0.49	0.49	0.49	0.49	
v/c Ratio	0.17		0.87					0.41	0.15	0.15	0.67	
Control Delay	17.0		39.0					13.4	2.4	5.4	7.9	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	17.0		39.0					13.4	2.4	5.4	7.9	
LOS	B		D					B	A	A	A	
Approach Delay								12.0			7.8	
Approach LOS								B			A	
Queue Length 50th (ft)	41		262					160	1	7	176	
Queue Length 95th (ft)	64		248					206	5	m7	m186	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	789		728					1576	668	297	1745	
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	0.15		0.75					0.41	0.15	0.15	0.67	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 18 (20%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 82.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



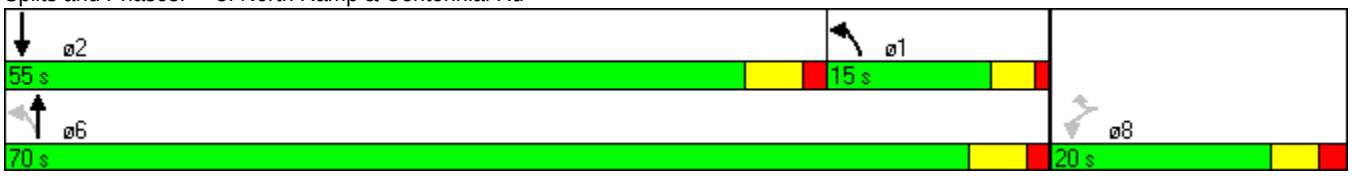


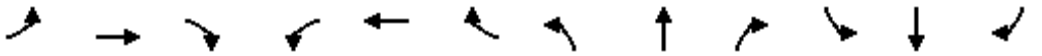
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	91	0	9	331	425	0	0	1361	304
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			791	
Travel Time (s)		6.1			10.6			13.1			13.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.73	0.92	0.56	0.94	0.76	0.92	0.92	0.77	0.68
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	125	0	16	352	559	0	0	2215	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	15.0	70.0	0.0	0.0	55.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	22.2%	0.0%	22.2%	16.7%	77.8%	0.0%	0.0%	61.1%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.4		10.4	70.4	69.0			54.0	
Actuated g/C Ratio				0.12		0.12	0.78	0.77			0.60	
v/c Ratio				0.58		0.10	1.24	0.21			1.05	
Control Delay				48.1		16.8	154.6	1.8			37.7	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				48.1		16.8	154.6	1.8			37.7	
LOS				D		B	F	A			D	
Approach Delay								60.8			37.7	
Approach LOS								E			D	
Queue Length 50th (ft)				69		0	~206	12			~754	
Queue Length 95th (ft)				94		8	#401	25			m205	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			711	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				306		213	285	2662			2103	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.41		0.08	1.24	0.21			1.05	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80 (89%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.24			
Intersection Signal Delay: 44.4		Intersection LOS: D	
Intersection Capacity Utilization 82.9%		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: 3: North Ramp & Centennial Rd



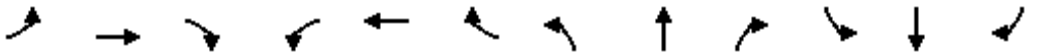


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	1	181	76	4	34	63	352	83	17	1334	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		215	0		215	530		0	0		115
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		1774			1749			791			260	
Travel Time (s)		40.3			39.8			13.5			4.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.38	0.25	0.71	0.63	0.50	0.77	0.79	0.73	0.55	0.71	0.78	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	17%	0%	1%	1%	0%	0%	10%	9%	2%	12%	2%	14%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	275	0	0	173	0	80	633	0	0	1734	28
Turn Type	Perm			Perm			pm+pt			Perm		Perm
Protected Phases		4			8		1	6			2	
Permitted Phases	4			8			6			2		2
Detector Phase	4	4		8	8		1	6		2	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		5.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		20.0	20.0		9.0	20.0		20.0	20.0	20.0
Total Split (s)	22.0	22.0	0.0	22.0	22.0	0.0	12.0	68.0	0.0	56.0	56.0	56.0
Total Split (%)	24.4%	24.4%	0.0%	24.4%	24.4%	0.0%	13.3%	75.6%	0.0%	62.2%	62.2%	62.2%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	Lead
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Min		C-Min	C-Min	C-Min
Act Effct Green (s)		21.6			21.6		61.5	60.4			52.0	52.0
Actuated g/C Ratio		0.24			0.24		0.68	0.67			0.58	0.58
v/c Ratio		0.54			0.88		0.42	0.29			1.63	0.03
Control Delay		17.8			73.3		34.1	10.2			308.4	7.4
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		17.8			73.3		34.1	10.2			308.4	7.4
LOS		B			E		C	B			F	A
Approach Delay		17.8			73.3			12.9			303.7	
Approach LOS		B			E			B			F	
Queue Length 50th (ft)		54			88		28	120			~1489	5
Queue Length 95th (ft)		0			78		44	103			m#878	m4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1694			1669			711			180	
Turn Bay Length (ft)							530					115
Base Capacity (vph)		507			197		222	2339			1061	823
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		0.54			0.88		0.36	0.27			1.63	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 60 (67%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.63			
Intersection Signal Delay: 192.2		Intersection LOS: F	
Intersection Capacity Utilization 111.9%		ICU Level of Service H	
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: 4: Trenton Dr & Centennial Rd

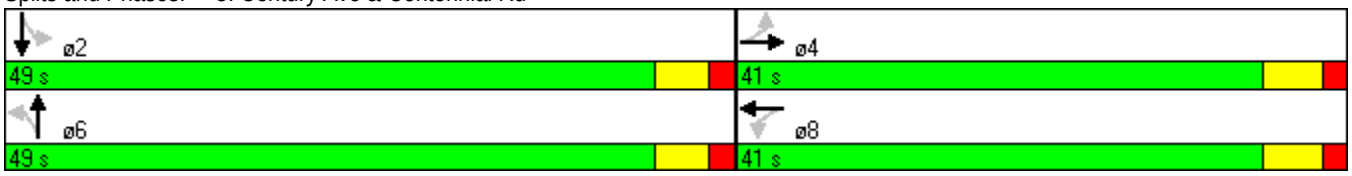


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	23	150	570	236	31	110	241	43	20	867	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		1736			1872			241			511	
Travel Time (s)		33.8			36.5			4.1			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.47	0.72	0.66	0.80	0.62	0.48	0.76	0.71	0.60	0.71	0.81	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	259	0	712	446	0	145	411	0	28	1170	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	41.0	41.0	0.0	41.0	41.0	0.0	49.0	49.0	0.0	49.0	49.0	0.0
Total Split (%)	45.6%	45.6%	0.0%	45.6%	45.6%	0.0%	54.4%	54.4%	0.0%	54.4%	54.4%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	35.3	35.3		35.3	35.3		43.5	43.5		43.5	43.5	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.48	0.48		0.48	0.48	
v/c Ratio	0.15	0.38		1.77	0.61		1.81	0.47		0.07	1.31	
Control Delay	19.7	17.0		380.5	25.8		430.8	13.4		13.2	172.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.7	17.0		380.5	25.8		430.8	13.4		13.2	172.6	
LOS	B	B		F	C		F	B		B	F	
Approach Delay		17.3			243.9			122.3			168.8	
Approach LOS		B			F			F			F	
Queue Length 50th (ft)	13	79		~610	194		~125	189		8	~871	
Queue Length 95th (ft)	17	101		#706	175		m#192	201		18	#952	

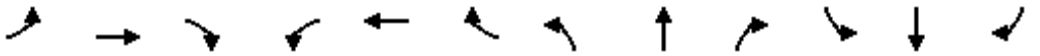
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1656			1792			161			431	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	245	682		402	726		80	867		388	892	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.38		1.77	0.61		1.81	0.47		0.07	1.31	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 89 (99%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.81	
Intersection Signal Delay: 173.9	Intersection LOS: F
Intersection Capacity Utilization 117.2%	ICU Level of Service H
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: 5: Century Ave & Centennial Rd



Appendix I: 2009 - Signal at Trenton PM (1B2)

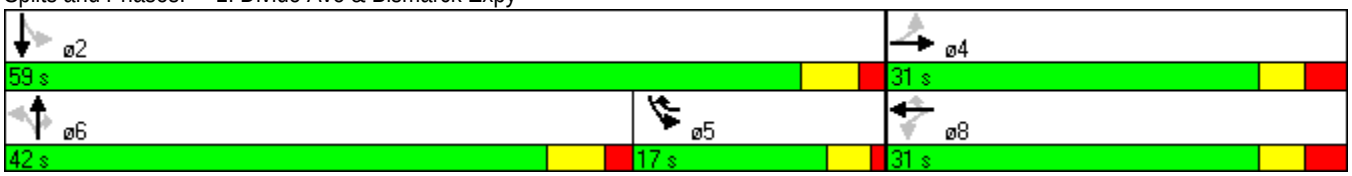


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	45	20	55	45	201	24	854	60	183	779	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.85	0.80	0.63	0.63	0.56	0.75	0.75	0.80	0.83	0.88	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	18%	7%	14%	8%	2%	10%	10%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	88	0	87	80	268	32	1068	72	208	1031	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	31.0	31.0	0.0	31.0	31.0	17.0	42.0	42.0	42.0	17.0	59.0	0.0
Total Split (%)	34.4%	34.4%	0.0%	34.4%	34.4%	18.9%	46.7%	46.7%	46.7%	18.9%	65.6%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lag	Lead	Lead	Lead	Lag		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	22.0	22.0		22.0	22.0	40.4	39.9	39.9	39.9	58.0	56.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24	0.45	0.44	0.44	0.44	0.64	0.63	
v/c Ratio	0.84	0.19		0.32	0.18	0.41	0.19	0.68	0.10	0.56	0.48	
Control Delay	55.1	18.2		30.1	26.7	16.1	21.1	23.7	4.8	22.4	5.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	
Total Delay	55.1	18.2		30.1	26.7	16.1	21.1	23.8	4.8	22.4	6.1	
LOS	E	B		C	C	B	C	C	A	C	A	
Approach Delay		46.1			20.8			22.5			8.8	
Approach LOS		D			C			C			A	
Queue Length 50th (ft)	143	24		39	35	82	11	261	0	44	81	
Queue Length 95th (ft)	#223	51		53	42	107	27	287	21	99	115	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	368	516		313	493	649	168	1569	691	384	2142	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	349	
Spillback Cap Reductn	0	0		0	0	0	0	42	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.17		0.28	0.16	0.41	0.19	0.70	0.10	0.54	0.58	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 33 (37%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		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.			

Splits and Phases: 1: Divide Ave & Bismarck Expy

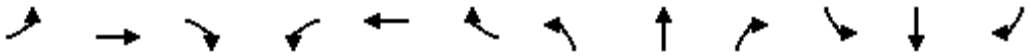


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	213	0	286	0	0	0	0	1134	111	27	557	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.73	0.92	0.78	0.92	0.92	0.92	0.92	0.83	0.79	0.61	0.97	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	12%	2%	2%	2%	2%	2%	16%	7%	10%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	292	0	367	0	0	0	0	1366	141	44	574	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	33.0	0.0	33.0	0.0	0.0	0.0	0.0	57.0	57.0	57.0	57.0	0.0
Total Split (%)	36.7%	0.0%	36.7%	0.0%	0.0%	0.0%	0.0%	63.3%	63.3%	63.3%	63.3%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	20.5		20.5					59.0	59.0	59.0	59.0	
Actuated g/C Ratio	0.23		0.23					0.66	0.66	0.66	0.66	
v/c Ratio	0.73		0.66					0.59	0.15	0.26	0.27	
Control Delay	42.6		12.5					7.1	0.5	7.5	4.6	
Queue Delay	0.0		0.0					0.5	0.0	0.0	0.0	
Total Delay	42.6		12.5					7.6	0.5	7.5	4.6	
LOS	D		B					A	A	A	A	
Approach Delay								7.0			4.8	
Approach LOS								A			A	
Queue Length 50th (ft)	155		33					116	0	6	47	
Queue Length 95th (ft)	167		63					169	m2	5	27	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	543		652					2320	961	171	2152	
Starvation Cap Reductn	0		0					481	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	0.54		0.56					0.74	0.15	0.26	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 37 (41%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 10.9		Intersection LOS: B	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Bismarck Expy

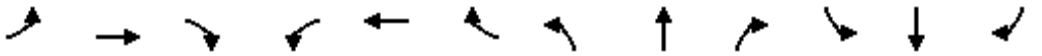


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	99	0	21	371	1055	0	0	536	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			782	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.85	0.25	0.48	0.69	0.93	0.92	0.92	0.96	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	20%	0%	0%	3%	1%	2%	2%	4%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	116	0	44	538	1134	0	0	718	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	38.0	70.0	0.0	0.0	32.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	22.2%	0.0%	22.2%	42.2%	77.8%	0.0%	0.0%	35.6%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.4		10.4	72.6	72.3			48.9	
Actuated g/C Ratio				0.12		0.12	0.81	0.80			0.54	
v/c Ratio				0.59		0.19	0.73	0.40			0.39	
Control Delay				49.1		12.8	10.8	1.6			13.5	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				49.1		12.8	10.8	1.6			13.5	
LOS				D		B	B	A			B	
Approach Delay								4.5			13.5	
Approach LOS								A			B	
Queue Length 50th (ft)				64		0	55	30			117	
Queue Length 95th (ft)				105		5	42	62			m156	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			702	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				280		302	996	2870			1853	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.41		0.15	0.54	0.40			0.39	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 34 (38%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 9.2		Intersection LOS: A	
Intersection Capacity Utilization 61.4%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

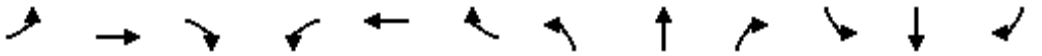


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	73	101	0	64	115	1193	216	39	608	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		215	0		215	530		0	0		115
Storage Lanes	0		0	0		0	1		0	0		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		1750			324			782			292	
Travel Time (s)		39.8			7.4			13.3			5.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.50	0.70	0.74	0.25	0.64	0.74	0.65	0.84	0.65	0.76	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	0%	1%	1%	0%	3%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	236	0	155	2092	0	0	860	40
Turn Type	Perm			Perm			pm+pt			pm+pt		Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		2
Detector Phase	4	4		8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		5.0	8.0		5.0	8.0	8.0
Minimum Split (s)	20.0	20.0		20.0	20.0		12.0	20.0		9.0	20.0	20.0
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	12.0	58.0	0.0	12.0	58.0	58.0
Total Split (%)	22.2%	22.2%	0.0%	22.2%	22.2%	0.0%	13.3%	64.4%	0.0%	13.3%	64.4%	64.4%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	0.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		16.0			16.0		66.0	66.0			54.6	54.6
Actuated g/C Ratio		0.18			0.18		0.73	0.73			0.61	0.61
v/c Ratio		0.34			0.97		0.46	0.81			1.29	0.04
Control Delay		12.3			83.6		8.3	10.6			160.9	1.8
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		12.3			83.6		8.3	10.6			160.9	1.8
LOS		B			F		A	B			F	A
Approach Delay		12.3			83.6			10.5			153.8	
Approach LOS		B			F			B			F	
Queue Length 50th (ft)		10			116		23	445			~646	0
Queue Length 95th (ft)		8			31		15	98			#678	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1670			244			702			212	
Turn Bay Length (ft)							530					115
Base Capacity (vph)		369			244		349	2582			666	935
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		0.34			0.97		0.44	0.81			1.29	0.04

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 60 (67%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.29			
Intersection Signal Delay: 52.2		Intersection LOS: D	
Intersection Capacity Utilization 100.2%		ICU Level of Service G	
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.			

Splits and Phases: 4: Trenton Dr & Centennial Rd

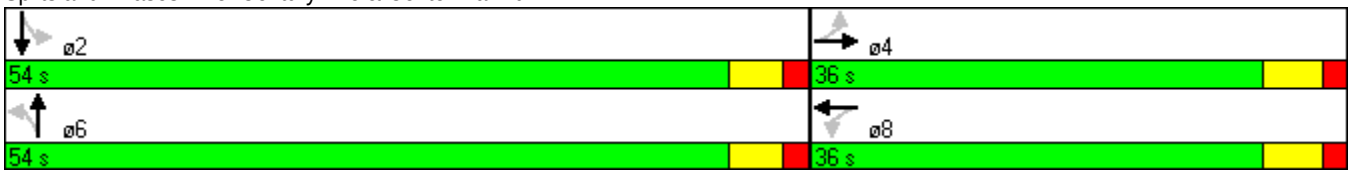


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	166	140	117	94	23	152	482	207	35	241	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	100		0	500		0	150		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		1745			1835			258			489	
Travel Time (s)		34.0			35.7			4.4			8.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.84	0.68	0.90	0.79	0.84	0.58	0.76	0.92	0.78	0.80	0.96	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	1%	3%	2%	0%	4%	2%	3%	1%	3%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	400	0	148	152	0	200	789	0	44	287	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	4	4		8	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	15.7	15.7		15.7	15.7		11.5	11.5		11.5	11.5	
Total Split (s)	36.0	36.0	0.0	36.0	36.0	0.0	54.0	54.0	0.0	54.0	54.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	0.0%	60.0%	60.0%	0.0%	60.0%	60.0%	0.0%
Yellow Time (s)	3.9	3.9		3.9	3.9		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.8	1.8		1.8	1.8		1.9	1.9		1.9	1.9	
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	0.0
Total Lost Time (s)	5.7	5.7	4.0	5.7	5.7	4.0	5.5	5.5	4.0	5.5	5.5	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Act Effct Green (s)	30.3	30.3		30.3	30.3		48.5	48.5		48.5	48.5	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.54	0.54		0.54	0.54	
v/c Ratio	0.15	0.65		0.72	0.24		0.36	0.81		0.27	0.30	
Control Delay	22.3	28.5		48.4	19.6		7.4	12.9		16.7	11.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.3	28.5		48.4	19.6		7.4	12.9		16.7	11.9	
LOS	C	C		D	B		A	B		B	B	
Approach Delay		27.7			33.8			11.8			12.5	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	25	172		73	52		17	81		13	80	
Queue Length 95th (ft)	51	180		#136	90		m40	m145		32	130	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		1665			1755			178			409	
Turn Bay Length (ft)	100			500			150			80		
Base Capacity (vph)	414	617		206	623		557	971		163	964	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.65		0.72	0.24		0.36	0.81		0.27	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 73 (81%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 87.3%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



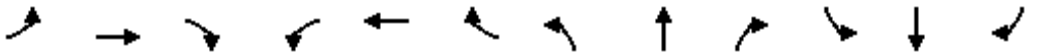
Appendix J: 2024 - Existing Control AM (2A1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	114	16	110	75	258	25	430	72	370	1268	283
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	141	0	120	82	280	27	467	78	402	1686	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	25.4	44.6	44.6	44.6	25.4	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	25.4%	44.6%	44.6%	44.6%	25.4%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	15.5	15.5		15.5	15.5	35.5	54.8	54.8	54.8	74.5	72.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.36	0.55	0.55	0.55	0.74	0.73	
v/c Ratio	0.63	0.50		0.70	0.33	0.47	0.20	0.26	0.10	0.54	0.66	
Control Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.5	5.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
Total Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.5	5.5	
LOS	D	D		E	D	A	C	B	A	A	A	
Approach Delay		47.2			25.8			13.2			5.5	
Approach LOS		D			C			B			A	
Queue Length 50th (ft)	69	80		74	47	23	8	75	0	50	155	
Queue Length 95th (ft)	119	129		125	85	64	36	146	28	m82	198	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	284	433		265	390	679	136	1816	786	813	2543	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	30	142	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.40	0.33		0.45	0.21	0.41	0.20	0.26	0.10	0.51	0.70	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 95 (95%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 81.6%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 1: Divide Ave & Bismarck Expy

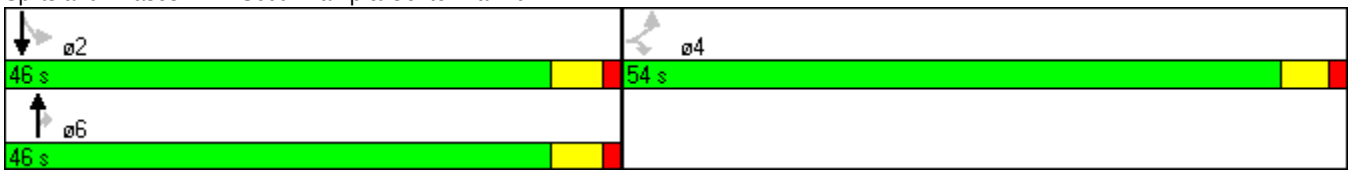


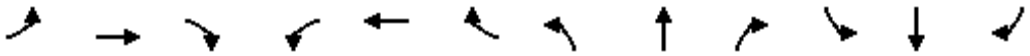
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	143	0	580	0	0	0	0	693	101	27	1063	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	0	630	0	0	0	0	753	110	29	1155	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	54.0	0.0	54.0	0.0	0.0	0.0	0.0	46.0	46.0	46.0	46.0	0.0
Total Split (%)	54.0%	0.0%	54.0%	0.0%	0.0%	0.0%	0.0%	46.0%	46.0%	46.0%	46.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	44.1		44.1					45.4	45.4	45.4	45.4	
Actuated g/C Ratio	0.44		0.44					0.45	0.45	0.45	0.45	
v/c Ratio	0.20		0.89					0.52	0.18	0.13	0.72	
Control Delay	16.7		40.8					19.3	3.6	4.4	8.2	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	16.7		40.8					19.3	3.6	4.4	8.2	
LOS	B		D					B	A	A	A	
Approach Delay								17.3			8.1	
Approach LOS								B			A	
Queue Length 50th (ft)	56		333					205	5	5	192	
Queue Length 95th (ft)	91		#499					160	19	m5	m176	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	849		779					1449	628	217	1605	
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	0.18		0.81					0.52	0.18	0.13	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 86 (86%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 18.7		Intersection LOS: B	
Intersection Capacity Utilization 98.9%		ICU Level of Service F	
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 Ramp & Centennial Rd



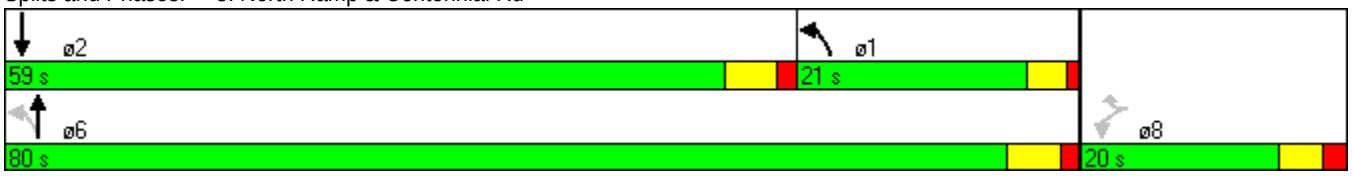


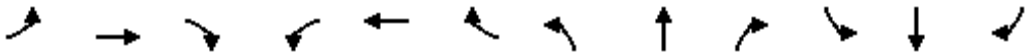
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	87	0	9	412	529	0	0	1700	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			779	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	95	0	10	448	575	0	0	2261	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	21.0	80.0	0.0	0.0	59.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	21.0%	80.0%	0.0%	0.0%	59.0%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				9.5		9.5	83.5	83.2			61.1	
Actuated g/C Ratio				0.10		0.10	0.84	0.83			0.61	
v/c Ratio				0.54		0.08	1.25	0.20			1.06	
Control Delay				53.9		21.9	157.1	1.6			40.4	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				53.9		21.9	157.1	1.6			40.4	
LOS				D		C	F	A			D	
Approach Delay								69.7			40.4	
Approach LOS								E			D	
Queue Length 50th (ft)				59		0	~318	28			~837	
Queue Length 95th (ft)				106		15	#539	38			m297	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			699	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				275		188	359	2886			2140	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.35		0.05	1.25	0.20			1.06	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 60 (60%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 49.5		Intersection LOS: D	
Intersection Capacity Utilization 98.9%		ICU Level of Service F	
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: 3: North Ramp & Centennial Rd



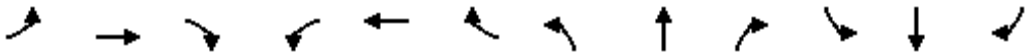


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	2	290	122	6	54	101	467	110	27	1644	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	2	315	133	7	59	110	508	120	29	1787	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								779			1310	
pX, platoon unblocked	0.75	0.75	0.75	0.75	0.75		0.75					
vC, conflicting volume	2337	2707	908	1740	2662	314	1816			627		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2119	2611	221	1326	2551	314	1427			627		
tC, single (s)	7.8	6.5	6.9	*7.5	6.5	6.9	4.3			4.3		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.3			2.3		
p0 queue free %	0	82	47	0	50	91	66			97		
cM capacity (veh/h)	7	12	592	25	13	688	326			886		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	328	198	110	338	289	29	1191	625
Volume Left	11	133	110	0	0	29	0	0
Volume Right	315	59	0	0	120	0	0	29
cSH	205	34	326	1700	1700	886	1700	1700
Volume to Capacity	1.60	5.78	0.34	0.20	0.17	0.03	0.70	0.37
Queue Length 95th (ft)	530	Err	36	0	0	3	0	0
Control Delay (s)	63.2	Err	21.5	0.0	0.0	9.2	0.0	0.0
Lane LOS	F	F	C			A		
Approach Delay (s)	63.2	Err	3.2			0.1		
Approach LOS	F	F						

Intersection Summary				
Average Delay	643.8			
Intersection Capacity Utilization	81.3%	ICU Level of Service	D	
Analysis Period (min)	15			

* User Entered Value

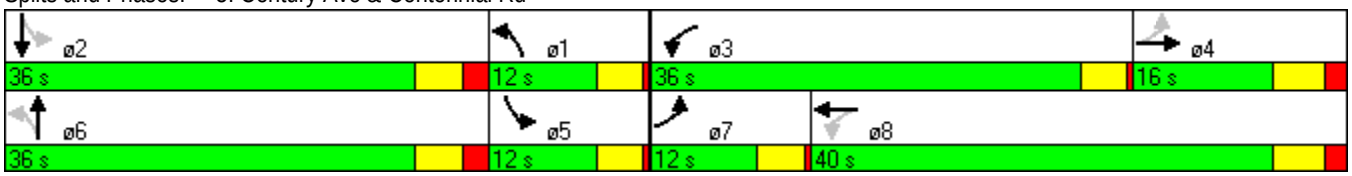


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	34	220	909	376	49	148	324	31	32	1370	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		596			559			1310			507	
Travel Time (s)		11.6			10.9			22.3			8.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	276	0	988	462	0	161	386	0	35	1623	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	12.0	16.0	0.0	36.0	40.0	0.0	12.0	36.0	0.0	12.0	36.0	0.0
Total Split (%)	12.0%	16.0%	0.0%	36.0%	40.0%	0.0%	12.0%	36.0%	0.0%	12.0%	36.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	18.3	10.3		48.4	40.2		41.2	34.9		39.0	30.5	
Actuated g/C Ratio	0.18	0.10		0.48	0.40		0.41	0.35		0.39	0.30	
v/c Ratio	0.12	0.92		1.49	0.62		0.78	0.32		0.09	1.51	
Control Delay	19.4	58.5		254.2	29.4		61.6	20.5		17.4	264.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.4	58.5		254.2	29.4		61.6	20.5		17.4	264.0	
LOS	B	E		F	C		E	C		B	F	
Approach Delay		55.0			182.6			32.6			258.8	
Approach LOS		D			F			C			F	
Queue Length 50th (ft)	9	86		~838	244		74	112		12	~768	
Queue Length 95th (ft)	23	#243		#1083	367		#164	132		31	#908	

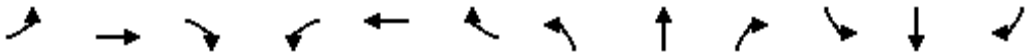
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		516			479			1230			427	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	258	299		662	747		214	1195		425	1073	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.10	0.92		1.49	0.62		0.75	0.32		0.08	1.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 48 (48%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.51			
Intersection Signal Delay: 184.0		Intersection LOS: F	
Intersection Capacity Utilization 131.7%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix K: 2024 - Existing Control PM (2A2)

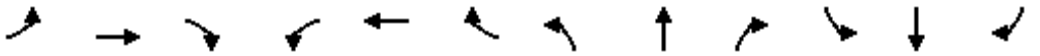


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	268	52	23	88	72	322	24	854	60	233	993	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	82	0	96	78	350	26	928	65	253	1242	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	21.0	42.0	42.0	42.0	21.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	21.0%	42.0%	42.0%	42.0%	21.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	26.5	26.5		26.5	26.5	45.5	44.8	44.8	44.8	63.5	61.8	
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.46	0.45	0.45	0.45	0.64	0.62	
v/c Ratio	0.85	0.17		0.30	0.17	0.56	0.15	0.61	0.10	0.67	0.59	
Control Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.1	6.0	22.9	7.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Total Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.2	6.0	22.9	7.6	
LOS	E	C		C	C	C	C	C	A	C	A	
Approach Delay		49.2			23.3			23.9			10.1	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	172	28		48	37	137	10	237	0	55	150	
Queue Length 95th (ft)	#284	62		89	71	193	33	346	28	152	190	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	400	572		374	535	673	174	1511	654	427	2114	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	286	
Spillback Cap Reductn	0	0		0	0	0	0	23	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.14		0.26	0.15	0.52	0.15	0.62	0.10	0.59	0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 20.5		Intersection LOS: C	
Intersection Capacity Utilization 73.2%		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: 1: Divide Ave & Bismarck Expy

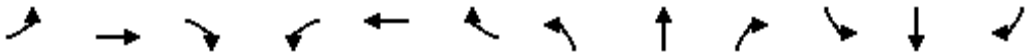


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	318	0	426	0	0	0	0	1394	136	32	654	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	346	0	463	0	0	0	0	1515	148	35	711	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	60.0	60.0	60.0	60.0	0.0
Total Split (%)	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%	0.0%	60.0%	60.0%	60.0%	60.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	26.0		26.0					63.5	63.5	63.5	63.5	
Actuated g/C Ratio	0.26		0.26					0.64	0.64	0.64	0.64	
v/c Ratio	0.76		0.83					0.71	0.17	0.30	0.34	
Control Delay	44.5		32.3					13.1	3.0	9.0	2.8	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.0	
Total Delay	44.5		32.3					13.2	3.0	9.0	2.8	
LOS	D		C					B	A	A	A	
Approach Delay								12.3			3.1	
Approach LOS								B			A	
Queue Length 50th (ft)	204		165					218	10	1	17	
Queue Length 95th (ft)	269		260					260	m24	m6	43	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	611		681					2124	862	117	2104	
Starvation Cap Reductn	0		0					51	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	0.57		0.68					0.73	0.17	0.30	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 1 (1%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

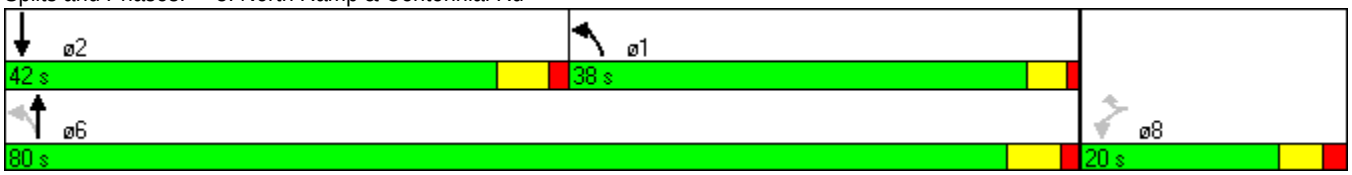


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	95	0	20	462	1313	0	0	670	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			781	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	103	0	22	502	1427	0	0	930	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	38.0	80.0	0.0	0.0	42.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	38.0%	80.0%	0.0%	0.0%	42.0%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.0		10.0	83.0	82.7			50.7	
Actuated g/C Ratio				0.10		0.10	0.83	0.83			0.51	
v/c Ratio				0.56		0.13	0.72	0.49			0.53	
Control Delay				54.2		17.3	13.0	1.9			15.2	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				54.2		17.3	13.0	1.9			15.2	
LOS				D		B	B	A			B	
Approach Delay								4.8			15.2	
Approach LOS								A			B	
Queue Length 50th (ft)				64		0	77	67			182	
Queue Length 95th (ft)				113		22	140	89			336	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			701	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				270		240	798	2898			1745	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.38		0.09	0.63	0.49			0.53	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 92 (92%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			

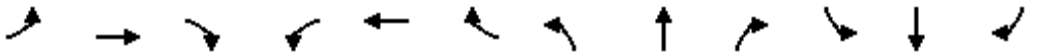
Splits and Phases: 3: North Ramp & Centennial Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	3	117	162	2	102	184	1581	286	62	749	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	3	127	176	2	111	200	1718	311	67	814	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8			8						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								781			1308	
pX, platoon unblocked	0.89	0.89	0.97	0.89	0.89	0.87	0.97			0.87		
vC, conflicting volume	2221	3390	418	2817	3246	1015	837			2029		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1962	3278	334	2634	3116	724	766			1887		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	26	80	0	62	65	76			75		
cM capacity (veh/h)	11	4	641	2	6	321	816			273		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	151	289	200	1146	884	67	543	294
Volume Left	21	176	200	0	0	67	0	0
Volume Right	127	111	0	0	311	0	0	23
cSH	59	4	816	1700	1700	273	1700	1700
Volume to Capacity	2.58	77.76	0.24	0.67	0.52	0.25	0.32	0.17
Queue Length 95th (ft)	382	Err	24	0	0	24	0	0
Control Delay (s)	865.3	Err	10.8	0.0	0.0	22.4	0.0	0.0
Lane LOS	F	F	B			C		
Approach Delay (s)	865.3	Err	1.0			1.7		
Approach LOS	F	F						

Intersection Summary				
Average Delay	846.5			
Intersection Capacity Utilization	82.0%	ICU Level of Service	E	
Analysis Period (min)	15			

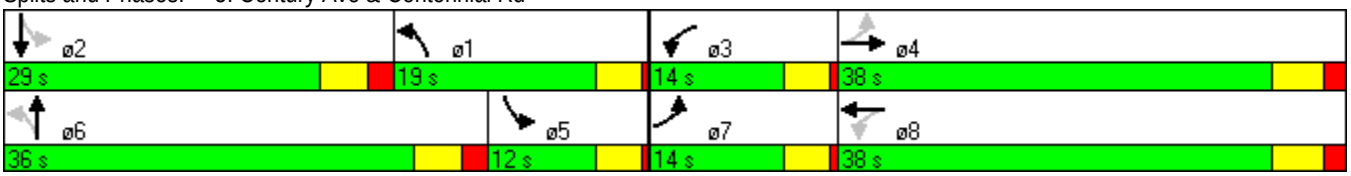


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	244	205	187	150	37	205	649	279	55	381	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		606			618			1308			505	
Travel Time (s)		11.8			12.0			22.3			8.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	488	0	203	203	0	223	1008	0	60	465	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	14.0	38.0	0.0	14.0	38.0	0.0	19.0	36.0	0.0	12.0	29.0	0.0
Total Split (%)	14.0%	38.0%	0.0%	14.0%	38.0%	0.0%	19.0%	36.0%	0.0%	12.0%	29.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	42.1	32.3		47.7	37.0		43.2	33.5		33.6	26.0	
Actuated g/C Ratio	0.42	0.32		0.48	0.37		0.43	0.34		0.34	0.26	
v/c Ratio	0.16	0.83		0.64	0.30		0.52	0.86		0.31	0.51	
Control Delay	14.7	41.8		25.3	23.5		27.3	34.8		28.7	33.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.7	41.8		25.3	23.5		27.3	34.8		28.7	33.9	
LOS	B	D		C	C		C	C		C	C	
Approach Delay		37.7			24.4			33.4			33.3	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	28	262		70	85		92	323		23	134	
Queue Length 95th (ft)	56	#433		#133	153		125	#435		46	186	

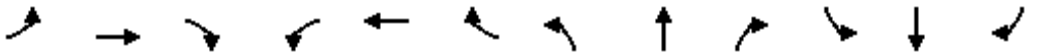
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		526			538			1228			425	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	577	591		320	676		489	1178		226	915	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.83		0.63	0.30		0.46	0.86		0.27	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 64 (64%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 33.0		Intersection LOS: C	
Intersection Capacity Utilization 81.9%		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: Century Ave & Centennial Rd



Appendix L: 2024 - Signal at Trenton AM (2B1)

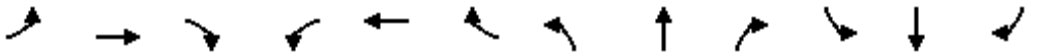


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	114	16	110	75	258	25	430	72	370	1268	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	141	0	120	82	280	27	467	78	402	1686	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	25.4	44.6	44.6	44.6	25.4	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	25.4%	44.6%	44.6%	44.6%	25.4%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	15.5	15.5		15.5	15.5	35.5	54.8	54.8	54.8	74.5	72.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.36	0.55	0.55	0.55	0.74	0.73	
v/c Ratio	0.63	0.50		0.70	0.33	0.47	0.20	0.26	0.10	0.54	0.66	
Control Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.3	5.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
Total Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.4	5.2	
LOS	D	D		E	D	A	C	B	A	A	A	
Approach Delay		47.2			25.8			13.2			5.2	
Approach LOS		D			C			B			A	
Queue Length 50th (ft)	69	80		74	47	23	8	75	0	50	155	
Queue Length 95th (ft)	119	129		125	85	64	36	146	28	m82	198	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	284	433		265	390	679	136	1816	786	813	2543	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	30	142	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.40	0.33		0.45	0.21	0.41	0.20	0.26	0.10	0.51	0.70	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 39 (39%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 12.6	Intersection LOS: B
Intersection Capacity Utilization 81.6%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 1: Divide Ave & Bismarck Expy

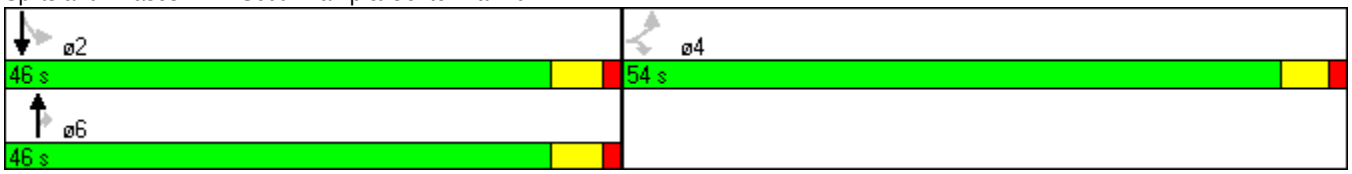


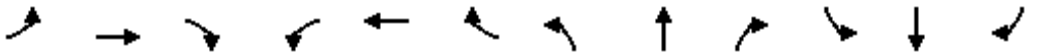
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	143	0	580	0	0	0	0	693	101	27	1063	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	0	630	0	0	0	0	753	110	29	1155	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	54.0	0.0	54.0	0.0	0.0	0.0	0.0	46.0	46.0	46.0	46.0	0.0
Total Split (%)	54.0%	0.0%	54.0%	0.0%	0.0%	0.0%	0.0%	46.0%	46.0%	46.0%	46.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	44.1		44.1					45.4	45.4	45.4	45.4	
Actuated g/C Ratio	0.44		0.44					0.45	0.45	0.45	0.45	
v/c Ratio	0.20		0.89					0.52	0.18	0.13	0.72	
Control Delay	16.7		40.8					19.3	3.6	4.4	7.4	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	16.7		40.8					19.3	3.6	4.4	7.4	
LOS	B		D					B	A	A	A	
Approach Delay								17.3			7.3	
Approach LOS								B			A	
Queue Length 50th (ft)	56		333					205	5	0	191	
Queue Length 95th (ft)	91		#499					160	19	m5	m175	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	849		779					1449	628	217	1605	
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	0.18		0.81					0.52	0.18	0.13	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 30 (30%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 18.3		Intersection LOS: B	
Intersection Capacity Utilization 98.9%		ICU Level of Service F	
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 Ramp & Centennial Rd



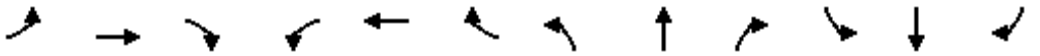


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	87	0	9	412	529	0	0	1700	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			783	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	95	0	10	448	575	0	0	2261	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	4.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	8.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	21.0	80.0	0.0	0.0	59.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	21.0%	80.0%	0.0%	0.0%	59.0%	0.0%
Yellow Time (s)				3.2		3.2	3.5	3.9			3.9	
All-Red Time (s)				2.0		2.0	0.5	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				9.5		9.5	83.5	83.2			61.1	
Actuated g/C Ratio				0.10		0.10	0.84	0.83			0.61	
v/c Ratio				0.54		0.08	1.25	0.20			1.06	
Control Delay				53.9		21.9	157.1	1.6			49.2	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				53.9		21.9	157.1	1.6			49.2	
LOS				D		C	F	A			D	
Approach Delay								69.7			49.2	
Approach LOS								E			D	
Queue Length 50th (ft)				59		0	~318	28			~846	
Queue Length 95th (ft)				106		15	#539	38			#1033	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			703	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				275		188	359	2886			2140	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.35		0.05	1.25	0.20			1.06	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 4 (4%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 55.4		Intersection LOS: E	
Intersection Capacity Utilization 98.9%		ICU Level of Service F	
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.			

Splits and Phases: 3: North Ramp & Centennial Rd

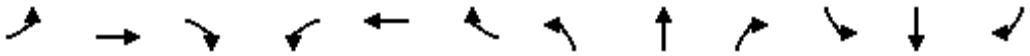


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	290	122	6	54	101	467	110	27	1644	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	0		200	550		0	215		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		638			313			783			1307	
Travel Time (s)		14.5			7.1			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	17%	0%	1%	1%	0%	0%	10%	9%	2%	12%	2%	14%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	13	315	0	140	59	110	628	0	29	1816	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	4	4	4	8	8	8	1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	9.0	20.0		20.0	20.0	
Total Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	12.0	76.0	0.0	64.0	64.0	0.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	24.0%	24.0%	12.0%	76.0%	0.0%	64.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Min		C-Min	C-Min	
Act Effct Green (s)		15.9	15.9		15.9	15.9	76.1	76.1		65.0	65.0	
Actuated g/C Ratio		0.16	0.16		0.16	0.16	0.76	0.76		0.65	0.65	
v/c Ratio		0.06	0.84		0.65	0.19	0.59	0.25		0.06	0.79	
Control Delay		33.8	41.0		52.4	10.7	21.7	6.2		2.6	6.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		33.8	41.0		52.4	10.7	21.7	6.2		2.6	6.8	
LOS		C	D		D	B	C	A		A	A	
Approach Delay		40.7			40.0			8.5			6.8	
Approach LOS		D			D			A			A	
Queue Length 50th (ft)		7	106		83	0	33	125		2	133	
Queue Length 95th (ft)		23	#207		143	34	70	162		m2	m96	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		558			233			703			1227	
Turn Bay Length (ft)			200			200	550			215		
Base Capacity (vph)		267	436		274	370	199	2496		456	2292	
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		0.05	0.72		0.51	0.16	0.55	0.25		0.06	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 87 (87%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 12.9		Intersection LOS: B	
Intersection Capacity Utilization 81.3%		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: 4: Trenton Dr & Centennial Rd

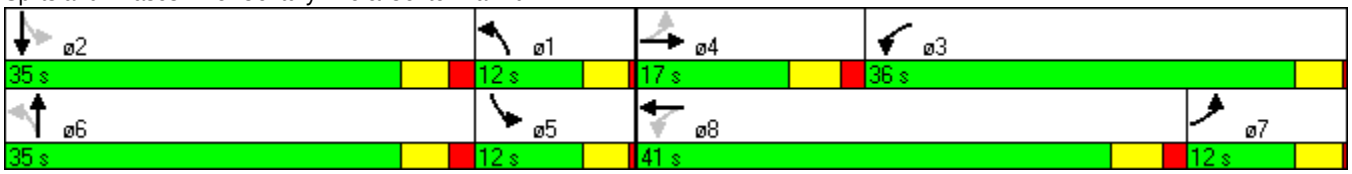


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	34	220	909	376	49	148	324	31	32	1370	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		704			799			1307			505	
Travel Time (s)		13.7			15.6			22.3			8.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	276	0	988	462	0	161	386	0	35	1623	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	12.0	17.0	0.0	36.0	41.0	0.0	12.0	35.0	0.0	12.0	35.0	0.0
Total Split (%)	12.0%	17.0%	0.0%	36.0%	41.0%	0.0%	12.0%	35.0%	0.0%	12.0%	35.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	20.0	11.3		49.4	40.5		40.2	33.9		38.0	29.5	
Actuated g/C Ratio	0.20	0.11		0.49	0.40		0.40	0.34		0.38	0.30	
v/c Ratio	0.13	0.87		1.49	0.61		0.78	0.33		0.09	1.56	
Control Delay	19.3	47.3		257.5	29.1		57.1	16.8		18.1	286.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	47.3		257.5	29.1		57.1	16.8		18.1	286.4	
LOS	B	D		F	C		E	B		B	F	
Approach Delay		44.8			184.7			28.6			280.8	
Approach LOS		D			F			C			F	
Queue Length 50th (ft)	9	81		~839	247		71	48		13	~781	
Queue Length 95th (ft)	23	#227		#1084	364		#169	68		31	#921	

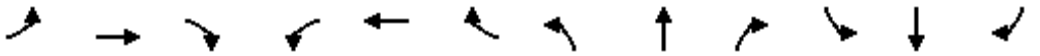
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		624			719			1227			425	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	232	318		661	752		214	1160		413	1038	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.87		1.49	0.61		0.75	0.33		0.08	1.56	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 92 (92%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.56			
Intersection Signal Delay: 192.7		Intersection LOS: F	
Intersection Capacity Utilization 131.7%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix M: 2024 - Signal at Trenton PM (2B2)

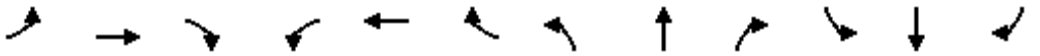


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	268	52	23	88	72	322	24	854	60	233	993	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	82	0	96	78	350	26	928	65	253	1242	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	21.0	42.0	42.0	42.0	21.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	21.0%	42.0%	42.0%	42.0%	21.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	26.5	26.5		26.5	26.5	45.5	44.8	44.8	44.8	63.5	61.8	
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.46	0.45	0.45	0.45	0.64	0.62	
v/c Ratio	0.85	0.17		0.30	0.17	0.56	0.15	0.61	0.10	0.67	0.59	
Control Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.1	6.0	24.3	8.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Total Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.2	6.0	24.3	8.3	
LOS	E	C		C	C	C	C	C	A	C	A	
Approach Delay		49.2			23.3			23.9			11.0	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	172	28		48	37	137	10	237	0	51	149	
Queue Length 95th (ft)	#284	62		89	71	193	33	346	28	152	188	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	400	572		374	535	673	174	1511	654	427	2114	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	286	
Spillback Cap Reductn	0	0		0	0	0	0	23	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.14		0.26	0.15	0.52	0.15	0.62	0.10	0.59	0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 17 (17%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 20.9		Intersection LOS: C	
Intersection Capacity Utilization 73.2%		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: 1: Divide Ave & Bismarck Expy

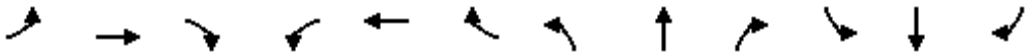


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	318	0	426	0	0	0	0	1394	136	32	654	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	346	0	463	0	0	0	0	1515	148	35	711	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	60.0	60.0	60.0	60.0	0.0
Total Split (%)	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%	0.0%	60.0%	60.0%	60.0%	60.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	26.0		26.0					63.5	63.5	63.5	63.5	
Actuated g/C Ratio	0.26		0.26					0.64	0.64	0.64	0.64	
v/c Ratio	0.76		0.83					0.71	0.17	0.30	0.34	
Control Delay	44.5		32.3					13.1	3.0	23.1	13.6	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.0	
Total Delay	44.5		32.3					13.2	3.0	23.1	13.6	
LOS	D		C					B	A	C	B	
Approach Delay								12.3			14.1	
Approach LOS								B			B	
Queue Length 50th (ft)	204		165					218	10	19	208	
Queue Length 95th (ft)	269		260					260	m24	m45	277	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	611		681					2124	862	117	2104	
Starvation Cap Reductn	0		0					51	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	0.57		0.68					0.73	0.17	0.30	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

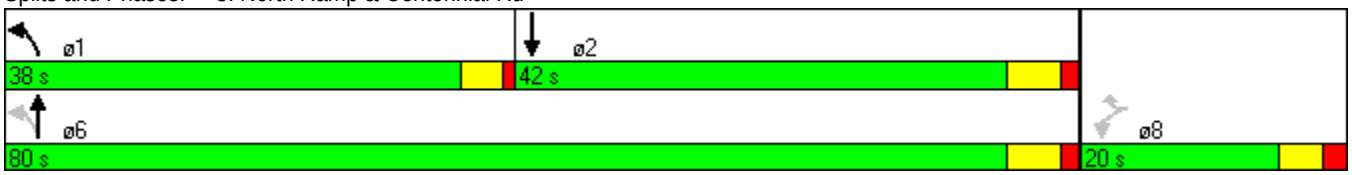


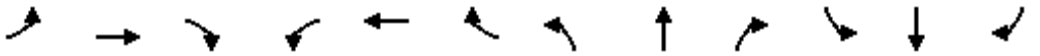
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	95	0	20	462	1313	0	0	670	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		0
Storage Lanes	0		0	1		1	1		0	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			786	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	103	0	22	502	1427	0	0	930	0
Turn Type				custom		custom	pm+pt					
Protected Phases							1	6			2	
Permitted Phases				8		8	6					
Detector Phase				8		8	1	6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	38.0	80.0	0.0	0.0	42.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	38.0%	80.0%	0.0%	0.0%	42.0%	0.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode				None		None	None	C-Min			C-Min	
Act Effct Green (s)				10.0		10.0	83.0	82.7			52.4	
Actuated g/C Ratio				0.10		0.10	0.83	0.83			0.52	
v/c Ratio				0.56		0.13	0.77	0.49			0.52	
Control Delay				54.2		17.3	12.1	7.6			18.9	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				54.2		17.3	12.1	7.6			18.9	
LOS				D		B	B	A			B	
Approach Delay								8.8			18.9	
Approach LOS								A			B	
Queue Length 50th (ft)				64		0	153	360			236	
Queue Length 95th (ft)				113		22	167	307			366	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			706	
Turn Bay Length (ft)						150	215					
Base Capacity (vph)				270		240	769	2898			1803	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.38		0.09	0.65	0.49			0.52	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 74 (74%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 13.6		Intersection LOS: B	
Intersection Capacity Utilization 74.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: North Ramp & Centennial Rd



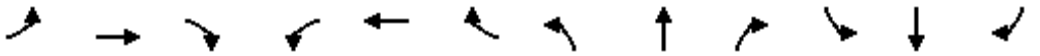


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	3	117	162	2	102	184	1581	286	62	749	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	0		200	550		0	215		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		746			982			786			1296	
Travel Time (s)		17.0			22.3			13.4			22.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	127	0	178	111	200	2029	0	67	837	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	4	4	4	8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	9.0	20.0		9.0	20.0	
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	14.0	64.0	0.0	14.0	64.0	0.0
Total Split (%)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	14.0%	64.0%	0.0%	14.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		16.4	16.4		16.4	16.4	74.1	66.8		69.7	63.0	
Actuated g/C Ratio		0.16	0.16		0.16	0.16	0.74	0.67		0.70	0.63	
v/c Ratio		0.11	0.35		0.82	0.31	0.40	0.87		0.35	0.38	
Control Delay		35.8	9.4		69.0	9.6	5.4	15.6		7.7	8.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		35.8	9.4		69.0	9.6	5.4	15.6		7.7	8.8	
LOS		D	A		E	A	A	B		A	A	
Approach Delay		13.6			46.2			14.7			8.7	
Approach LOS		B			D			B			A	
Queue Length 50th (ft)		13	0		109	0	25	647		4	150	
Queue Length 95th (ft)		36	49		#213	46	38	#814		m2	183	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		666			902			706			1216	
Turn Bay Length (ft)			200			200	550			215		
Base Capacity (vph)		246	389		238	376	516	2323		251	2224	
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		0.10	0.33		0.75	0.30	0.39	0.87		0.27	0.38	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 36 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 82.7%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Trenton Dr & Centennial Rd

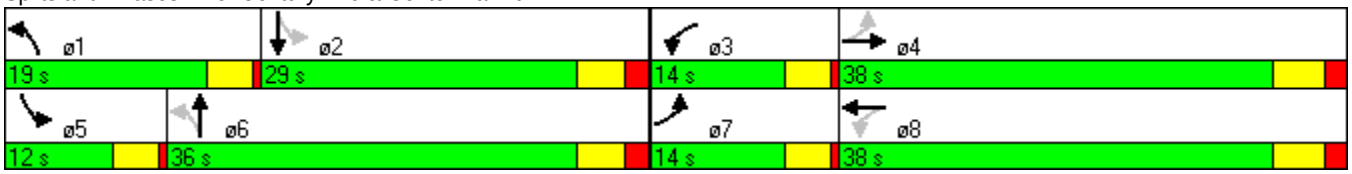


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	244	205	187	150	37	205	649	279	55	381	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		674			715			1296			473	
Travel Time (s)		13.1			13.9			22.1			8.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	488	0	203	203	0	223	1008	0	60	465	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	14.0	38.0	0.0	14.0	38.0	0.0	19.0	36.0	0.0	12.0	29.0	0.0
Total Split (%)	14.0%	38.0%	0.0%	14.0%	38.0%	0.0%	19.0%	36.0%	0.0%	12.0%	29.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	42.1	32.3		45.6	35.9		44.3	33.6		34.6	26.0	
Actuated g/C Ratio	0.42	0.32		0.46	0.36		0.44	0.34		0.35	0.26	
v/c Ratio	0.16	0.83		0.68	0.31		0.54	0.85		0.29	0.51	
Control Delay	15.2	41.8		28.7	24.3		11.0	24.9		20.8	33.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.2	41.8		28.7	24.3		11.0	24.9		20.8	33.7	
LOS	B	D		C	C		B	C		C	C	
Approach Delay		37.8			26.5			22.4			32.2	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	29	262		73	88		54	304		22	131	
Queue Length 95th (ft)	56	#433		#133	153		m58	m#408		46	186	

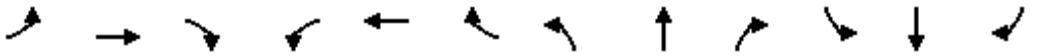
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		594			635			1216			393	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	576	591		302	658		437	1181		223	913	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.83		0.67	0.31		0.51	0.85		0.27	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 94 (94%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 28.1		Intersection LOS: C	
Intersection Capacity Utilization 81.9%		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: 5: Century Ave & Centennial Rd



Appendix N: 2024 - Signal at Trenton & NE Loop Ramp AM (2C1)

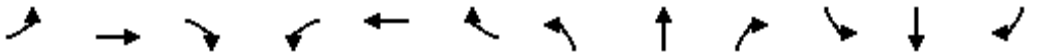


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	114	16	110	75	258	25	430	72	370	1268	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	5%	0%	6%	17%	26%	4%	9%	18%	2%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	141	0	120	82	280	27	467	78	402	1686	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	25.4	44.6	44.6	44.6	25.4	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	25.4%	44.6%	44.6%	44.6%	25.4%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	15.5	15.5		15.5	15.5	35.5	54.8	54.8	54.8	74.5	72.8	
Actuated g/C Ratio	0.16	0.16		0.16	0.16	0.36	0.55	0.55	0.55	0.74	0.73	
v/c Ratio	0.63	0.50		0.70	0.33	0.47	0.20	0.26	0.10	0.54	0.66	
Control Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.0	4.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
Total Delay	53.6	42.0		60.6	39.3	6.9	21.3	14.3	4.4	5.1	4.7	
LOS	D	D		E	D	A	C	B	A	A	A	
Approach Delay		47.2			25.8			13.2			4.8	
Approach LOS		D			C			B			A	
Queue Length 50th (ft)	69	80		74	47	23	8	75	0	50	155	
Queue Length 95th (ft)	119	129		125	85	64	36	146	28	m82	197	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	284	433		265	390	679	136	1816	786	813	2543	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	30	142	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.40	0.33		0.45	0.21	0.41	0.20	0.26	0.10	0.51	0.70	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 67 (67%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.70	
Intersection Signal Delay: 12.4	Intersection LOS: B
Intersection Capacity Utilization 81.6%	ICU Level of Service D
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 1: Divide Ave & Bismarck Expy

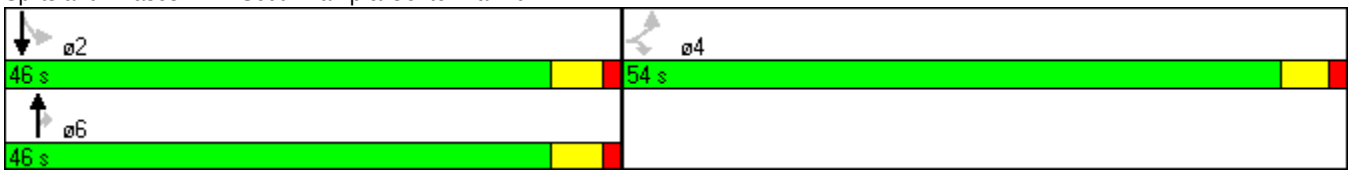


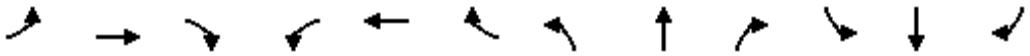
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	143	0	580	0	0	0	0	693	101	27	1063	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	0%	3%	2%	2%	2%	0%	13%	29%	13%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	0	630	0	0	0	0	753	110	29	1155	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	54.0	0.0	54.0	0.0	0.0	0.0	0.0	46.0	46.0	46.0	46.0	0.0
Total Split (%)	54.0%	0.0%	54.0%	0.0%	0.0%	0.0%	0.0%	46.0%	46.0%	46.0%	46.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	44.1		44.1					45.4	45.4	45.4	45.4	
Actuated g/C Ratio	0.44		0.44					0.45	0.45	0.45	0.45	
v/c Ratio	0.20		0.89					0.52	0.18	0.13	0.72	
Control Delay	16.7		40.8					19.3	3.6	12.6	19.2	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	16.7		40.8					19.3	3.6	12.6	19.2	
LOS	B		D					B	A	B	B	
Approach Delay								17.3			19.0	
Approach LOS								B			B	
Queue Length 50th (ft)	56		333					205	5	8	236	
Queue Length 95th (ft)	91		#499					160	19	m12	387	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	849		779					1449	628	217	1605	
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	0.18		0.81					0.52	0.18	0.13	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 58 (58%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 74.0%		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: 2: South Ramp & Centennial Rd



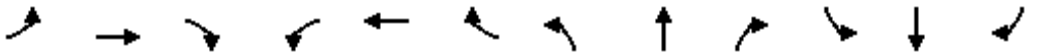


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	87	0	9	0	529	412	0	1700	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			783	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	10%	2%	33%	7%	4%	2%	2%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	95	0	10	0	575	448	0	2261	0
Turn Type				custom		custom			Free			
Protected Phases								6			2	
Permitted Phases				8		8			Free			
Detector Phase				8		8		6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	
Minimum Split (s)				20.0		20.0		20.0			22.4	
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	0.0	80.0	0.0	0.0	80.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	0.0%	80.0%	0.0%	0.0%	80.0%	0.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	
All-Red Time (s)				2.0		2.0		1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	
Act Effct Green (s)				9.5		9.5		83.2	100.0		83.2	
Actuated g/C Ratio				0.10		0.10		0.83	1.00		0.83	
v/c Ratio				0.54		0.08		0.20	0.28		0.78	
Control Delay				53.9		21.9		3.5	0.4		3.3	
Queue Delay				0.0		0.0		0.0	0.0		0.0	
Total Delay				53.9		21.9		3.5	0.4		3.3	
LOS				D		C		A	A		A	
Approach Delay								2.2			3.3	
Approach LOS								A			A	
Queue Length 50th (ft)				59		0		23	0		7	
Queue Length 95th (ft)				106		15		92	0		56	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			703	
Turn Bay Length (ft)						150			215			
Base Capacity (vph)				275		188		2886	1583		2905	
Starvation Cap Reductn				0		0		0	0		0	
Spillback Cap Reductn				0		0		0	0		0	
Storage Cap Reductn				0		0		0	0		0	
Reduced v/c Ratio				0.35		0.05		0.20	0.28		0.78	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 14 (14%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 4.5		Intersection LOS: A	
Intersection Capacity Utilization 71.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: North Ramp & Centennial Rd

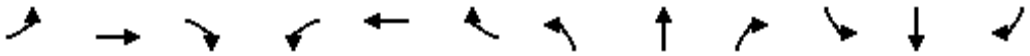


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	290	122	6	54	101	467	110	27	1644	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	0		200	550		0	215		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		638			313			783			1307	
Travel Time (s)		14.5			7.1			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	17%	0%	1%	1%	0%	0%	10%	9%	2%	12%	2%	14%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	13	315	0	140	59	110	628	0	29	1816	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	4	4	4	8	8	8	1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	9.0	20.0		20.0	20.0	
Total Split (s)	24.0	24.0	24.0	24.0	24.0	24.0	12.0	76.0	0.0	64.0	64.0	0.0
Total Split (%)	24.0%	24.0%	24.0%	24.0%	24.0%	24.0%	12.0%	76.0%	0.0%	64.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Min		C-Min	C-Min	
Act Effct Green (s)		15.9	15.9		15.9	15.9	76.1	76.1		65.2	65.2	
Actuated g/C Ratio		0.16	0.16		0.16	0.16	0.76	0.76		0.65	0.65	
v/c Ratio		0.06	0.84		0.65	0.19	0.59	0.25		0.06	0.79	
Control Delay		33.8	41.0		52.4	10.7	47.6	7.5		2.8	6.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		33.8	41.0		52.4	10.7	47.6	7.5		2.8	6.7	
LOS		C	D		D	B	D	A		A	A	
Approach Delay		40.7			40.0			13.5			6.7	
Approach LOS		D			D			B			A	
Queue Length 50th (ft)		7	106		83	0	30	87		2	151	
Queue Length 95th (ft)		23	#207		143	34	83	90		m2	m104	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		558			233			703			1227	
Turn Bay Length (ft)			200			200	550			215		
Base Capacity (vph)		267	436		274	370	204	2496		448	2301	
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		0.05	0.72		0.51	0.16	0.54	0.25		0.06	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 16 (16%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 81.3%		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: 4: Trenton Dr & Centennial Rd

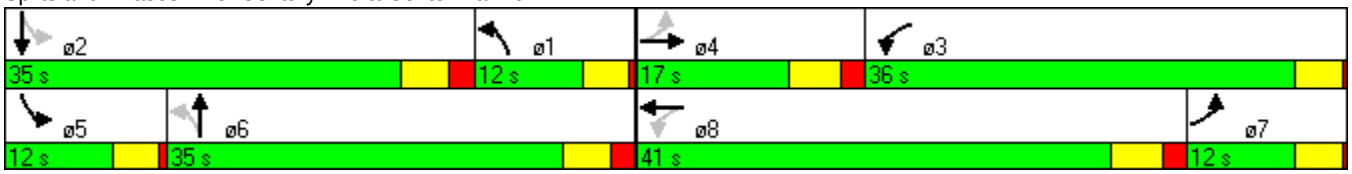


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	34	220	909	376	49	148	324	31	32	1370	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		704			799			1307			505	
Travel Time (s)		13.7			15.6			22.3			8.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	5%	5%	0%	0%	2%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	276	0	988	462	0	161	386	0	35	1623	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	12.0	17.0	0.0	36.0	41.0	0.0	12.0	35.0	0.0	12.0	35.0	0.0
Total Split (%)	12.0%	17.0%	0.0%	36.0%	41.0%	0.0%	12.0%	35.0%	0.0%	12.0%	35.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	20.0	11.3		49.0	40.1		36.1	34.6		31.0	29.5	
Actuated g/C Ratio	0.20	0.11		0.49	0.40		0.36	0.35		0.31	0.30	
v/c Ratio	0.13	0.90		1.51	0.62		0.72	0.33		0.12	1.56	
Control Delay	19.3	55.4		265.8	29.5		42.2	13.1		25.5	286.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	55.4		265.8	29.5		42.2	13.1		25.5	286.4	
LOS	B	E		F	C		D	B		C	F	
Approach Delay		52.2			190.5			21.7			280.9	
Approach LOS		D			F			C			F	
Queue Length 50th (ft)	9	91		~839	247		43	52		16	~781	
Queue Length 95th (ft)	23	#244		#1084	364		#146	64		39	#921	

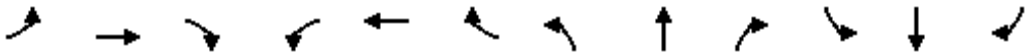
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		624			719			1227			425	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	232	306		653	744		225	1186		297	1038	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.90		1.51	0.62		0.72	0.33		0.12	1.56	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 32 (32%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.56			
Intersection Signal Delay: 194.5		Intersection LOS: F	
Intersection Capacity Utilization 131.7%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix O: 2024 - Signal at Trenton & NE Loop Ramp PM (2C2)

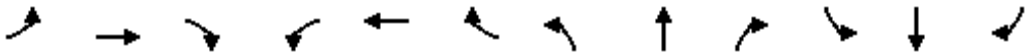


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	268	52	23	88	72	322	24	854	60	233	993	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	291	82	0	96	78	350	26	928	65	253	1242	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	21.0	42.0	42.0	42.0	21.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	21.0%	42.0%	42.0%	42.0%	21.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	26.5	26.5		26.5	26.5	45.5	44.8	44.8	44.8	63.5	61.8	
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.46	0.45	0.45	0.45	0.64	0.62	
v/c Ratio	0.85	0.17		0.30	0.17	0.56	0.15	0.61	0.10	0.67	0.59	
Control Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.1	6.0	21.3	10.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Total Delay	57.3	20.2		30.5	27.5	20.3	23.6	25.1	6.0	21.3	10.9	
LOS	E	C		C	C	C	C	C	A	C	B	
Approach Delay		49.2			23.3			23.9			12.6	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	172	28		48	37	137	10	237	0	66	170	
Queue Length 95th (ft)	#284	62		89	71	193	33	346	28	146	238	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	400	572		374	535	673	174	1511	654	427	2114	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	286	
Spillback Cap Reductn	0	0		0	0	0	0	13	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.73	0.14		0.26	0.15	0.52	0.15	0.62	0.10	0.59	0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 43 (43%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 21.6		Intersection LOS: C	
Intersection Capacity Utilization 73.2%		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: 1: Divide Ave & Bismarck Expy

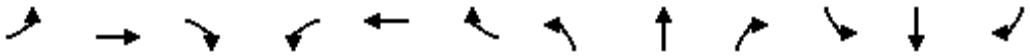


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	318	0	426	0	0	0	0	1394	136	32	654	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		175	0		0	0		0	222		0
Storage Lanes	1		1	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	346	0	463	0	0	0	0	1515	148	35	711	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	40.0	0.0	40.0	0.0	0.0	0.0	0.0	60.0	60.0	60.0	60.0	0.0
Total Split (%)	40.0%	0.0%	40.0%	0.0%	0.0%	0.0%	0.0%	60.0%	60.0%	60.0%	60.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	26.0		26.0					63.5	63.5	63.5	63.5	
Actuated g/C Ratio	0.26		0.26					0.64	0.64	0.64	0.64	
v/c Ratio	0.76		0.83					0.71	0.17	0.30	0.34	
Control Delay	44.5		32.3					12.9	2.9	14.6	7.1	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.0	
Total Delay	44.5		32.3					13.0	2.9	14.6	7.1	
LOS	D		C					B	A	B	A	
Approach Delay								12.1			7.4	
Approach LOS								B			A	
Queue Length 50th (ft)	204		165					223	10	6	60	
Queue Length 95th (ft)	269		260					266	m24	24	112	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)			175							222		
Base Capacity (vph)	611		681					2124	862	117	2104	
Starvation Cap Reductn	0		0					51	0	0	0	
Spillback Cap Reductn	0		1					0	0	0	21	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.57		0.68					0.73	0.17	0.30	0.34	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 30 (30%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 64.0%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

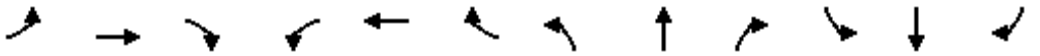


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	95	0	20	0	1313	462	0	670	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		0
Storage Lanes	0		0	1		1	0		1	0		0
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			786	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	103	0	22	0	1427	502	0	930	0
Turn Type				custom		custom			Free			
Protected Phases								6			2	
Permitted Phases				8		8			Free			
Detector Phase				8		8		6			2	
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	
Minimum Split (s)				20.0		20.0		20.0			22.4	
Total Split (s)	0.0	0.0	0.0	24.0	0.0	24.0	0.0	76.0	0.0	0.0	76.0	0.0
Total Split (%)	0.0%	0.0%	0.0%	24.0%	0.0%	24.0%	0.0%	76.0%	0.0%	0.0%	76.0%	0.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	
All-Red Time (s)				2.0		2.0		1.5			1.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	
Act Effct Green (s)				10.0		10.0		82.7	100.0		82.7	
Actuated g/C Ratio				0.10		0.10		0.83	1.00		0.83	
v/c Ratio				0.56		0.13		0.49	0.32		0.33	
Control Delay				54.2		17.3		2.3	0.4		1.6	
Queue Delay				0.0		0.0		0.0	0.0		0.0	
Total Delay				54.2		17.3		2.3	0.4		1.6	
LOS				D		B		A	A		A	
Approach Delay								1.8			1.6	
Approach LOS								A			A	
Queue Length 50th (ft)				64		0		65	0		14	
Queue Length 95th (ft)				113		22		47	0		10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			706	
Turn Bay Length (ft)						150			215			
Base Capacity (vph)				343		299		2898	1583		2829	
Starvation Cap Reductn				0		0		0	0		0	
Spillback Cap Reductn				0		0		0	0		0	
Storage Cap Reductn				0		0		0	0		0	
Reduced v/c Ratio				0.30		0.07		0.49	0.32		0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 49 (49%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 3.7		Intersection LOS: A	
Intersection Capacity Utilization 49.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: North Ramp & Centennial Rd

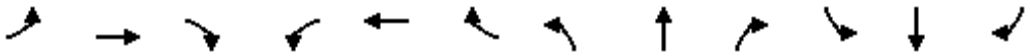


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	3	117	162	2	102	184	1581	286	62	749	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	0		200	550		0	215		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		746			982			786			1296	
Travel Time (s)		17.0			22.3			13.4			22.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	24	127	0	178	111	200	2029	0	67	837	0
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	4	4	4	8	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	9.0	20.0		9.0	20.0	
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	14.0	64.0	0.0	14.0	64.0	0.0
Total Split (%)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	14.0%	64.0%	0.0%	14.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Act Effct Green (s)		16.4	16.4		16.4	16.4	74.1	66.8		69.7	63.0	
Actuated g/C Ratio		0.16	0.16		0.16	0.16	0.74	0.67		0.70	0.63	
v/c Ratio		0.11	0.35		0.82	0.31	0.40	0.87		0.35	0.38	
Control Delay		35.8	9.4		69.0	9.6	6.0	15.2		7.7	8.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		35.8	9.4		69.0	9.6	6.0	15.2		7.7	8.8	
LOS		D	A		E	A	A	B		A	A	
Approach Delay		13.6			46.2			14.3			8.7	
Approach LOS		B			D			B			A	
Queue Length 50th (ft)		13	0		109	0	20	253		4	150	
Queue Length 95th (ft)		36	49		#213	46	57	#796		m2	183	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		666			902			706			1216	
Turn Bay Length (ft)			200			200	550			215		
Base Capacity (vph)		246	389		238	376	516	2323		251	2224	
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		0.10	0.33		0.75	0.30	0.39	0.87		0.27	0.38	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 32 (32%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 15.5		Intersection LOS: B	
Intersection Capacity Utilization 82.7%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Trenton Dr & Centennial Rd

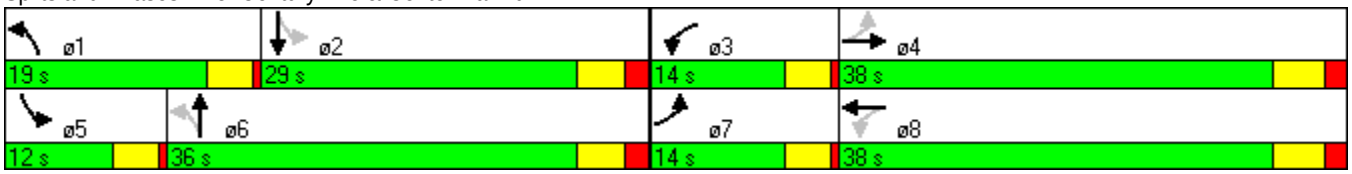


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	244	205	187	150	37	205	649	279	55	381	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		0	215		0	215		0	215		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		674			715			1296			473	
Travel Time (s)		13.1			13.9			22.1			8.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	488	0	203	203	0	223	1008	0	60	465	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7		8.0	15.7		8.0	11.5		8.0	11.5	
Total Split (s)	14.0	38.0	0.0	14.0	38.0	0.0	19.0	36.0	0.0	12.0	29.0	0.0
Total Split (%)	14.0%	38.0%	0.0%	14.0%	38.0%	0.0%	19.0%	36.0%	0.0%	12.0%	29.0%	0.0%
Yellow Time (s)	3.5	3.9		3.5	3.9		3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8		0.5	1.8		0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	4.0	4.0	5.7	4.0	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	Max		None	Max		None	C-Max		None	C-Max	
Act Effct Green (s)	42.1	32.3		45.6	35.9		44.3	33.6		34.6	26.0	
Actuated g/C Ratio	0.42	0.32		0.46	0.36		0.44	0.34		0.35	0.26	
v/c Ratio	0.16	0.83		0.68	0.31		0.54	0.85		0.29	0.51	
Control Delay	15.2	41.8		28.7	24.3		10.5	23.8		20.8	33.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.2	41.8		28.7	24.3		10.5	23.8		20.8	33.7	
LOS	B	D		C	C		B	C		C	C	
Approach Delay		37.8			26.5			21.4			32.2	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	29	262		73	88		54	273		22	131	
Queue Length 95th (ft)	56	#433		#133	153		m58	m#408		46	186	

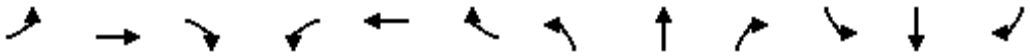
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		594			635			1216			393	
Turn Bay Length (ft)	215			215			215			215		
Base Capacity (vph)	576	591		302	658		437	1181		223	913	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.15	0.83		0.67	0.31		0.51	0.85		0.27	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 90 (90%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 27.7		Intersection LOS: C	
Intersection Capacity Utilization 81.9%		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: 5: Century Ave & Centennial Rd



Appendix P: 2035 - Existing Control AM (3A1)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	125	18	141	96	328	25	430	72	428	1468	328
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	156	0	153	104	357	27	467	78	465	1953	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	24.1	45.9	45.9	45.9	24.1	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	24.1%	45.9%	45.9%	45.9%	24.1%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	18.6	18.6		18.6	18.6	41.3	49.0	49.0	49.0	71.4	69.7	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.41	0.49	0.49	0.49	0.71	0.70	
v/c Ratio	0.54	0.45		0.81	0.32	0.52	0.39	0.28	0.11	0.69	0.82	
Control Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	10.8	11.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	
Total Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	10.8	11.6	
LOS	D	D		E	D	A	D	B	A	B	B	
Approach Delay		40.4			28.0			17.0			11.5	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	72	84		93	57	45	11	94	0	100	262	
Queue Length 95th (ft)	125	137		#162	101	104	#55	146	28	168	356	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	303	448		245	414	727	70	1652	715	702	2369	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	2	130	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.42	0.35		0.62	0.25	0.49	0.39	0.28	0.11	0.66	0.87	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 92 (92%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 17.0	Intersection LOS: B
Intersection Capacity Utilization 91.0%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

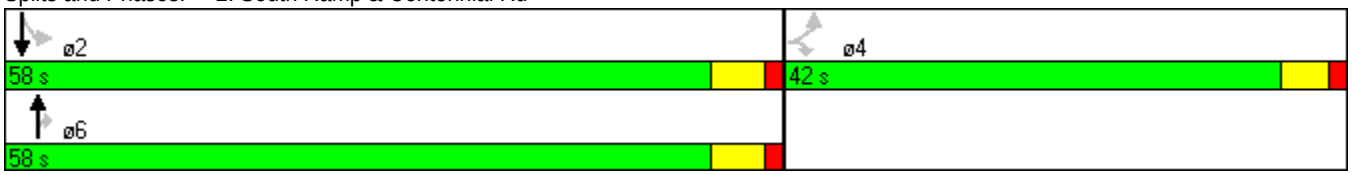
Splits and Phases: 1: Divide Ave & Bismarck Expy

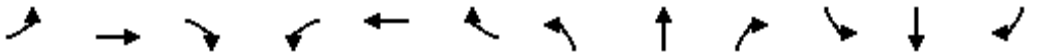
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	0	720	0	0	0	0	788	115	30	1178	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	0	783	0	0	0	0	857	125	33	1280	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	42.0	0.0	42.0	0.0	0.0	0.0	0.0	58.0	58.0	58.0	58.0	0.0
Total Split (%)	42.0%	0.0%	42.0%	0.0%	0.0%	0.0%	0.0%	58.0%	58.0%	58.0%	58.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.5		31.5					58.0	58.0	58.0	58.0	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.18		0.84					0.44	0.16	0.12	0.67	
Control Delay	24.2		37.6					12.1	3.4	2.6	5.0	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.2	
Total Delay	24.2		37.6					12.2	3.4	2.6	5.3	
LOS	C		D					B	A	A	A	
Approach Delay								11.1			5.2	
Approach LOS								B			A	
Queue Length 50th (ft)	45		238					127	5	2	76	
Queue Length 95th (ft)	66		298					173	21	m3	m150	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1255		1074					1938	790	281	1920	
Starvation Cap Reductn	0		0					310	0	0	0	
Spillback Cap Reductn	0		3					0	0	0	143	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.15		0.73					0.53	0.16	0.12	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 78 (78%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 101.8%		ICU Level of Service G	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



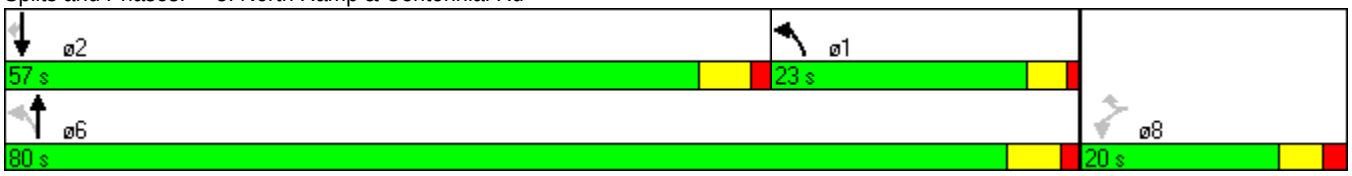


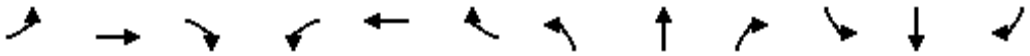
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	175	0	17	471	605	0	0	1949	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			790	
Travel Time (s)		6.1			10.6			13.1			13.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	190	0	18	512	658	0	0	2118	473
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	23.0	80.0	0.0	0.0	57.0	57.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	23.0%	80.0%	0.0%	0.0%	57.0%	57.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				13.3		13.3	77.5	76.1			53.1	53.1
Actuated g/C Ratio				0.13		0.13	0.78	0.76			0.53	0.53
v/c Ratio				0.79		0.08	1.30	0.25			1.14	0.48
Control Delay				64.2		16.9	177.2	2.8			87.3	4.9
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				64.2		16.9	177.2	2.8			87.3	4.9
LOS				E		B	F	A			F	A
Approach Delay								79.1			72.3	
Approach LOS								E			E	
Queue Length 50th (ft)				117		0	~382	52			~879	60
Queue Length 95th (ft)				#211		20	#610	56			m646	m47

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			710	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		237	395	2668			1862	983
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				0.70		0.08	1.30	0.25			1.14	0.48

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 56 (56%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.30			
Intersection Signal Delay: 73.6		Intersection LOS: E	
Intersection Capacity Utilization 101.8%		ICU Level of Service G	
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: 3: North Ramp & Centennial Rd

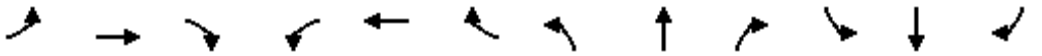




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	2	369	155	8	69	129	551	130	35	1871	31
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	2	401	168	9	75	140	599	141	38	2034	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								790			1305	
pX, platoon unblocked	0.49	0.49	0.49	0.49	0.49		0.49					
vC, conflicting volume	2786	3147	1034	2044	3093	370	2067			740		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2565	3299	0	1057	3190	370	1104			740		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	25	0	0	88	55			96		
cM capacity (veh/h)	0	2	533	0	3	627	309			862		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	416	168	84	140	399	341	38	1356	712
Volume Left	13	168	0	140	0	0	38	0	0
Volume Right	401	0	75	0	0	141	0	0	34
cSH	2	0	24	309	1700	1700	862	1700	1700
Volume to Capacity	264.17	Err	3.51	0.45	0.23	0.20	0.04	0.80	0.42
Queue Length 95th (ft)	Err	Err	Err	56	0	0	3	0	0
Control Delay (s)	Err	Err	Err	26.0	0.0	0.0	9.4	0.0	0.0
Lane LOS	F	F	F	D			A		
Approach Delay (s)	Err	Err		4.1			0.2		
Approach LOS	F	F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	94.1%	ICU Level of Service	F	
Analysis Period (min)	15			

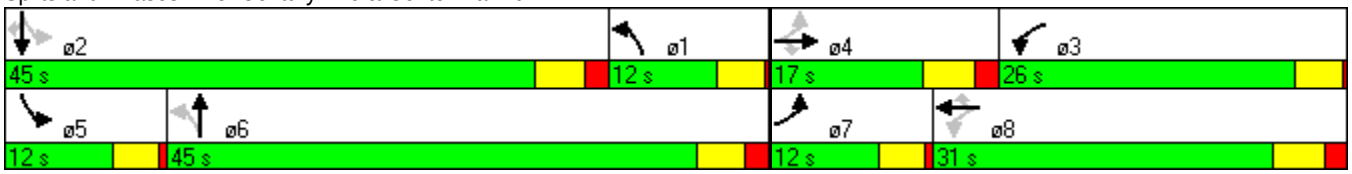


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	42	271	1158	479	63	176	386	37	40	1738	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		200	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		696			680			1305			494	
Travel Time (s)		13.6			13.2			22.2			8.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	46	295	1259	521	68	191	460	0	43	1889	170
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	17.0	17.0	26.0	31.0	31.0	12.0	45.0	0.0	12.0	45.0	45.0
Total Split (%)	12.0%	17.0%	17.0%	26.0%	31.0%	31.0%	12.0%	45.0%	0.0%	12.0%	45.0%	45.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.0	11.3	11.3	32.0	30.3	30.3	46.1	44.6		41.0	39.5	39.5
Actuated g/C Ratio	0.13	0.11	0.11	0.32	0.30	0.30	0.46	0.45		0.41	0.40	0.40
v/c Ratio	0.18	0.12	1.05	1.24	0.49	0.13	0.84	0.29		0.12	1.35	0.25
Control Delay	41.1	40.7	95.2	148.3	31.7	8.1	64.2	14.7		18.8	191.0	10.0
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	41.1	40.7	95.2	148.3	31.7	8.1	64.2	14.7		18.8	191.0	10.0
LOS	D	D	F	F	C	A	E	B		B	F	A
Approach Delay		83.6			110.2			29.2			172.8	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)	20	14	~136	~553	151	0	83	100		16	~835	29
Queue Length 95th (ft)	49	31	#305	#691	207	33	#207	118		38	#973	73

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		616			600			1225			414	
Turn Bay Length (ft)	215		215	215		200	215			215		215
Base Capacity (vph)	197	400	281	1016	1071	526	227	1564		370	1398	685
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	0.17	0.12	1.05	1.24	0.49	0.13	0.84	0.29		0.12	1.35	0.25

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 32 (32%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.35	
Intersection Signal Delay: 124.1	Intersection LOS: F
Intersection Capacity Utilization 110.5%	ICU Level of Service H
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.	

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix Q: 2035 - Existing Control PM (3A2)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	58	26	112	92	410	24	854	60	270	1150	174
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	321	91	0	122	100	446	26	928	65	293	1439	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	22.0	41.0	41.0	41.0	22.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	22.0%	41.0%	41.0%	41.0%	22.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.3	28.3		28.3	28.3	49.7	40.6	40.6	40.6	61.7	60.0	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.50	0.41	0.41	0.41	0.62	0.60	
v/c Ratio	0.90	0.17		0.36	0.20	0.66	0.22	0.68	0.11	0.77	0.70	
Control Delay	62.3	20.1		31.1	27.3	21.9	29.2	28.9	6.2	37.5	7.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	
Total Delay	62.3	20.1		31.1	27.3	21.9	29.2	28.9	6.2	37.5	8.1	
LOS	E	C		C	C	C	C	C	A	D	A	
Approach Delay		53.0			24.4			27.5			13.1	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	188	31		59	46	168	12	274	0	110	155	
Queue Length 95th (ft)	#336	69		110	87	270	36	353	28	#206	202	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	392	572		370	535	707	117	1371	599	418	2052	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	226	
Spillback Cap Reductn	0	0		0	0	0	0	26	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.16		0.33	0.19	0.63	0.22	0.69	0.11	0.70	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 13 (13%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 79.8%		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.			

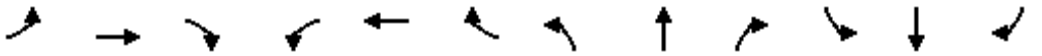
Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	0	529	0	0	0	0	1584	155	35	724	0
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	428	0	575	0	0	0	0	1722	168	38	787	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	26.0	0.0	26.0	0.0	0.0	0.0	0.0	74.0	74.0	74.0	74.0	0.0
Total Split (%)	26.0%	0.0%	26.0%	0.0%	0.0%	0.0%	0.0%	74.0%	74.0%	74.0%	74.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	18.2		18.2					71.3	71.3	71.3	71.3	
Actuated g/C Ratio	0.18		0.18					0.71	0.71	0.71	0.71	
v/c Ratio	0.69		0.67					0.72	0.18	0.34	0.33	
Control Delay	44.1		13.5					8.1	1.4	16.6	4.3	
Queue Delay	0.0		0.0					0.7	0.0	0.0	0.0	
Total Delay	44.1		13.5					8.8	1.4	16.6	4.3	
LOS	D		B					A	A	B	A	
Approach Delay								8.2			4.9	
Approach LOS								A			A	
Queue Length 50th (ft)	130		44					156	3	3	31	
Queue Length 95th (ft)	178		103					216	m11	m14	37	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	711		923					2382	955	113	2360	
Starvation Cap Reductn	0		0					315	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	0.60		0.62					0.83	0.18	0.34	0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 12.4		Intersection LOS: B	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

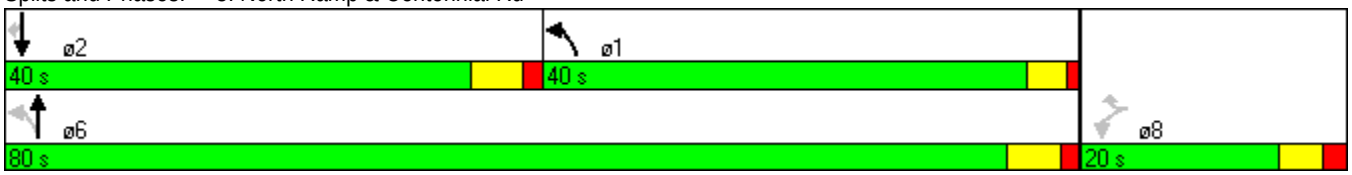


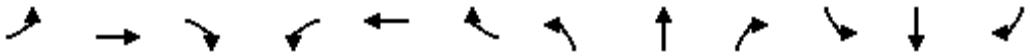
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	92	0	19	528	1502	0	0	767	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			788	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												10%
Lane Group Flow (vph)	0	0	0	100	0	21	574	1633	0	0	857	209
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	40.0	80.0	0.0	0.0	40.0	40.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	40.0%	80.0%	0.0%	0.0%	40.0%	40.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				9.8		9.8	83.1	82.8			44.3	44.3
Actuated g/C Ratio				0.10		0.10	0.83	0.83			0.44	0.44
v/c Ratio				0.56		0.13	0.75	0.56			0.58	0.27
Control Delay				54.1		17.3	17.8	3.0			20.6	3.4
Queue Delay				0.0		0.0	0.0	0.1			0.0	0.0
Total Delay				54.1		17.3	17.8	3.1			20.6	3.4
LOS				D		B	B	A			C	A
Approach Delay								6.9			17.2	
Approach LOS								A			B	
Queue Length 50th (ft)				62		0	120	98			257	6
Queue Length 95th (ft)				110		22	264	145			350	36

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			708	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		239	804	2903			1485	761
Starvation Cap Reductn				0		0	0	223			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.37		0.09	0.71	0.61			0.58	0.27

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 93 (93%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: North Ramp & Centennial Rd

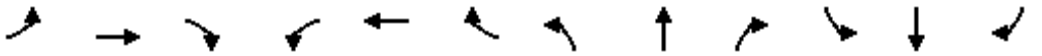




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	4	149	206	2	131	235	1866	338	80	853	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	4	162	224	2	142	255	2028	367	87	927	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								788			1304	
pX, platoon unblocked	0.84	0.84	0.97	0.84	0.84	0.83	0.97			0.83		
vC, conflicting volume	2783	4021	477	3362	3850	1198	953			2396		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2580	4052	398	3269	3849	819	890			2269		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	72	0	0	46	65			53		
cM capacity (veh/h)	0	1	583	0	1	263	735			183		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	192	224	145	255	1352	1043	87	618	335
Volume Left	26	224	0	255	0	0	87	0	0
Volume Right	162	0	142	0	0	367	0	0	26
cSH	0	0	55	735	1700	1700	183	1700	1700
Volume to Capacity	3049.89	Err	2.64	0.35	0.80	0.61	0.47	0.36	0.20
Queue Length 95th (ft)	Err	Err	372	39	0	0	57	0	0
Control Delay (s)	Err	Err	904.1	12.5	0.0	0.0	41.2	0.0	0.0
Lane LOS	F	F	F	B			E		
Approach Delay (s)	Err	Err		1.2			3.4		
Approach LOS	F	F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	94.9%	ICU Level of Service	F	
Analysis Period (min)	15			

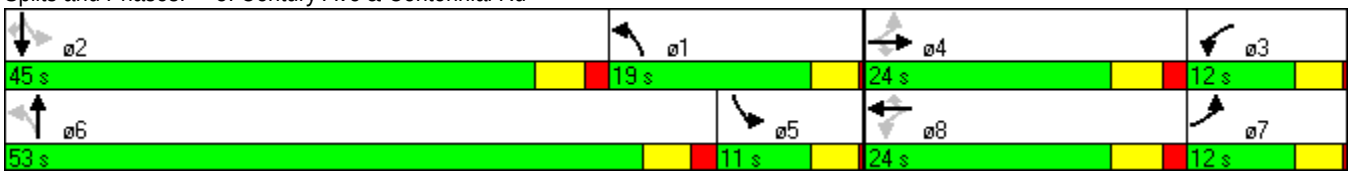


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	300	253	238	191	47	243	771	331	70	483	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		656			630			1304			510	
Travel Time (s)		12.8			12.3			22.2			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												10%
Lane Group Flow (vph)	107	326	275	259	208	51	264	1198	0	76	532	58
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	24.0	24.0	12.0	24.0	24.0	19.0	53.0	0.0	11.0	45.0	45.0
Total Split (%)	12.0%	24.0%	24.0%	12.0%	24.0%	24.0%	19.0%	53.0%	0.0%	11.0%	45.0%	45.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	25.9	18.3	18.3	25.9	18.3	18.3	62.1	52.3		51.7	44.0	44.0
Actuated g/C Ratio	0.26	0.18	0.18	0.26	0.18	0.18	0.62	0.52		0.52	0.44	0.44
v/c Ratio	0.32	0.50	0.54	0.48	0.32	0.15	0.45	0.66		0.36	0.36	0.09
Control Delay	30.3	39.9	8.7	32.7	37.1	11.2	16.3	16.0		19.8	20.0	5.4
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	30.3	39.9	8.7	32.7	37.1	11.2	16.3	16.0		19.8	20.0	5.4
LOS	C	D	A	C	D	B	B	B		B	C	A
Approach Delay		26.3			32.4			16.1			18.7	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	51	99	0	64	61	0	70	248		18	123	0
Queue Length 95th (ft)	93	144	69	95	95	32	113	330		36	173	26

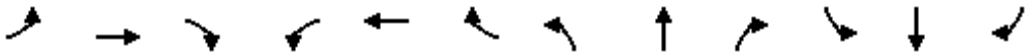
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		576			550			1224			430	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	373	648	514	612	648	331	629	1812		228	1490	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.29	0.50	0.54	0.42	0.32	0.15	0.42	0.66		0.33	0.36	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 58 (58%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 21.3		Intersection LOS: C	
Intersection Capacity Utilization 66.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix R: 2035 – Signal at Trenton AM (3B1)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	125	18	141	96	328	25	430	72	428	1468	328
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	156	0	153	104	357	27	467	78	465	1953	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	24.1	45.9	45.9	45.9	24.1	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	24.1%	45.9%	45.9%	45.9%	24.1%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	18.6	18.6		18.6	18.6	41.3	49.0	49.0	49.0	71.4	69.7	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.41	0.49	0.49	0.49	0.71	0.70	
v/c Ratio	0.54	0.45		0.81	0.32	0.52	0.39	0.28	0.11	0.69	0.82	
Control Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	10.8	11.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	
Total Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	10.8	11.6	
LOS	D	D		E	D	A	D	B	A	B	B	
Approach Delay		40.4			28.0			17.0			11.5	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	72	84		93	57	45	11	94	0	100	262	
Queue Length 95th (ft)	125	137		#162	101	104	#55	146	28	168	356	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	303	448		245	414	727	70	1652	715	702	2369	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	2	130	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.42	0.35		0.62	0.25	0.49	0.39	0.28	0.11	0.66	0.87	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 62 (62%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 17.0		Intersection LOS: B	
Intersection Capacity Utilization 91.0%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

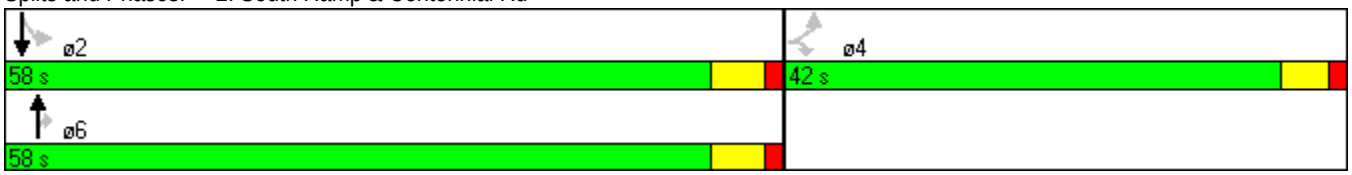
Splits and Phases: 1: Divide Ave & Bismarck Expy

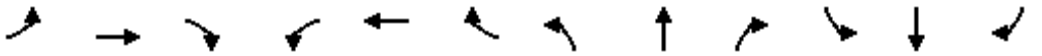
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	0	720	0	0	0	0	788	115	30	1178	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	0	783	0	0	0	0	857	125	33	1280	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	42.0	0.0	42.0	0.0	0.0	0.0	0.0	58.0	58.0	58.0	58.0	0.0
Total Split (%)	42.0%	0.0%	42.0%	0.0%	0.0%	0.0%	0.0%	58.0%	58.0%	58.0%	58.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.5		31.5					58.0	58.0	58.0	58.0	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.18		0.84					0.44	0.16	0.12	0.67	
Control Delay	24.2		37.6					12.1	3.4	2.6	5.0	
Queue Delay	0.0		0.0					0.1	0.0	0.0	0.2	
Total Delay	24.2		37.6					12.2	3.4	2.6	5.2	
LOS	C		D					B	A	A	A	
Approach Delay								11.1			5.2	
Approach LOS								B			A	
Queue Length 50th (ft)	45		238					127	5	2	76	
Queue Length 95th (ft)	66		298					173	21	m3	m148	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1255		1074					1938	790	281	1920	
Starvation Cap Reductn	0		0					310	0	0	0	
Spillback Cap Reductn	0		3					0	0	0	143	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.15		0.73					0.53	0.16	0.12	0.72	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 48 (48%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 15.8		Intersection LOS: B	
Intersection Capacity Utilization 101.8%		ICU Level of Service G	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



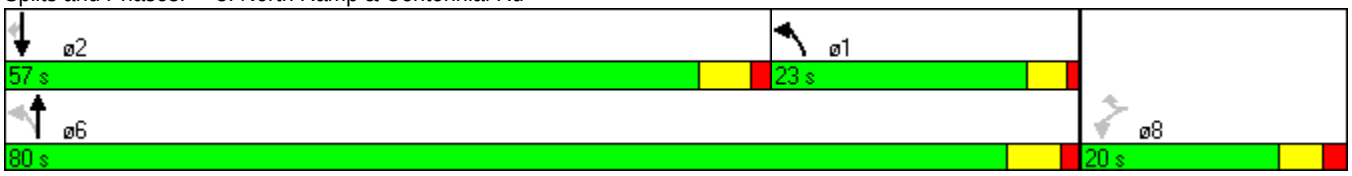


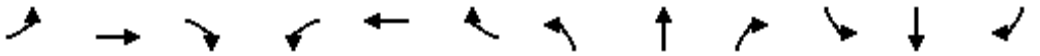
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	175	0	17	471	605	0	0	1949	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			776	
Travel Time (s)		6.1			10.6			13.1			13.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	190	0	18	512	658	0	0	2118	473
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	23.0	80.0	0.0	0.0	57.0	57.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	23.0%	80.0%	0.0%	0.0%	57.0%	57.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				13.3		13.3	77.5	76.1			53.1	53.1
Actuated g/C Ratio				0.13		0.13	0.78	0.76			0.53	0.53
v/c Ratio				0.79		0.08	1.30	0.25			1.14	0.48
Control Delay				64.2		16.9	177.2	2.8			85.7	2.8
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				64.2		16.9	177.2	2.8			85.7	2.8
LOS				E		B	F	A			F	A
Approach Delay								79.1			70.5	
Approach LOS								E			E	
Queue Length 50th (ft)				117		0	~382	52			~884	20
Queue Length 95th (ft)				#211		20	#610	56			m#951	m19

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			696	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		237	395	2668			1862	983
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				0.70		0.08	1.30	0.25			1.14	0.48

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 26 (26%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.30			
Intersection Signal Delay: 72.5		Intersection LOS: E	
Intersection Capacity Utilization 101.8%		ICU Level of Service G	
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: 3: North Ramp & Centennial Rd



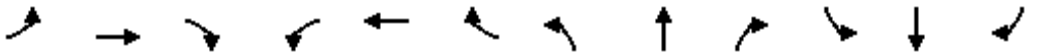


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	369	155	8	69	129	551	130	35	1871	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		709			951			776			1318	
Travel Time (s)		16.1			21.6			13.2			22.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	15	401	168	84	0	140	740	0	38	2068	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0	0.0	12.0	75.0	0.0	63.0	63.0	0.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	0.0%	12.0%	75.0%	0.0%	63.0%	63.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		20.0	20.0	20.0	20.0		72.0	72.0		60.4	60.4	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.72	0.72		0.60	0.60	
v/c Ratio		0.05	0.94	0.60	0.22		0.67	0.30		0.09	0.97	
Control Delay		32.1	57.0	46.0	11.1		32.5	6.3		4.7	17.9	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		32.1	57.0	46.0	11.1		32.5	6.3		4.7	17.9	
LOS		C	E	D	B		C	A		A	B	
Approach Delay		56.1			34.4			10.5			17.6	
Approach LOS		E			C			B			B	
Queue Length 50th (ft)		8	170	97	5		41	105		7	753	
Queue Length 95th (ft)		25	#351	167	44		#117	121		m5	m320	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		629			871			696			1238	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		324	442	293	398		215	2495		418	2135	
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		0.05	0.91	0.57	0.21		0.65	0.30		0.09	0.97	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 2 (2%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 21.4		Intersection LOS: C	
Intersection Capacity Utilization 94.1%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd



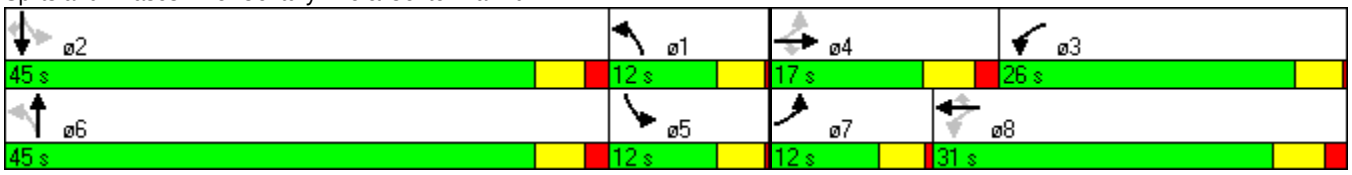
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	42	271	1158	479	63	176	386	37	40	1738	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		805			659			1318			490	
Travel Time (s)		15.7			12.8			22.5			8.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	46	295	1259	521	68	191	460	0	43	1889	170
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	17.0	17.0	26.0	31.0	31.0	12.0	45.0	0.0	12.0	45.0	45.0
Total Split (%)	12.0%	17.0%	17.0%	26.0%	31.0%	31.0%	12.0%	45.0%	0.0%	12.0%	45.0%	45.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.0	11.3	11.3	32.1	30.4	30.4	50.5	44.2		47.9	39.5	39.5
Actuated g/C Ratio	0.13	0.11	0.11	0.32	0.30	0.30	0.50	0.44		0.48	0.40	0.40
v/c Ratio	0.18	0.12	1.00	1.23	0.48	0.13	0.88	0.30		0.09	1.35	0.25
Control Delay	41.1	40.7	79.8	146.2	31.6	8.1	64.6	12.6		12.7	191.0	10.0
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	41.1	40.7	79.8	146.2	31.6	8.1	64.6	12.6		12.7	191.0	10.0
LOS	D	D	E	F	C	A	E	B		B	F	A
Approach Delay		71.5			108.8			27.8			172.7	
Approach LOS		E			F			C			F	
Queue Length 50th (ft)	20	14	~111	~553	151	0	75	66		13	~835	29
Queue Length 95th (ft)	49	31	#286	#691	207	33	#202	93		29	#973	73

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		725			579			1238			410	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	197	400	294	1020	1075	528	220	1550		476	1398	685
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	0.17	0.12	1.00	1.23	0.48	0.13	0.87	0.30		0.09	1.35	0.25

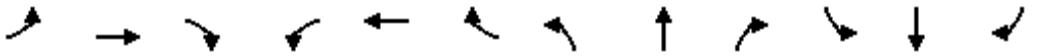
Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 91 (91%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.35
Intersection Signal Delay: 122.4 Intersection LOS: F
Intersection Capacity Utilization 110.5% ICU Level of Service H
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.

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix S: 2035 – Signal at Trenton PM (3B2)

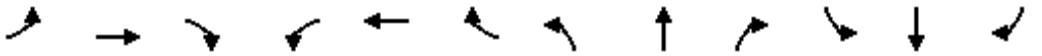


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	58	26	112	92	410	24	854	60	270	1150	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	321	91	0	122	100	446	26	928	65	293	1439	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	23.0	40.0	40.0	40.0	23.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	23.0%	40.0%	40.0%	40.0%	23.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.3	28.3		28.3	28.3	50.2	40.1	40.1	40.1	61.7	60.0	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.50	0.40	0.40	0.40	0.62	0.60	
v/c Ratio	0.90	0.17		0.36	0.20	0.66	0.22	0.69	0.11	0.76	0.70	
Control Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.6	6.4	36.7	7.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	
Total Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.7	6.4	36.7	8.2	
LOS	E	C		C	C	C	C	C	A	D	A	
Approach Delay		53.0			24.1			28.2			13.0	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	188	31		59	46	167	12	277	0	114	160	
Queue Length 95th (ft)	#336	69		110	87	264	37	358	29	204	194	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	392	572		370	535	719	117	1353	592	429	2052	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	226	
Spillback Cap Reductn	0	0		0	0	0	0	23	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.16		0.33	0.19	0.62	0.22	0.70	0.11	0.68	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 14 (14%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 23.3		Intersection LOS: C	
Intersection Capacity Utilization 79.8%		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: 1: Divide Ave & Bismarck Expy

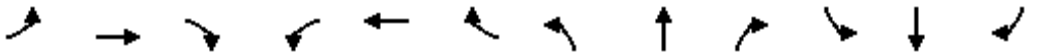


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	0	529	0	0	0	0	1584	155	35	724	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	428	0	575	0	0	0	0	1722	168	38	787	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	26.0	0.0	26.0	0.0	0.0	0.0	0.0	74.0	74.0	74.0	74.0	0.0
Total Split (%)	26.0%	0.0%	26.0%	0.0%	0.0%	0.0%	0.0%	74.0%	74.0%	74.0%	74.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	18.2		18.2					71.3	71.3	71.3	71.3	
Actuated g/C Ratio	0.18		0.18					0.71	0.71	0.71	0.71	
v/c Ratio	0.69		0.67					0.72	0.18	0.34	0.33	
Control Delay	44.1		13.5					7.6	1.2	16.5	4.1	
Queue Delay	0.0		0.0					0.8	0.0	0.0	0.0	
Total Delay	44.1		13.5					8.3	1.2	16.5	4.1	
LOS	D		B					A	A	B	A	
Approach Delay								7.7			4.6	
Approach LOS								A			A	
Queue Length 50th (ft)	130		44					137	2	3	30	
Queue Length 95th (ft)	178		103					201	m9	m50	37	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	711		923					2382	955	113	2360	
Starvation Cap Reductn	0		0					332	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	0.60		0.62					0.84	0.18	0.34	0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 8 (8%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 12.1		Intersection LOS: B	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

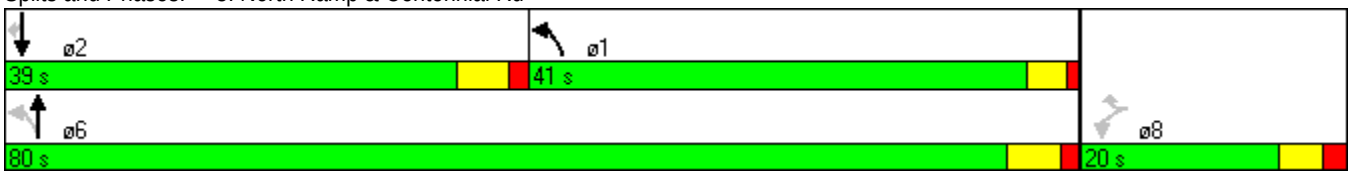


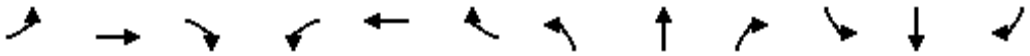
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	92	0	19	528	1502	0	0	767	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			793	
Travel Time (s)		6.1			10.6			13.1			13.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	100	0	21	574	1633	0	0	834	232
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	41.0	80.0	0.0	0.0	39.0	39.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	41.0%	80.0%	0.0%	0.0%	39.0%	39.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				9.8		9.8	83.1	82.8			43.4	43.4
Actuated g/C Ratio				0.10		0.10	0.83	0.83			0.43	0.43
v/c Ratio				0.56		0.13	0.72	0.56			0.55	0.28
Control Delay				54.1		17.3	16.7	3.4			20.9	7.1
Queue Delay				0.0		0.0	0.0	0.2			0.0	0.0
Total Delay				54.1		17.3	16.7	3.6			20.9	7.1
LOS				D		B	B	A			C	A
Approach Delay								7.0			17.9	
Approach LOS								A			B	
Queue Length 50th (ft)				62		0	106	107			232	27
Queue Length 95th (ft)				110		22	239	142			m277	m53

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			713	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		239	836	2903			1522	826
Starvation Cap Reductn				0		0	0	223			0	0
Spillback Cap Reductn				0		0	0	463			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.37		0.09	0.69	0.67			0.55	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 96 (96%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd



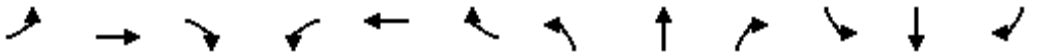


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	4	149	206	2	131	235	1866	338	80	853	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		681			921			793			1295	
Travel Time (s)		15.5			20.9			13.5			22.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	162	224	144	0	255	2395	0	87	953	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	20.0	68.0	0.0	12.0	60.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	20.0%	68.0%	0.0%	12.0%	60.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		17.6	17.6	17.6	17.6		65.1	65.1		59.9	58.8	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.65	0.65		0.60	0.59	
v/c Ratio		0.12	0.39	0.93	0.36		0.62	1.06		0.43	0.46	
Control Delay		37.6	9.2	85.2	9.8		12.9	52.8		22.1	7.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.6	9.2	85.2	9.8		12.9	52.8		22.1	7.1	
LOS		D	A	F	A		B	D		C	A	
Approach Delay		13.6			55.7			48.9			8.3	
Approach LOS		B			E			D			A	
Queue Length 50th (ft)		17	0	~148	2		57	~909		12	73	
Queue Length 95th (ft)		44	56	#300	55		93	#1028		m47	76	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		601			841			713			1215	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		245	411	242	395		474	2265		216	2074	
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		0.12	0.39	0.93	0.36		0.54	1.06		0.40	0.46	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 40 (40%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 38.0		Intersection LOS: D	
Intersection Capacity Utilization 94.9%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd

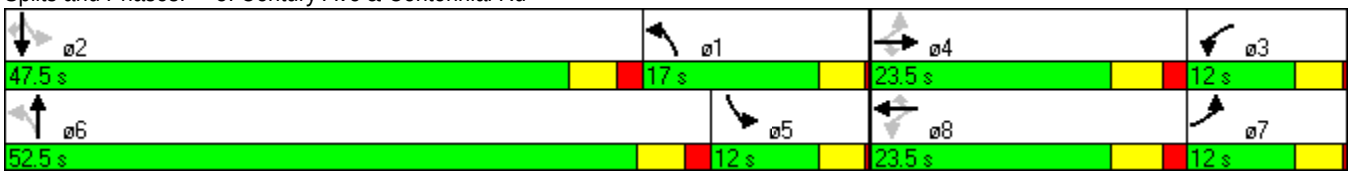


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	300	253	238	191	47	243	771	331	70	483	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		682			662			1295			520	
Travel Time (s)		13.3			12.9			22.1			8.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	326	275	259	208	51	264	1198	0	76	525	65
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	23.5	23.5	12.0	23.5	23.5	17.0	52.5	0.0	12.0	47.5	47.5
Total Split (%)	12.0%	23.5%	23.5%	12.0%	23.5%	23.5%	17.0%	52.5%	0.0%	12.0%	47.5%	47.5%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	25.5	17.8	17.8	25.5	17.8	17.8	62.5	52.7		54.5	46.8	46.8
Actuated g/C Ratio	0.26	0.18	0.18	0.26	0.18	0.18	0.62	0.53		0.54	0.47	0.47
v/c Ratio	0.32	0.52	0.54	0.49	0.33	0.16	0.45	0.66		0.33	0.32	0.08
Control Delay	30.7	40.6	8.9	33.3	37.6	11.4	3.7	6.1		17.8	17.8	4.6
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	30.7	40.6	8.9	33.3	37.6	11.4	3.7	6.1		17.8	17.8	4.6
LOS	C	D	A	C	D	B	A	A		B	B	A
Approach Delay		26.8			32.9			5.6			16.5	
Approach LOS		C			C			A			B	
Queue Length 50th (ft)	51	100	0	64	61	0	14	97		17	107	0
Queue Length 95th (ft)	93	144	70	96	96	32	m28	m137		36	155	24

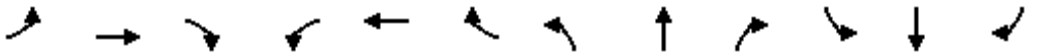
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		602			582			1215			440	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	367	630	508	600	630	324	638	1823		258	1655	775
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.29	0.52	0.54	0.43	0.33	0.16	0.41	0.66		0.29	0.32	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 54 (54%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 66.9%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix T: 2035 - Signal at Trenton & NE Loop Ramp AM (3C1)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	125	18	141	96	328	25	430	72	428	1468	328
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	156	0	153	104	357	27	467	78	465	1953	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	24.1	45.9	45.9	45.9	24.1	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	24.1%	45.9%	45.9%	45.9%	24.1%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	18.6	18.6		18.6	18.6	41.3	49.0	49.0	49.0	71.4	69.7	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.41	0.49	0.49	0.49	0.71	0.70	
v/c Ratio	0.54	0.45		0.81	0.32	0.52	0.39	0.28	0.11	0.69	0.82	
Control Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	11.2	12.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	
Total Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	11.2	12.8	
LOS	D	D		E	D	A	D	B	A	B	B	
Approach Delay		40.4			28.0			17.0			12.5	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	72	84		93	57	45	11	94	0	96	337	
Queue Length 95th (ft)	125	137		#162	101	104	#55	146	28	180	386	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	303	448		245	414	727	70	1652	715	702	2369	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	2	130	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.42	0.35		0.62	0.25	0.49	0.39	0.28	0.11	0.66	0.87	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 38 (38%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 91.0%	ICU Level of Service F
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

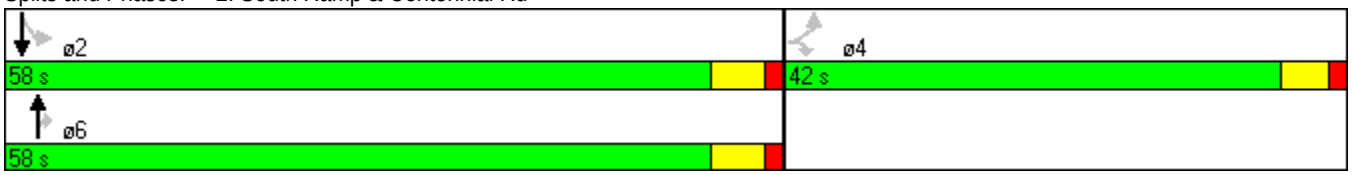
Splits and Phases: 1: Divide Ave & Bismarck Expy

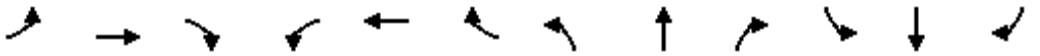
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	0	720	0	0	0	0	788	115	30	1178	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	0	783	0	0	0	0	857	125	33	1280	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	42.0	0.0	42.0	0.0	0.0	0.0	0.0	58.0	58.0	58.0	58.0	0.0
Total Split (%)	42.0%	0.0%	42.0%	0.0%	0.0%	0.0%	0.0%	58.0%	58.0%	58.0%	58.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.5		31.5					58.0	58.0	58.0	58.0	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.18		0.84					0.44	0.16	0.12	0.67	
Control Delay	24.2		37.6					12.3	3.9	7.2	10.4	
Queue Delay	0.0		0.2					0.1	0.0	0.0	0.1	
Total Delay	24.2		37.8					12.4	3.9	7.2	10.6	
LOS	C		D					B	A	A	B	
Approach Delay								11.3			10.5	
Approach LOS								B			B	
Queue Length 50th (ft)	45		238					117	5	6	180	
Queue Length 95th (ft)	66		298					163	21	m9	319	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1255		1074					1938	790	281	1920	
Starvation Cap Reductn	0		0					310	0	0	0	
Spillback Cap Reductn	0		29					0	0	0	104	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.15		0.75					0.53	0.16	0.12	0.70	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 32 (32%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 66.5%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



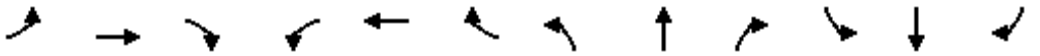


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	175	0	17	0	605	471	0	1949	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			776	
Travel Time (s)		6.1			10.6			13.1			13.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	190	0	18	0	658	512	0	2118	473
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	21.0	0.0	21.0	0.0	79.0	0.0	0.0	79.0	79.0
Total Split (%)	0.0%	0.0%	0.0%	21.0%	0.0%	21.0%	0.0%	79.0%	0.0%	0.0%	79.0%	79.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				13.6		13.6		75.8	100.0		75.8	75.8
Actuated g/C Ratio				0.14		0.14		0.76	1.00		0.76	0.76
v/c Ratio				0.77		0.08		0.25	0.32		0.80	0.36
Control Delay				61.4		16.5		2.5	0.6		2.3	0.4
Queue Delay				0.0		0.0		0.0	0.0		0.3	0.0
Total Delay				61.4		16.5		2.5	0.6		2.6	0.4
LOS				E		B		A	A		A	A
Approach Delay								1.6			2.2	
Approach LOS								A			A	
Queue Length 50th (ft)				117		0		34	0		111	2
Queue Length 95th (ft)				#193		20		40	0		m93	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			696	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				289		251		2657	1583		2657	1327
Starvation Cap Reductn				0		0		0	0		118	0
Spillback Cap Reductn				0		0		0	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.66		0.07		0.25	0.32		0.83	0.36

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 2 (2%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 4.9		Intersection LOS: A	
Intersection Capacity Utilization 71.4%		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: 3: North Ramp & Centennial Rd

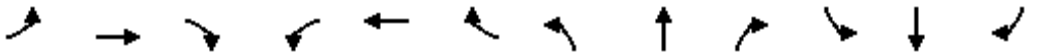


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	369	155	8	69	129	551	130	35	1871	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		709			951			776			1318	
Travel Time (s)		16.1			21.6			13.2			22.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	15	401	168	84	0	140	740	0	38	2068	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0	0.0	12.0	75.0	0.0	63.0	63.0	0.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	0.0%	12.0%	75.0%	0.0%	63.0%	63.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		20.2	20.2	20.2	20.2		71.8	71.8		60.5	60.5	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.72	0.72		0.60	0.60	
v/c Ratio		0.05	0.93	0.60	0.22		0.69	0.30		0.10	0.97	
Control Delay		32.1	55.7	45.6	11.0		40.5	4.6		4.2	13.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		32.1	55.7	45.6	11.0		40.5	4.6		4.2	13.6	
LOS		C	E	D	B		D	A		A	B	
Approach Delay		54.8			34.1			10.3			13.4	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)		8	170	97	5		16	32		4	487	
Queue Length 95th (ft)		25	#351	167	44		#111	90		m3	m192	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		629			871			696			1238	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		327	445	296	401		216	2495		390	2137	
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		0.05	0.90	0.57	0.21		0.65	0.30		0.10	0.97	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 3 (3%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 18.8		Intersection LOS: B	
Intersection Capacity Utilization 94.1%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd

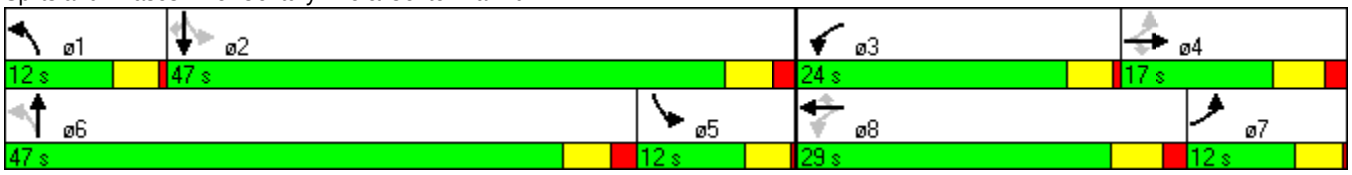


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	42	271	1158	479	63	176	386	37	40	1738	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		805			659			1318			490	
Travel Time (s)		15.7			12.8			22.5			8.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	46	295	1259	521	68	191	460	0	43	1889	170
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	17.0	17.0	24.0	29.0	29.0	12.0	47.0	0.0	12.0	47.0	47.0
Total Split (%)	12.0%	17.0%	17.0%	24.0%	29.0%	29.0%	12.0%	47.0%	0.0%	12.0%	47.0%	47.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.0	11.3	11.3	29.8	28.1	28.1	47.8	46.3		43.0	41.5	41.5
Actuated g/C Ratio	0.13	0.11	0.11	0.30	0.28	0.28	0.48	0.46		0.43	0.42	0.42
v/c Ratio	0.19	0.12	0.98	1.46	0.52	0.14	0.85	0.28		0.10	1.29	0.24
Control Delay	42.9	40.7	72.3	242.3	33.9	8.6	56.7	16.2		18.0	162.0	9.0
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	42.9	40.7	72.3	242.3	33.9	8.6	56.7	16.2		18.0	162.0	9.0
LOS	D	D	E	F	C	A	E	B		B	F	A
Approach Delay		65.7			175.0			28.1			146.7	
Approach LOS		E			F			C			F	
Queue Length 50th (ft)	20	14	104	~567	157	0	84	77		16	~810	26
Queue Length 95th (ft)	49	31	#276	#696	214	34	#204	135		36	#948	69

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		725			579			1238			410	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	184	400	301	862	995	494	226	1624		459	1469	716
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	0.18	0.12	0.98	1.46	0.52	0.14	0.85	0.28		0.09	1.29	0.24

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 72 (72%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.46	
Intersection Signal Delay: 135.6	Intersection LOS: F
Intersection Capacity Utilization 110.5%	ICU Level of Service H
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.	

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix U: 2035 - Signal at Trenton & NE Loop Ramp PM (3C2)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	58	26	112	92	410	24	854	60	270	1150	174
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	321	91	0	122	100	446	26	928	65	293	1439	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	23.0	40.0	40.0	40.0	23.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	23.0%	40.0%	40.0%	40.0%	23.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.3	28.3		28.3	28.3	50.2	40.1	40.1	40.1	61.7	60.0	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.50	0.40	0.40	0.40	0.62	0.60	
v/c Ratio	0.90	0.17		0.36	0.20	0.66	0.22	0.69	0.11	0.76	0.70	
Control Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.6	6.4	31.1	11.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	
Total Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.7	6.4	31.1	12.0	
LOS	E	C		C	C	C	C	C	A	C	B	
Approach Delay		53.0			24.1			28.2			15.2	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	188	31		59	46	167	12	277	0	103	263	
Queue Length 95th (ft)	#336	69		110	87	264	37	358	29	189	306	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	392	572		370	535	719	117	1353	592	429	2052	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	226	
Spillback Cap Reductn	0	0		0	0	0	0	32	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.16		0.33	0.19	0.62	0.22	0.70	0.11	0.68	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 24.3		Intersection LOS: C	
Intersection Capacity Utilization 79.8%		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.			

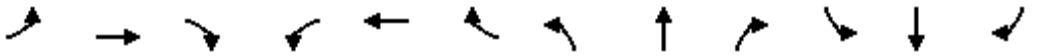
Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	0	529	0	0	0	0	1584	155	35	724	0
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	428	0	575	0	0	0	0	1722	168	38	787	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	26.0	0.0	26.0	0.0	0.0	0.0	0.0	74.0	74.0	74.0	74.0	0.0
Total Split (%)	26.0%	0.0%	26.0%	0.0%	0.0%	0.0%	0.0%	74.0%	74.0%	74.0%	74.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	18.2		18.2					71.3	71.3	71.3	71.3	
Actuated g/C Ratio	0.18		0.18					0.71	0.71	0.71	0.71	
v/c Ratio	0.69		0.67					0.72	0.18	0.34	0.33	
Control Delay	44.1		13.5					7.0	0.8	13.7	3.5	
Queue Delay	0.0		0.0					1.0	0.0	0.0	0.0	
Total Delay	44.1		13.5					8.0	0.8	13.7	3.5	
LOS	D		B					A	A	B	A	
Approach Delay								7.3			4.0	
Approach LOS								A			A	
Queue Length 50th (ft)	130		44					94	1	4	45	
Queue Length 95th (ft)	178		103					162	m5	43	68	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	711		923					2382	955	113	2360	
Starvation Cap Reductn	0		0					372	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	0.60		0.62					0.86	0.18	0.34	0.33	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 11 (11%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 11.8		Intersection LOS: B	
Intersection Capacity Utilization 62.9%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

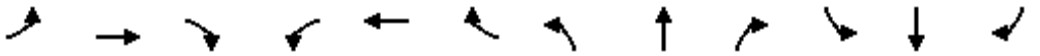


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	92	0	19	0	1502	528	0	767	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			793	
Travel Time (s)		6.1			10.6			13.1			13.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	100	0	21	0	1633	574	0	834	232
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	0.0	78.0	0.0	0.0	78.0	78.0
Total Split (%)	0.0%	0.0%	0.0%	22.0%	0.0%	22.0%	0.0%	78.0%	0.0%	0.0%	78.0%	78.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				9.8		9.8		82.8	100.0		82.8	82.8
Actuated g/C Ratio				0.10		0.10		0.83	1.00		0.83	0.83
v/c Ratio				0.56		0.13		0.56	0.36		0.29	0.17
Control Delay				54.1		17.3		4.1	0.5		3.5	1.5
Queue Delay				0.0		0.0		0.1	0.0		0.0	0.0
Total Delay				54.1		17.3		4.2	0.5		3.5	1.5
LOS				D		B		A	A		A	A
Approach Delay								3.2			3.0	
Approach LOS								A			A	
Queue Length 50th (ft)				62		0		192	0		94	12
Queue Length 95th (ft)				110		22		204	0		m118	m28

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			713	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				307		269		2903	1583		2903	1364
Starvation Cap Reductn				0		0		223	0		0	0
Spillback Cap Reductn				0		0		238	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.33		0.08		0.61	0.36		0.29	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 4.8		Intersection LOS: A	
Intersection Capacity Utilization 54.5%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

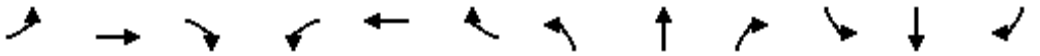


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	4	149	206	2	131	235	1866	338	80	853	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		681			921			793			1295	
Travel Time (s)		15.5			20.9			13.5			22.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	162	224	144	0	255	2395	0	87	953	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	20.0	68.0	0.0	12.0	60.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	20.0%	68.0%	0.0%	12.0%	60.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		17.6	17.6	17.6	17.6		65.1	65.1		59.9	58.8	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.65	0.65		0.60	0.59	
v/c Ratio		0.12	0.39	0.93	0.36		0.62	1.06		0.43	0.46	
Control Delay		37.6	9.2	85.2	9.8		12.5	52.0		20.7	7.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.6	9.2	85.2	9.8		12.5	52.0		20.7	7.3	
LOS		D	A	F	A		B	D		C	A	
Approach Delay		13.6			55.7			48.2			8.4	
Approach LOS		B			E			D			A	
Queue Length 50th (ft)		17	0	~148	2		31	~906		14	83	
Queue Length 95th (ft)		44	56	#300	55		69	#1029		35	88	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		601			841			713			1215	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		245	411	242	395		474	2265		216	2074	
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		0.12	0.39	0.93	0.36		0.54	1.06		0.40	0.46	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 36 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 37.5		Intersection LOS: D	
Intersection Capacity Utilization 94.9%		ICU Level of Service F	
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.			

Splits and Phases: 4: Trenton Dr & Centennial Rd

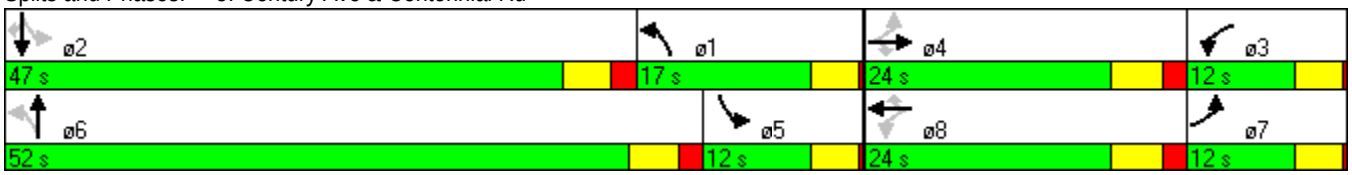


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	300	253	238	191	47	243	771	331	70	483	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		682			662			1295			520	
Travel Time (s)		13.3			12.9			22.1			8.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	326	275	259	208	51	264	1198	0	76	525	65
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	24.0	24.0	12.0	24.0	24.0	17.0	52.0	0.0	12.0	47.0	47.0
Total Split (%)	12.0%	24.0%	24.0%	12.0%	24.0%	24.0%	17.0%	52.0%	0.0%	12.0%	47.0%	47.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	25.9	18.3	18.3	25.9	18.3	18.3	62.1	52.2		54.1	46.3	46.3
Actuated g/C Ratio	0.26	0.18	0.18	0.26	0.18	0.18	0.62	0.52		0.54	0.46	0.46
v/c Ratio	0.32	0.50	0.54	0.48	0.32	0.15	0.45	0.66		0.34	0.32	0.08
Control Delay	30.3	39.9	8.7	32.7	37.1	11.2	6.7	4.6		18.4	18.1	4.6
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	30.3	39.9	8.7	32.7	37.1	11.2	6.7	4.6		18.4	18.1	4.6
LOS	C	D	A	C	D	B	A	A		B	B	A
Approach Delay		26.3			32.3			5.0			16.8	
Approach LOS		C			C			A			B	
Queue Length 50th (ft)	51	99	0	64	61	0	34	111		18	108	0
Queue Length 95th (ft)	93	144	69	95	95	32	m47	m147		36	155	24

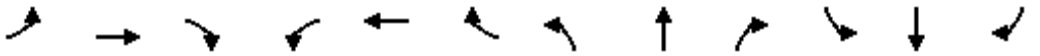
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		602			582			1215			440	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	373	648	514	612	648	331	634	1807		256	1639	768
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.29	0.50	0.54	0.42	0.32	0.15	0.42	0.66		0.30	0.32	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 56 (56%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 66.9%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix V: 2035 - Signal at Trenton & NE/SW Loop Ramps AM (3D1)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	125	18	141	96	328	25	430	72	428	1468	328
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	156	0	153	104	357	27	467	78	465	1953	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	30.0	30.0	0.0	30.0	30.0	24.1	45.9	45.9	45.9	24.1	70.0	0.0
Total Split (%)	30.0%	30.0%	0.0%	30.0%	30.0%	24.1%	45.9%	45.9%	45.9%	24.1%	70.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	18.6	18.6		18.6	18.6	41.3	49.0	49.0	49.0	71.4	69.7	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.41	0.49	0.49	0.49	0.71	0.70	
v/c Ratio	0.54	0.45		0.81	0.32	0.52	0.39	0.28	0.11	0.69	0.82	
Control Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	11.2	12.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	
Total Delay	44.2	37.3		67.7	36.4	8.5	42.6	17.5	4.9	11.2	12.9	
LOS	D	D		E	D	A	D	B	A	B	B	
Approach Delay		40.4			28.0			17.0			12.6	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	72	84		93	57	45	11	94	0	97	338	
Queue Length 95th (ft)	125	137		#162	101	104	#55	146	28	180	386	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	303	448		245	414	727	70	1652	715	702	2369	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	2	130	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.42	0.35		0.62	0.25	0.49	0.39	0.28	0.11	0.66	0.87	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 38 (38%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 17.7		Intersection LOS: B	
Intersection Capacity Utilization 91.0%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

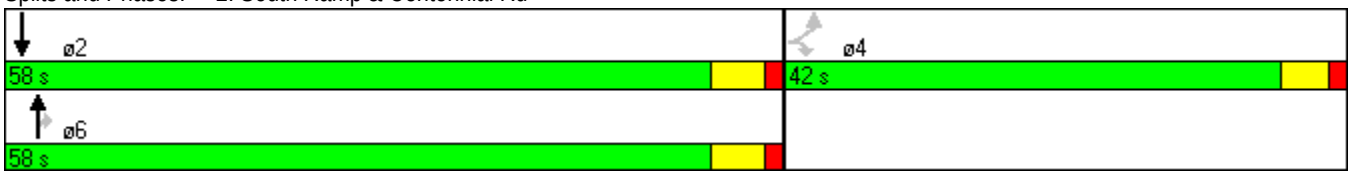
Splits and Phases: 1: Divide Ave & Bismarck Expy

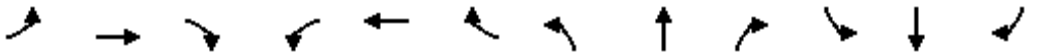
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	0	720	0	0	0	0	788	115	0	1178	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	0		222
Storage Lanes	2		2	0		0	0		1	0		1
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	0	783	0	0	0	0	857	125	0	1280	33
Turn Type	custom		custom						Perm			Free
Protected Phases								6			2	
Permitted Phases	4		4						6			Free
Detector Phase	4		4					6	6		2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0		6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4		21.4	
Total Split (s)	42.0	0.0	42.0	0.0	0.0	0.0	0.0	58.0	58.0	0.0	58.0	0.0
Total Split (%)	42.0%	0.0%	42.0%	0.0%	0.0%	0.0%	0.0%	58.0%	58.0%	0.0%	58.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9		3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5		1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min		C-Min	
Act Effct Green (s)	31.5		31.5					58.0	58.0		58.0	100.0
Actuated g/C Ratio	0.32		0.32					0.58	0.58		0.58	1.00
v/c Ratio	0.18		0.84					0.44	0.16		0.67	0.02
Control Delay	24.2		37.6					12.3	3.9		10.8	0.0
Queue Delay	0.0		0.2					0.1	0.0		0.1	0.0
Total Delay	24.2		37.8					12.4	3.9		10.9	0.0
LOS	C		D					B	A		B	A
Approach Delay								11.3			10.7	
Approach LOS								B			B	
Queue Length 50th (ft)	45		238					117	5		178	0
Queue Length 95th (ft)	66		298					163	21		318	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200									222
Base Capacity (vph)	1255		1074					1938	790		1920	1583
Starvation Cap Reductn	0		0					310	0		0	0
Spillback Cap Reductn	0		29					0	0		104	0
Storage Cap Reductn	0		0					0	0		0	0
Reduced v/c Ratio	0.15		0.75					0.53	0.16		0.70	0.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 32 (32%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 18.2		Intersection LOS: B	
Intersection Capacity Utilization 66.5%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



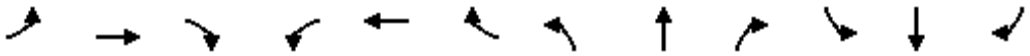


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	175	0	17	0	605	471	0	1949	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			776	
Travel Time (s)		6.1			10.6			13.1			13.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	190	0	18	0	658	512	0	2118	473
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	21.0	0.0	21.0	0.0	79.0	0.0	0.0	79.0	79.0
Total Split (%)	0.0%	0.0%	0.0%	21.0%	0.0%	21.0%	0.0%	79.0%	0.0%	0.0%	79.0%	79.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				13.6		13.6		75.8	100.0		75.8	75.8
Actuated g/C Ratio				0.14		0.14		0.76	1.00		0.76	0.76
v/c Ratio				0.77		0.08		0.25	0.32		0.80	0.36
Control Delay				61.4		16.5		2.5	0.6		2.3	0.4
Queue Delay				0.0		0.0		0.0	0.0		0.3	0.0
Total Delay				61.4		16.5		2.5	0.6		2.6	0.4
LOS				E		B		A	A		A	A
Approach Delay								1.7			2.2	
Approach LOS								A			A	
Queue Length 50th (ft)				117		0		33	0		111	2
Queue Length 95th (ft)				#193		20		38	0		m93	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			696	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				289		251		2657	1583		2657	1327
Starvation Cap Reductn				0		0		0	0		118	0
Spillback Cap Reductn				0		0		0	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.66		0.07		0.25	0.32		0.83	0.36

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 3 (3%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 4.9		Intersection LOS: A	
Intersection Capacity Utilization 71.4%		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: 3: North Ramp & Centennial Rd

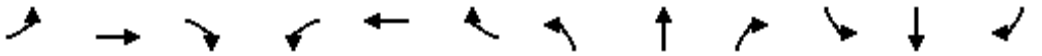


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	2	369	155	8	69	129	551	130	35	1871	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		709			951			776			1318	
Travel Time (s)		16.1			21.6			13.2			22.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	15	401	168	84	0	140	740	0	38	2068	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0	25.0	25.0	25.0	0.0	12.0	75.0	0.0	63.0	63.0	0.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	0.0%	12.0%	75.0%	0.0%	63.0%	63.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		20.2	20.2	20.2	20.2		71.8	71.8		60.5	60.5	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.72	0.72		0.60	0.60	
v/c Ratio		0.05	0.93	0.60	0.22		0.69	0.30		0.10	0.97	
Control Delay		32.1	55.7	45.6	11.0		39.8	4.4		2.5	11.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		32.1	55.7	45.6	11.0		39.8	4.4		2.5	11.5	
LOS		C	E	D	B		D	A		A	B	
Approach Delay		54.8			34.1			10.1			11.3	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)		8	170	97	5		15	30		4	339	
Queue Length 95th (ft)		25	#351	167	44		#111	85		m3	m220	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		629			871			696			1238	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		327	445	296	401		216	2495		390	2137	
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		0.05	0.90	0.57	0.21		0.65	0.30		0.10	0.97	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 4 (4%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 17.5		Intersection LOS: B	
Intersection Capacity Utilization 94.1%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd

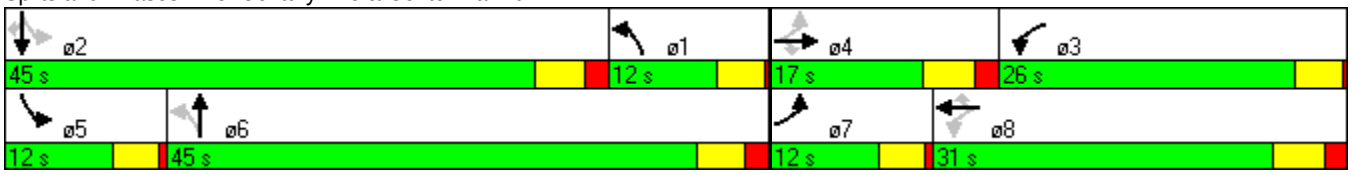


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	42	271	1158	479	63	176	386	37	40	1738	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		805			659			1318			490	
Travel Time (s)		15.7			12.8			22.5			8.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	46	295	1259	521	68	191	460	0	43	1889	170
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	17.0	17.0	26.0	31.0	31.0	12.0	45.0	0.0	12.0	45.0	45.0
Total Split (%)	12.0%	17.0%	17.0%	26.0%	31.0%	31.0%	12.0%	45.0%	0.0%	12.0%	45.0%	45.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	13.0	11.3	11.3	32.0	30.3	30.3	46.2	44.7		41.0	39.5	39.5
Actuated g/C Ratio	0.13	0.11	0.11	0.32	0.30	0.30	0.46	0.45		0.41	0.40	0.40
v/c Ratio	0.18	0.12	1.05	1.24	0.49	0.13	0.84	0.29		0.12	1.35	0.25
Control Delay	41.1	40.7	95.2	148.3	31.7	8.1	63.3	16.4		18.8	191.0	10.0
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	41.1	40.7	95.2	148.3	31.7	8.1	63.3	16.4		18.8	191.0	10.0
LOS	D	D	F	F	C	A	E	B		B	F	A
Approach Delay		83.6			110.2			30.2			172.8	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)	20	14	~136	~553	151	0	78	97		16	~835	29
Queue Length 95th (ft)	49	31	#305	#691	207	33	#219	110		38	#973	73

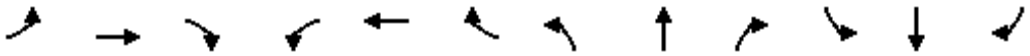
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		725			579			1238			410	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	197	400	281	1016	1071	526	227	1567		370	1398	685
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	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	0.17	0.12	1.05	1.24	0.49	0.13	0.84	0.29		0.12	1.35	0.25

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 13 (13%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.35			
Intersection Signal Delay: 124.2		Intersection LOS: F	
Intersection Capacity Utilization 110.5%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix W: 2035 - Signal at Trenton & NE/SW Loop Ramps PM (3D2)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	295	58	26	112	92	410	24	854	60	270	1150	174
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	321	91	0	122	100	446	26	928	65	293	1439	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	37.0	37.0	0.0	37.0	37.0	23.0	40.0	40.0	40.0	23.0	63.0	0.0
Total Split (%)	37.0%	37.0%	0.0%	37.0%	37.0%	23.0%	40.0%	40.0%	40.0%	23.0%	63.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.3	28.3		28.3	28.3	50.2	40.1	40.1	40.1	61.7	60.0	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.50	0.40	0.40	0.40	0.62	0.60	
v/c Ratio	0.90	0.17		0.36	0.20	0.66	0.22	0.69	0.11	0.76	0.70	
Control Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.6	6.4	31.1	11.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	
Total Delay	62.3	20.1		31.1	27.3	21.5	29.8	29.7	6.4	31.1	12.0	
LOS	E	C		C	C	C	C	C	A	C	B	
Approach Delay		53.0			24.1			28.2			15.2	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	188	31		59	46	167	12	277	0	103	263	
Queue Length 95th (ft)	#336	69		110	87	264	37	358	29	189	306	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	392	572		370	535	719	117	1353	592	429	2052	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	226	
Spillback Cap Reductn	0	0		0	0	0	0	32	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.82	0.16		0.33	0.19	0.62	0.22	0.70	0.11	0.68	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 24.3		Intersection LOS: C	
Intersection Capacity Utilization 79.8%		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.			

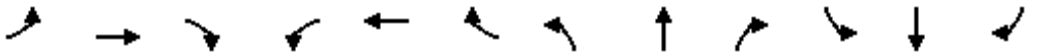
Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	0	529	0	0	0	0	1584	155	0	724	35
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	0		222
Storage Lanes	2		2	0		0	0		1	0		1
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	428	0	575	0	0	0	0	1722	168	0	787	38
Turn Type	custom		custom						Perm			Free
Protected Phases								6			2	
Permitted Phases	4		4						6			Free
Detector Phase	4		4					6	6		2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0		6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4		21.4	
Total Split (s)	26.0	0.0	26.0	0.0	0.0	0.0	0.0	74.0	74.0	0.0	74.0	0.0
Total Split (%)	26.0%	0.0%	26.0%	0.0%	0.0%	0.0%	0.0%	74.0%	74.0%	0.0%	74.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9		3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5		1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min		C-Min	
Act Effct Green (s)	18.2		18.2					71.3	71.3		71.3	100.0
Actuated g/C Ratio	0.18		0.18					0.71	0.71		0.71	1.00
v/c Ratio	0.69		0.67					0.72	0.18		0.33	0.02
Control Delay	44.1		13.5					7.0	0.8		3.5	0.0
Queue Delay	0.0		0.0					1.0	0.0		0.0	0.0
Total Delay	44.1		13.5					8.0	0.8		3.5	0.0
LOS	D		B					A	A		A	A
Approach Delay								7.3			3.4	
Approach LOS								A			A	
Queue Length 50th (ft)	130		44					94	1		45	0
Queue Length 95th (ft)	178		103					162	m5		68	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200									222
Base Capacity (vph)	711		923					2382	955		2360	1583
Starvation Cap Reductn	0		0					372	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	0.60		0.62					0.86	0.18		0.33	0.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 11 (11%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 62.9%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

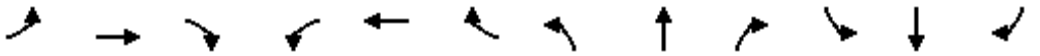


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	92	0	19	0	1502	528	0	767	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			793	
Travel Time (s)		6.1			10.6			13.1			13.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	100	0	21	0	1633	574	0	834	232
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	0.0	78.0	0.0	0.0	78.0	78.0
Total Split (%)	0.0%	0.0%	0.0%	22.0%	0.0%	22.0%	0.0%	78.0%	0.0%	0.0%	78.0%	78.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				9.8		9.8		82.8	100.0		82.8	82.8
Actuated g/C Ratio				0.10		0.10		0.83	1.00		0.83	0.83
v/c Ratio				0.56		0.13		0.56	0.36		0.29	0.17
Control Delay				54.1		17.3		4.1	0.5		3.5	1.5
Queue Delay				0.0		0.0		0.1	0.0		0.0	0.0
Total Delay				54.1		17.3		4.2	0.5		3.5	1.5
LOS				D		B		A	A		A	A
Approach Delay								3.2			3.0	
Approach LOS								A			A	
Queue Length 50th (ft)				62		0		192	0		94	12
Queue Length 95th (ft)				110		22		204	0		m118	m28

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			713	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				307		269		2903	1583		2903	1364
Starvation Cap Reductn				0		0		223	0		0	0
Spillback Cap Reductn				0		0		238	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.33		0.08		0.61	0.36		0.29	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 6 (6%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 4.8		Intersection LOS: A	
Intersection Capacity Utilization 54.5%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

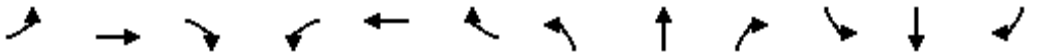


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	4	149	206	2	131	235	1866	338	80	853	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		681			921			793			1295	
Travel Time (s)		15.5			20.9			13.5			22.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	162	224	144	0	255	2395	0	87	953	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	20.0	68.0	0.0	12.0	60.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	20.0%	68.0%	0.0%	12.0%	60.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		17.6	17.6	17.6	17.6		65.1	65.1		59.9	58.8	
Actuated g/C Ratio		0.18	0.18	0.18	0.18		0.65	0.65		0.60	0.59	
v/c Ratio		0.12	0.39	0.93	0.36		0.62	1.06		0.43	0.46	
Control Delay		37.6	9.2	85.2	9.8		12.5	52.0		20.7	7.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.6	9.2	85.2	9.8		12.5	52.0		20.7	7.3	
LOS		D	A	F	A		B	D		C	A	
Approach Delay		13.6			55.7			48.2			8.4	
Approach LOS		B			E			D			A	
Queue Length 50th (ft)		17	0	~148	2		31	~906		14	83	
Queue Length 95th (ft)		44	56	#300	55		69	#1029		35	88	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		601			841			713			1215	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		245	411	242	395		474	2265		216	2074	
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		0.12	0.39	0.93	0.36		0.54	1.06		0.40	0.46	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 36 (36%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 37.5		Intersection LOS: D	
Intersection Capacity Utilization 94.9%		ICU Level of Service F	
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.			

Splits and Phases: 4: Trenton Dr & Centennial Rd

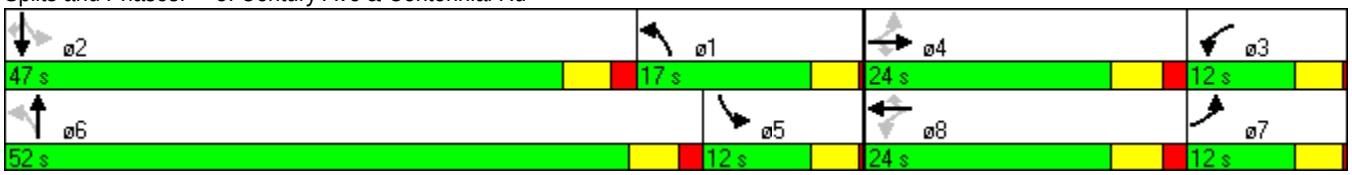


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	300	253	238	191	47	243	771	331	70	483	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		682			662			1295			520	
Travel Time (s)		13.3			12.9			22.1			8.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	326	275	259	208	51	264	1198	0	76	525	65
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	24.0	24.0	12.0	24.0	24.0	17.0	52.0	0.0	12.0	47.0	47.0
Total Split (%)	12.0%	24.0%	24.0%	12.0%	24.0%	24.0%	17.0%	52.0%	0.0%	12.0%	47.0%	47.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	25.9	18.3	18.3	25.9	18.3	18.3	62.1	52.2		54.1	46.3	46.3
Actuated g/C Ratio	0.26	0.18	0.18	0.26	0.18	0.18	0.62	0.52		0.54	0.46	0.46
v/c Ratio	0.32	0.50	0.54	0.48	0.32	0.15	0.45	0.66		0.34	0.32	0.08
Control Delay	30.3	39.9	8.7	32.7	37.1	11.2	6.7	4.6		18.4	18.1	4.6
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	30.3	39.9	8.7	32.7	37.1	11.2	6.7	4.6		18.4	18.1	4.6
LOS	C	D	A	C	D	B	A	A		B	B	A
Approach Delay		26.3			32.3			5.0			16.8	
Approach LOS		C			C			A			B	
Queue Length 50th (ft)	51	99	0	64	61	0	34	111		18	108	0
Queue Length 95th (ft)	93	144	69	95	95	32	m47	m147		36	155	24

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		602			582			1215			440	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	373	648	514	612	648	331	634	1807		256	1639	768
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	0.29	0.50	0.54	0.42	0.32	0.15	0.42	0.66		0.30	0.32	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 56 (56%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 66.9%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix X: 2059 – Existing Conditions AM (4A1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	173	25	267	182	623	34	578	97	462	1584	353
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	215	0	290	198	677	37	628	105	502	2106	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	34.0	34.0	0.0	34.0	34.0	35.4	30.6	30.6	30.6	35.4	66.0	0.0
Total Split (%)	34.0%	34.0%	0.0%	34.0%	34.0%	35.4%	30.6%	30.6%	30.6%	35.4%	66.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.0	28.0		28.0	28.0	61.3	29.0	29.0	29.0	62.0	60.3	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.61	0.29	0.29	0.29	0.62	0.60	
v/c Ratio	0.60	0.41		1.12	0.41	0.82	0.54	0.64	0.22	0.86	1.02	
Control Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.3	37.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	
Total Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.3	73.8	
LOS	D	C		F	C	C	E	D	A	C	E	
Approach Delay		35.7			50.7			33.3			65.0	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	97	108		~214	103	263	21	193	0	205	~606	
Queue Length 95th (ft)	172	176		#377	168	435	#77	259	41	m258	#885	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	291	522		259	484	878	69	978	474	634	2055	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	167	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.60	0.41		1.12	0.41	0.77	0.54	0.64	0.22	0.79	1.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 24 (24%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 54.4	Intersection LOS: D
Intersection Capacity Utilization 105.0%	ICU Level of Service G
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.	

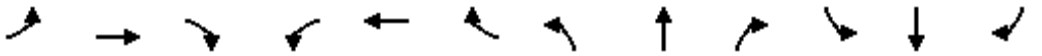
Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	0	764	0	0	0	0	926	135	39	1528	0
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	0	830	0	0	0	0	1007	147	42	1661	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	37.9	0.0	37.9	0.0	0.0	0.0	0.0	62.1	62.1	62.1	62.1	0.0
Total Split (%)	37.9%	0.0%	37.9%	0.0%	0.0%	0.0%	0.0%	62.1%	62.1%	62.1%	62.1%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.6		31.6					57.9	57.9	57.9	57.9	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.19		0.92					0.52	0.18	0.19	0.87	
Control Delay	25.1		47.6					13.3	3.1	3.2	9.2	
Queue Delay	0.0		4.5					0.2	0.0	0.0	19.7	
Total Delay	25.1		52.1					13.5	3.1	3.2	29.0	
LOS	C		D					B	A	A	C	
Approach Delay								12.1			28.3	
Approach LOS								B			C	
Queue Length 50th (ft)	47		272					177	9	4	428	
Queue Length 95th (ft)	75		#396					194	m15	m4	m226	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1115		938					1937	799	226	1919	
Starvation Cap Reductn	0		0					259	0	0	0	
Spillback Cap Reductn	0		65					0	0	0	309	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.18		0.95					0.60	0.18	0.19	1.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 28.4		Intersection LOS: C	
Intersection Capacity Utilization 106.4%		ICU Level of Service G	
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 Ramp & Centennial Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	193	0	19	447	573	0	0	2128	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			786	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	210	0	21	486	623	0	0	2313	516
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	20.0	80.0	0.0	0.0	60.0	60.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	20.0%	80.0%	0.0%	0.0%	60.0%	60.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				13.8		13.8	77.0	75.6			54.6	54.6
Actuated g/C Ratio				0.14		0.14	0.77	0.76			0.55	0.55
v/c Ratio				0.83		0.09	1.34	0.24			1.21	0.51
Control Delay				69.3		16.1	195.0	3.8			117.6	5.1
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				69.3		16.1	195.0	3.8			117.6	5.1
LOS				E		B	F	A			F	A
Approach Delay								87.6			97.1	
Approach LOS								F			F	
Queue Length 50th (ft)				130		0	~382	51			~973	91
Queue Length 95th (ft)				#244		22	#582	68			m642	m62

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			706	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		239	363	2651			1914	1011
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				0.78		0.09	1.34	0.24			1.21	0.51

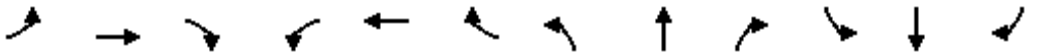
Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 76 (76%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.34			
Intersection Signal Delay: 92.8		Intersection LOS: F	
Intersection Capacity Utilization 106.4%		ICU Level of Service G	
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: 3: North Ramp & Centennial Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	2	423	177	9	80	107	595	140	22	1755	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	2	460	192	10	87	116	647	152	24	1908	32
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								786			1308	
pX, platoon unblocked	0.61	0.61	0.60	0.61	0.61	1.00	0.60			1.00		
vC, conflicting volume	2619	3003	970	1958	2942	399	1939			799		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2367	3001	0	1275	2901	398	1246			798		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	58	30	0	0	86	65			97		
cM capacity (veh/h)	0	5	656	11	6	601	335			820		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	477	192	97	116	431	368	24	1272	667
Volume Left	15	192	0	116	0	0	24	0	0
Volume Right	460	0	87	0	0	152	0	0	32
cSH	3	11	54	335	1700	1700	820	1700	1700
Volume to Capacity	166.43	17.46	1.79	0.35	0.25	0.22	0.03	0.75	0.39
Queue Length 95th (ft)	Err	Err	231	38	0	0	2	0	0
Control Delay (s)	Err	Err	539.6	21.3	0.0	0.0	9.5	0.0	0.0
Lane LOS	F	F	F	C			A		
Approach Delay (s)	Err	6834.0		2.7			0.1		
Approach LOS	F	F							

Intersection Summary				
Average Delay	1852.0			
Intersection Capacity Utilization	95.4%	ICU Level of Service		F
Analysis Period (min)	15			



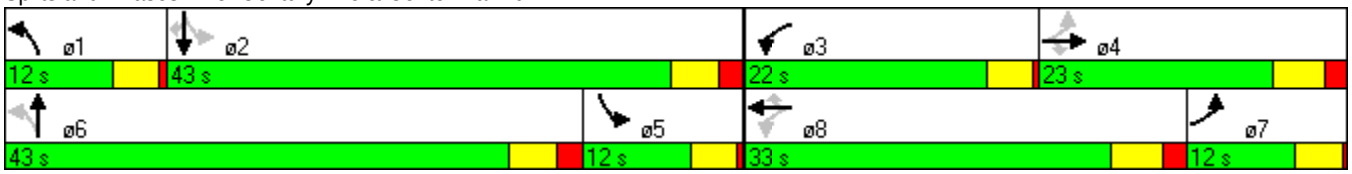
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	64	415	1147	475	62	182	399	38	44	1921	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		548			576			1308			327	
Travel Time (s)		10.7			11.2			22.3			5.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	70	451	1247	516	67	198	475	0	48	2088	188
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	23.0	23.0	22.0	33.0	33.0	12.0	43.0	0.0	12.0	43.0	43.0
Total Split (%)	12.0%	23.0%	23.0%	22.0%	33.0%	33.0%	12.0%	43.0%	0.0%	12.0%	43.0%	43.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	19.0	17.3	17.3	31.4	29.7	29.7	43.8	42.3		39.0	37.5	37.5
Actuated g/C Ratio	0.19	0.17	0.17	0.31	0.30	0.30	0.44	0.42		0.39	0.38	0.38
v/c Ratio	0.22	0.11	1.13	1.48	0.49	0.13	0.88	0.32		0.12	1.57	0.29
Control Delay	38.3	35.5	112.4	248.6	31.7	7.8	62.0	22.7		20.9	288.2	12.1
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	38.3	35.5	112.4	248.6	31.7	7.8	62.0	22.7		20.9	288.2	12.1
LOS	D	D	F	F	C	A	E	C		C	F	B
Approach Delay		96.4			178.6			34.3			260.4	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)	27	20	~250	~514	147	0	103	130		19	~1000	39
Queue Length 95th (ft)	61	40	#446	#643	200	32	#215	176		42	#1138	89

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		468			496			1228			247	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	236	612	399	844	1051	517	225	1484		419	1327	653
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	0.22	0.11	1.13	1.48	0.49	0.13	0.88	0.32		0.11	1.57	0.29

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 11 (11%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.57
Intersection Signal Delay: 187.1 Intersection LOS: F
Intersection Capacity Utilization 124.2% ICU Level of Service H
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.

Splits and Phases: 5: Century Ave & Centennial Rd



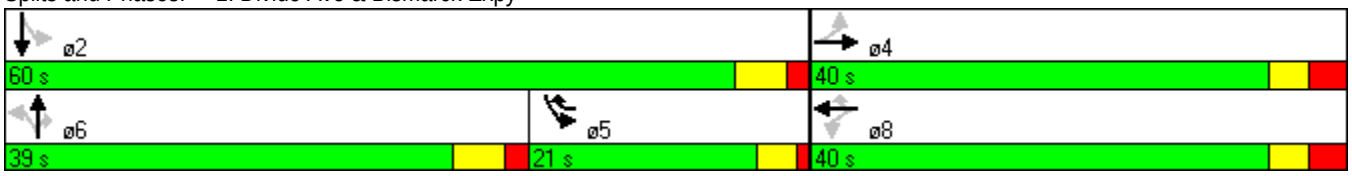
Appendix Y: 2059 – Existing Conditions PM (4A2)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	80	35	213	174	778	32	1148	81	291	1240	188
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	443	125	0	232	189	846	35	1248	88	316	1552	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	21.0	39.0	39.0	39.0	21.0	60.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	21.0%	39.0%	39.0%	39.0%	21.0%	60.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lag	Lead	Lead	Lead	Lag		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	34.0	34.0		34.0	34.0	57.0	33.3	33.3	33.3	56.0	54.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.57	0.33	0.33	0.33	0.56	0.54	
v/c Ratio	1.18	0.20		0.59	0.32	1.12	0.51	1.11	0.17	0.92	0.83	
Control Delay	136.5	19.8		34.6	26.4	93.3	56.3	95.2	9.9	64.0	21.0	
Queue Delay	12.3	0.0		0.0	0.0	10.2	0.0	6.4	0.0	0.0	1.2	
Total Delay	148.8	19.8		34.6	26.4	103.5	56.3	101.6	9.9	64.0	22.2	
LOS	F	B		C	C	F	E	F	A	E	C	
Approach Delay		120.4			79.3			94.5			29.3	
Approach LOS		F			E			F			C	
Queue Length 50th (ft)	~340	45		121	89	~624	18	~481	10	165	283	
Queue Length 95th (ft)	#531	88		204	147	#861	#66	#614	45	m#303	481	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	376	626		394	587	757	69	1124	503	345	1859	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	133	
Spillback Cap Reductn	9	0		0	0	16	0	15	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.21	0.20		0.59	0.32	1.14	0.51	1.13	0.17	0.92	0.90	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 16 (16%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 69.6	Intersection LOS: E
Intersection Capacity Utilization 115.6%	ICU Level of Service H
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: Divide Ave & Bismarck Expy

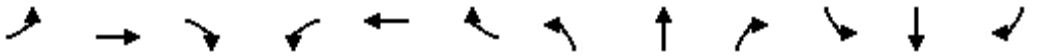


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	418	0	561	0	0	0	0	1862	182	46	939	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	454	0	610	0	0	0	0	2024	198	50	1021	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	24.0	0.0	24.0	0.0	0.0	0.0	0.0	76.0	76.0	76.0	76.0	0.0
Total Split (%)	24.0%	0.0%	24.0%	0.0%	0.0%	0.0%	0.0%	76.0%	76.0%	76.0%	76.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	17.8		17.8					71.7	71.7	71.7	71.7	
Actuated g/C Ratio	0.18		0.18					0.72	0.72	0.72	0.72	
v/c Ratio	0.75		0.83					0.84	0.20	0.72	0.43	
Control Delay	47.4		31.7					7.4	0.1	57.9	0.6	
Queue Delay	0.0		0.4					14.1	0.0	0.0	0.1	
Total Delay	47.4		32.2					21.6	0.1	57.9	0.6	
LOS	D		C					C	A	E	A	
Approach Delay								19.6			3.3	
Approach LOS								B			A	
Queue Length 50th (ft)	140		113					323	0	12	0	
Queue Length 95th (ft)	195		#193					m235	m0	m#23	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	643		760					2398	968	69	2376	
Starvation Cap Reductn	0		0					406	0	0	0	
Spillback Cap Reductn	0		18					0	0	0	216	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.71		0.82					1.02	0.20	0.72	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 92 (92%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 81.6%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

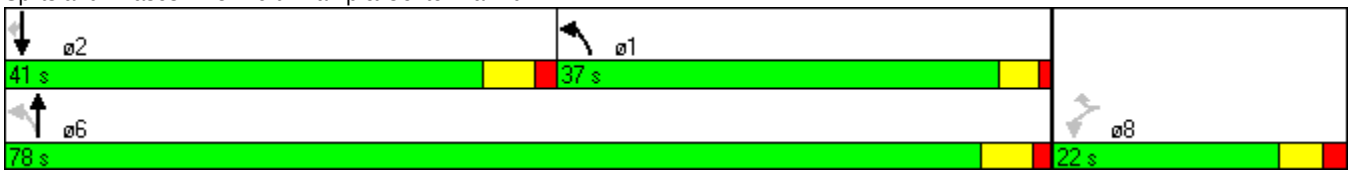


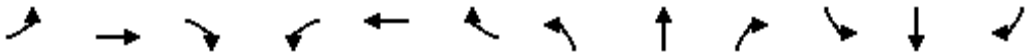
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	210	0	45	501	1424	0	0	838	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			787	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	228	0	49	545	1548	0	0	911	253
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	37.0	78.0	0.0	0.0	41.0	41.0
Total Split (%)	0.0%	0.0%	0.0%	22.0%	0.0%	22.0%	37.0%	78.0%	0.0%	0.0%	41.0%	41.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				15.2		15.2	75.6	74.2			39.7	39.7
Actuated g/C Ratio				0.15		0.15	0.76	0.74			0.40	0.40
v/c Ratio				0.82		0.18	0.80	0.60			0.66	0.32
Control Delay				64.5		12.3	27.4	6.3			26.5	4.0
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				64.5		12.3	27.4	6.3			26.5	4.0
LOS				E		B	C	A			C	A
Approach Delay								11.8			21.6	
Approach LOS								B			C	
Queue Length 50th (ft)				140		0	191	208			279	3
Queue Length 95th (ft)				#248		32	m321	231			333	m36

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			707	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				307		292	723	2601			1390	787
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				0.74		0.17	0.75	0.60			0.66	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 9 (9%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 81.6%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

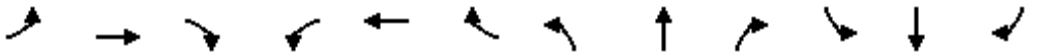




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	28	5	170	236	2	149	194	2017	365	51	800	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	5	185	257	2	162	211	2192	397	55	870	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								787			1293	
pX, platoon unblocked	0.79	0.79		0.79	0.79	0.79				0.79		
vC, conflicting volume	2673	4003	447	3361	3817	1295	893			2589		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2585	4274	447	3458	4037	835	893			2478		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	67	0	0	34	72			62		
cM capacity (veh/h)	0	1	559	0	1	245	755			144		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	221	257	164	211	1462	1128	55	580	314
Volume Left	30	257	0	211	0	0	55	0	0
Volume Right	185	0	162	0	0	397	0	0	24
cSH	0	0	55	755	1700	1700	144	1700	1700
Volume to Capacity	4673.94	Err	3.00	0.28	0.86	0.66	0.38	0.34	0.18
Queue Length 95th (ft)	Err	Err	431	29	0	0	41	0	0
Control Delay (s)	Err	Err	1058.6	11.6	0.0	0.0	44.8	0.0	0.0
Lane LOS	F	F	F	B			E		
Approach Delay (s)	Err	Err		0.9			2.6		
Approach LOS	F	F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	100.5%	ICU Level of Service	G	
Analysis Period (min)	15			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	459	387	235	189	46	252	798	343	78	534	66
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		672			603			1293			519	
Travel Time (s)		13.1			11.7			22.0			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	499	421	255	205	50	274	1240	0	85	580	72
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	21.7	21.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	13.0	25.0	25.0	13.0	25.0	25.0	20.0	50.0	0.0	12.0	42.0	42.0
Total Split (%)	13.0%	25.0%	25.0%	13.0%	25.0%	25.0%	20.0%	50.0%	0.0%	12.0%	42.0%	42.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	29.8	19.3	19.3	29.8	19.3	19.3	58.2	47.4		48.5	39.7	39.7
Actuated g/C Ratio	0.30	0.19	0.19	0.30	0.19	0.19	0.58	0.47		0.48	0.40	0.40
v/c Ratio	0.41	0.73	0.73	0.50	0.30	0.14	0.54	0.75		0.38	0.41	0.11
Control Delay	27.9	45.1	17.6	27.4	36.0	10.9	12.1	22.6		15.7	23.4	5.6
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	27.9	45.1	17.6	27.4	36.0	10.9	12.1	22.6		15.7	23.4	5.6
LOS	C	D	B	C	D	B	B	C		B	C	A
Approach Delay		31.8			29.2			20.7			20.7	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	74	158	50	59	59	0	73	355		22	138	0
Queue Length 95th (ft)	127	216	165	89	93	31	111	436		43	195	28

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		592			523			1213			439	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	403	683	573	516	684	346	540	1647		236	1406	673
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	0.73	0.73	0.49	0.30	0.14	0.51	0.75		0.36	0.41	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 80 (80%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 25.0		Intersection LOS: C	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: Century Ave & Centennial Rd

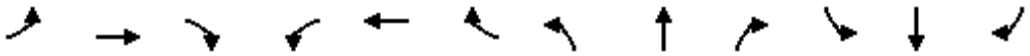
Appendix Z: 2059 - Signal at Trenton AM (4B1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	173	25	267	182	623	34	578	97	462	1584	353
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	215	0	290	198	677	37	628	105	502	2106	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	34.0	34.0	0.0	34.0	34.0	35.4	30.6	30.6	30.6	35.4	66.0	0.0
Total Split (%)	34.0%	34.0%	0.0%	34.0%	34.0%	35.4%	30.6%	30.6%	30.6%	35.4%	66.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.0	28.0		28.0	28.0	61.3	29.0	29.0	29.0	62.0	60.3	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.61	0.29	0.29	0.29	0.62	0.60	
v/c Ratio	0.60	0.41		1.12	0.41	0.82	0.54	0.64	0.22	0.86	1.02	
Control Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.3	37.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	
Total Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.3	73.8	
LOS	D	C		F	C	C	E	D	A	C	E	
Approach Delay		35.7			50.7			33.3			65.0	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	97	108		~214	103	263	21	193	0	205	~606	
Queue Length 95th (ft)	172	176		#377	168	435	#77	259	41	m258	#885	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	291	522		259	484	878	69	978	474	634	2055	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	167	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.60	0.41		1.12	0.41	0.77	0.54	0.64	0.22	0.79	1.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 76 (76%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 54.4	Intersection LOS: D
Intersection Capacity Utilization 105.0%	ICU Level of Service G
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: Divide Ave & Bismarck Expy

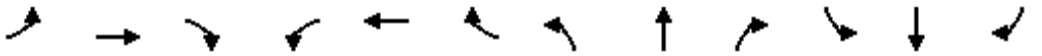


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	0	764	0	0	0	0	926	135	39	1528	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	0	830	0	0	0	0	1007	147	42	1661	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	37.9	0.0	37.9	0.0	0.0	0.0	0.0	62.1	62.1	62.1	62.1	0.0
Total Split (%)	37.9%	0.0%	37.9%	0.0%	0.0%	0.0%	0.0%	62.1%	62.1%	62.1%	62.1%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.6		31.6					57.9	57.9	57.9	57.9	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.19		0.92					0.52	0.18	0.19	0.87	
Control Delay	25.1		47.6					13.3	3.1	3.2	9.3	
Queue Delay	0.0		4.5					0.2	0.0	0.0	19.7	
Total Delay	25.1		52.1					13.5	3.1	3.2	29.0	
LOS	C		D					B	A	A	C	
Approach Delay								12.1			28.4	
Approach LOS								B			C	
Queue Length 50th (ft)	47		272					177	9	4	428	
Queue Length 95th (ft)	75		#396					194	m15	m4	m226	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1115		938					1937	799	226	1919	
Starvation Cap Reductn	0		0					259	0	0	0	
Spillback Cap Reductn	0		65					0	0	0	309	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.18		0.95					0.60	0.18	0.19	1.03	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 52 (52%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 28.4		Intersection LOS: C	
Intersection Capacity Utilization 106.4%		ICU Level of Service G	
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 Ramp & Centennial Rd

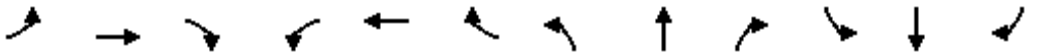


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	193	0	19	447	573	0	0	2128	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			782	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	210	0	21	486	623	0	0	2313	516
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	20.0	80.0	0.0	0.0	60.0	60.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	20.0%	80.0%	0.0%	0.0%	60.0%	60.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				13.8		13.8	77.0	75.6			54.6	54.6
Actuated g/C Ratio				0.14		0.14	0.77	0.76			0.55	0.55
v/c Ratio				0.83		0.09	1.34	0.24			1.21	0.51
Control Delay				69.3		16.1	195.0	3.8			118.8	4.6
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				69.3		16.1	195.0	3.8			118.8	4.6
LOS				E		B	F	A			F	A
Approach Delay								87.6			98.0	
Approach LOS								F			F	
Queue Length 50th (ft)				130		0	~382	51			~985	47
Queue Length 95th (ft)				#244		22	#582	68			m#1091	m67

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			702	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				270		239	363	2651			1914	1011
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				0.78		0.09	1.34	0.24			1.21	0.51

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 28 (28%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.34			
Intersection Signal Delay: 93.3		Intersection LOS: F	
Intersection Capacity Utilization 106.4%		ICU Level of Service G	
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: 3: North Ramp & Centennial Rd

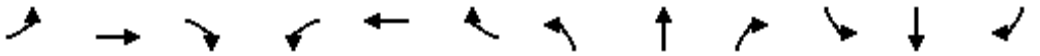


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	2	423	177	9	79	107	595	140	22	1755	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		632			937			782			1308	
Travel Time (s)		14.4			21.3			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	460	192	96	0	116	799	0	24	1940	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	23.0	23.0	23.0	23.0	23.0	0.0	12.0	77.0	0.0	65.0	65.0	0.0
Total Split (%)	23.0%	23.0%	23.0%	23.0%	23.0%	0.0%	12.0%	77.0%	0.0%	65.0%	65.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		20.4	20.4	20.4	20.4		71.6	71.6		60.7	60.7	
Actuated g/C Ratio		0.20	0.20	0.20	0.20		0.72	0.72		0.61	0.61	
v/c Ratio		0.05	1.06	0.68	0.24		0.59	0.32		0.07	0.90	
Control Delay		33.8	87.9	50.9	11.1		46.4	8.4		3.7	13.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		33.8	87.9	50.9	11.1		46.4	8.4		3.7	13.7	
LOS		C	F	D	B		D	A		A	B	
Approach Delay		85.9			37.6			13.2			13.6	
Approach LOS		F			D			B			B	
Queue Length 50th (ft)		9	~255	115	5		30	107		4	530	
Queue Length 95th (ft)		28	#457	#219	49		88	124		m3	m235	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		552			857			702			1228	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		310	435	284	398		216	2529		367	2156	
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		0.05	1.06	0.68	0.24		0.54	0.32		0.07	0.90	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 4 (4%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 24.9		Intersection LOS: C	
Intersection Capacity Utilization 95.4%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd

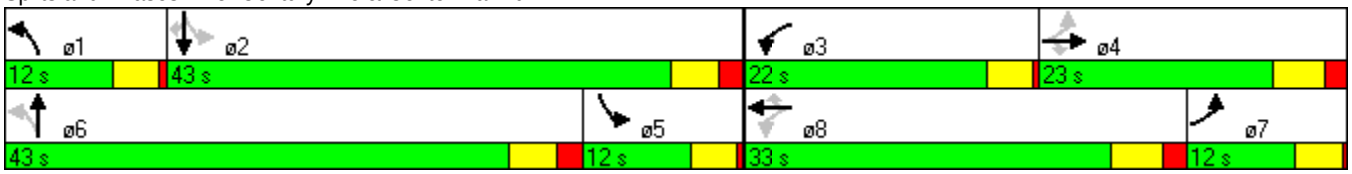


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	64	415	1147	475	62	182	399	38	44	1921	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		505			579			1308			512	
Travel Time (s)		9.8			11.3			22.3			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	70	451	1247	516	67	198	475	0	48	2088	188
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	23.0	23.0	22.0	33.0	33.0	12.0	43.0	0.0	12.0	43.0	43.0
Total Split (%)	12.0%	23.0%	23.0%	22.0%	33.0%	33.0%	12.0%	43.0%	0.0%	12.0%	43.0%	43.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	19.0	17.3	17.3	31.4	29.7	29.7	43.8	42.3		39.0	37.5	37.5
Actuated g/C Ratio	0.19	0.17	0.17	0.31	0.30	0.30	0.44	0.42		0.39	0.38	0.38
v/c Ratio	0.22	0.11	1.13	1.48	0.49	0.13	0.88	0.32		0.12	1.57	0.29
Control Delay	38.3	35.5	112.4	248.6	31.7	7.8	57.5	18.2		20.9	288.2	12.1
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	38.3	35.5	112.4	248.6	31.7	7.8	57.5	18.2		20.9	288.2	12.1
LOS	D	D	F	F	C	A	E	B		C	F	B
Approach Delay		96.4			178.6			29.8			260.4	
Approach LOS		F			F			C			F	
Queue Length 50th (ft)	27	20	~250	~514	147	0	104	132		19	~1000	39
Queue Length 95th (ft)	61	40	#446	#643	200	32	#217	181		42	#1138	89

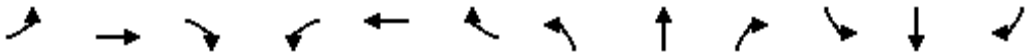
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		425			499			1228			432	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	236	612	399	844	1051	517	225	1484		419	1327	653
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.22	0.11	1.13	1.48	0.49	0.13	0.88	0.32		0.11	1.57	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 63 (63%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.57			
Intersection Signal Delay: 186.6		Intersection LOS: F	
Intersection Capacity Utilization 124.2%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix AA: 2059 - Signal at Trenton PM (4B2)

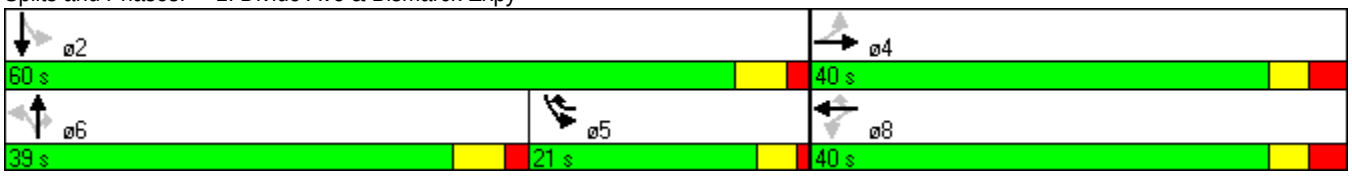


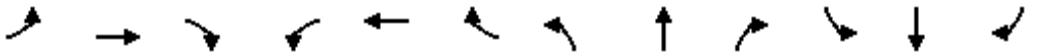
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	80	35	213	174	778	32	1148	81	291	1240	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	443	125	0	232	189	846	35	1248	88	316	1552	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	21.0	39.0	39.0	39.0	21.0	60.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	21.0%	39.0%	39.0%	39.0%	21.0%	60.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lag	Lead	Lead	Lead	Lag		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	34.0	34.0		34.0	34.0	57.0	33.3	33.3	33.3	56.0	54.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.57	0.33	0.33	0.33	0.56	0.54	
v/c Ratio	1.18	0.20		0.59	0.32	1.12	0.51	1.11	0.17	0.92	0.83	
Control Delay	136.5	19.8		34.6	26.4	93.3	56.3	95.2	9.9	65.1	22.2	
Queue Delay	12.3	0.0		0.0	0.0	10.2	0.0	6.4	0.0	0.0	1.2	
Total Delay	148.8	19.8		34.6	26.4	103.5	56.3	101.6	9.9	65.1	23.4	
LOS	F	B		C	C	F	E	F	A	E	C	
Approach Delay		120.4			79.3			94.5			30.5	
Approach LOS		F			E			F			C	
Queue Length 50th (ft)	~340	45		121	89	~624	18	~481	10	167	473	
Queue Length 95th (ft)	#531	88		204	147	#861	#66	#614	45	m#303	577	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	376	626		394	587	757	69	1124	503	345	1859	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	133	
Spillback Cap Reductn	9	0		0	0	16	0	15	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.21	0.20		0.59	0.32	1.14	0.51	1.13	0.17	0.92	0.90	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 9 (9%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.18	
Intersection Signal Delay: 70.0	Intersection LOS: E
Intersection Capacity Utilization 115.6%	ICU Level of Service H
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: Divide Ave & Bismarck Expy



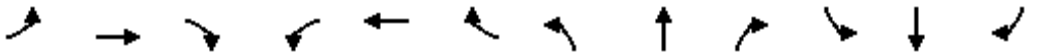


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	418	0	561	0	0	0	0	1862	182	46	939	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	454	0	610	0	0	0	0	2024	198	50	1021	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	24.0	0.0	24.0	0.0	0.0	0.0	0.0	76.0	76.0	76.0	76.0	0.0
Total Split (%)	24.0%	0.0%	24.0%	0.0%	0.0%	0.0%	0.0%	76.0%	76.0%	76.0%	76.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	17.8		17.8					71.7	71.7	71.7	71.7	
Actuated g/C Ratio	0.18		0.18					0.72	0.72	0.72	0.72	
v/c Ratio	0.75		0.83					0.84	0.20	0.72	0.43	
Control Delay	47.4		31.7					7.4	0.1	57.4	0.6	
Queue Delay	0.0		0.6					14.1	0.0	0.0	0.1	
Total Delay	47.4		32.3					21.6	0.1	57.4	0.7	
LOS	D		C					C	A	E	A	
Approach Delay								19.6			3.3	
Approach LOS								B			A	
Queue Length 50th (ft)	140		113					323	0	13	0	
Queue Length 95th (ft)	195		#193					m235	m0	m#24	0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	643		760					2398	968	69	2376	
Starvation Cap Reductn	0		0					406	0	0	0	
Spillback Cap Reductn	0		23					0	0	0	273	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.71		0.83					1.02	0.20	0.72	0.49	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 85 (85%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 81.6%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd

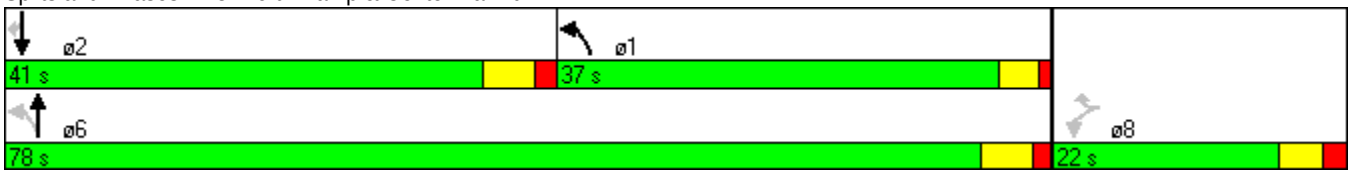


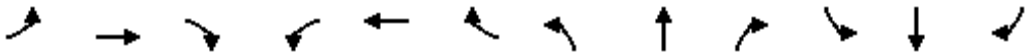
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	210	0	45	501	1424	0	0	838	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	215		0	0		200
Storage Lanes	0		0	1		1	1		0	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			788	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	228	0	49	545	1548	0	0	911	253
Turn Type				custom		custom	pm+pt					Perm
Protected Phases							1	6			2	
Permitted Phases				8		8	6					2
Detector Phase				8		8	1	6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0	5.0	10.0			10.0	10.0
Minimum Split (s)				20.0		20.0	9.0	20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	22.0	0.0	22.0	37.0	78.0	0.0	0.0	41.0	41.0
Total Split (%)	0.0%	0.0%	0.0%	22.0%	0.0%	22.0%	37.0%	78.0%	0.0%	0.0%	41.0%	41.0%
Yellow Time (s)				3.2		3.2	3.0	3.9			3.9	3.9
All-Red Time (s)				2.0		2.0	1.0	1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag							Lag				Lead	Lead
Lead-Lag Optimize?							Yes				Yes	Yes
Recall Mode				None		None	None	C-Min			C-Min	C-Min
Act Effct Green (s)				15.2		15.2	75.6	74.2			39.7	39.7
Actuated g/C Ratio				0.15		0.15	0.76	0.74			0.40	0.40
v/c Ratio				0.82		0.18	0.80	0.60			0.66	0.32
Control Delay				64.5		12.3	27.6	5.7			24.7	6.9
Queue Delay				0.0		0.0	0.0	1.4			0.0	0.0
Total Delay				64.5		12.4	27.6	7.1			24.7	6.9
LOS				E		B	C	A			C	A
Approach Delay								12.5			20.8	
Approach LOS								B			C	
Queue Length 50th (ft)				140		0	199	180			257	20
Queue Length 95th (ft)				#248		32	m318	204			m283	m52

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			708	
Turn Bay Length (ft)						150	215					200
Base Capacity (vph)				307		292	723	2601			1390	787
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		11	0	796			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.74		0.17	0.75	0.86			0.66	0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 81.6%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd



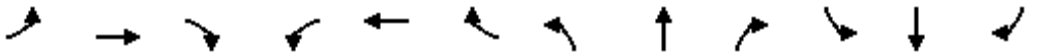


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	5	170	236	2	149	194	2017	365	51	800	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		604			932			788			1302	
Travel Time (s)		13.7			21.2			13.4			22.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	185	257	164	0	211	2589	0	55	894	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	16.0	68.0	0.0	12.0	64.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	16.0%	68.0%	0.0%	12.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		19.1	19.1	19.1	19.1		64.0	64.0		59.8	58.7	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.64	0.64		0.60	0.59	
v/c Ratio		0.13	0.41	0.98	0.40		0.51	1.16		0.28	0.43	
Control Delay		37.4	8.7	94.9	12.9		9.3	98.6		13.6	6.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	10.9		0.0	0.0	
Total Delay		37.4	8.7	94.9	12.9		9.3	109.5		13.6	6.5	
LOS		D	A	F	B		A	F		B	A	
Approach Delay		13.3			63.0			101.9			6.9	
Approach LOS		B			E			F			A	
Queue Length 50th (ft)		19	0	~184	15		36	~1055		7	58	
Queue Length 95th (ft)		48	59	#353	74		57	#1196		m13	59	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		524			852			708			1222	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		263	453	262	414		436	2228		216	2126	
Starvation Cap Reductn		0	0	0	0		0	46		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	0.41	0.98	0.40		0.48	1.19		0.25	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 40 (40%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 73.2		Intersection LOS: E	
Intersection Capacity Utilization 101.3%		ICU Level of Service G	
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: 4: Trenton Dr & Centennial Rd

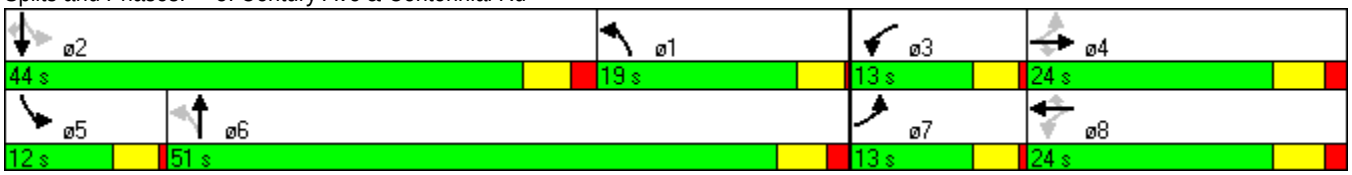


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	459	387	235	189	46	252	798	343	78	534	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		637			607			1302			516	
Travel Time (s)		12.4			11.8			22.2			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	499	421	255	205	50	274	1240	0	85	580	72
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	13.0	24.0	24.0	13.0	24.0	24.0	19.0	51.0	0.0	12.0	44.0	44.0
Total Split (%)	13.0%	24.0%	24.0%	13.0%	24.0%	24.0%	19.0%	51.0%	0.0%	12.0%	44.0%	44.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	28.8	18.3	18.3	28.9	18.3	18.3	49.7	48.2		40.2	38.7	38.7
Actuated g/C Ratio	0.29	0.18	0.18	0.29	0.18	0.18	0.50	0.48		0.40	0.39	0.39
v/c Ratio	0.42	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.41	0.42	0.11
Control Delay	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
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	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
LOS	C	D	B	C	D	B	A	A		C	C	A
Approach Delay		32.0			30.2			7.4			22.1	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	76	161	30	60	60	0	59	200		34	140	0
Queue Length 95th (ft)	129	218	136	91	94	32	m55	m162		65	188	27

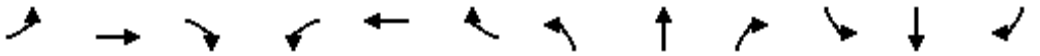
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		557			527			1222			436	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	391	648	589	495	649	332	546	1674		217	1369	656
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.41	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.39	0.42	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 65 (65%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix BB: 2059 - Signal at Trenton & NE Loop Ramp AM (4C1)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	173	25	267	182	623	34	578	97	462	1584	353
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	215	0	290	198	677	37	628	105	502	2106	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	34.0	34.0	0.0	34.0	34.0	35.4	30.6	30.6	30.6	35.4	66.0	0.0
Total Split (%)	34.0%	34.0%	0.0%	34.0%	34.0%	35.4%	30.6%	30.6%	30.6%	35.4%	66.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.0	28.0		28.0	28.0	61.3	29.0	29.0	29.0	62.0	60.3	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.61	0.29	0.29	0.29	0.62	0.60	
v/c Ratio	0.60	0.41		1.12	0.41	0.82	0.54	0.64	0.22	0.86	1.02	
Control Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.5	37.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	
Total Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.5	74.5	
LOS	D	C		F	C	C	E	D	A	C	E	
Approach Delay		35.7			50.7			33.3			65.7	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	97	108		~214	103	263	21	193	0	205	~606	
Queue Length 95th (ft)	172	176		#377	168	435	#77	259	41	m258	#885	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	291	522		259	484	878	69	978	474	634	2055	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	167	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.60	0.41		1.12	0.41	0.77	0.54	0.64	0.22	0.79	1.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 48 (48%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 54.7	Intersection LOS: D
Intersection Capacity Utilization 105.0%	ICU Level of Service G
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.	

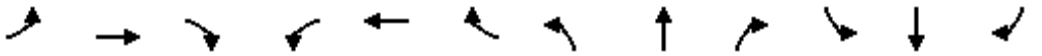
Splits and Phases: 1: Divide Ave & Bismarck Expy

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	0	764	0	0	0	0	926	135	39	1528	0
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	0	830	0	0	0	0	1007	147	42	1661	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	37.9	0.0	37.9	0.0	0.0	0.0	0.0	62.1	62.1	62.1	62.1	0.0
Total Split (%)	37.9%	0.0%	37.9%	0.0%	0.0%	0.0%	0.0%	62.1%	62.1%	62.1%	62.1%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	31.6		31.6					57.9	57.9	57.9	57.9	
Actuated g/C Ratio	0.32		0.32					0.58	0.58	0.58	0.58	
v/c Ratio	0.19		0.92					0.52	0.18	0.19	0.87	
Control Delay	25.1		47.6					13.3	3.1	6.6	14.8	
Queue Delay	0.0		4.5					0.2	0.0	0.0	20.2	
Total Delay	25.1		52.1					13.5	3.1	6.6	35.0	
LOS	C		D					B	A	A	C	
Approach Delay								12.1			34.3	
Approach LOS								B			C	
Queue Length 50th (ft)	47		272					177	9	9	373	
Queue Length 95th (ft)	75		#396					194	m15	m9	503	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1115		938					1937	799	226	1919	
Starvation Cap Reductn	0		0					259	0	0	0	
Spillback Cap Reductn	0		65					0	0	0	311	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.18		0.95					0.60	0.18	0.19	1.03	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 24 (24%), Referenced to phase 2:SBTL and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 31.0	Intersection LOS: C
Intersection Capacity Utilization 77.7%	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: 2: South Ramp & Centennial Rd

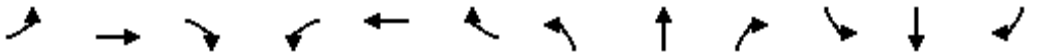


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	193	0	19	0	573	447	0	2128	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			782	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	210	0	21	0	623	486	0	2313	516
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	0.0	80.0	0.0	0.0	80.0	80.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	0.0%	80.0%	0.0%	0.0%	80.0%	80.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				13.8		13.8		75.6	100.0		75.6	75.6
Actuated g/C Ratio				0.14		0.14		0.76	1.00		0.76	0.76
v/c Ratio				0.83		0.09		0.24	0.31		0.87	0.39
Control Delay				69.3		16.1		5.4	0.5		5.2	0.6
Queue Delay				0.0		0.0		0.0	0.0		0.5	0.0
Total Delay				69.3		16.1		5.4	0.5		5.7	0.6
LOS				E		B		A	A		A	A
Approach Delay								3.2			4.8	
Approach LOS								A			A	
Queue Length 50th (ft)				130		0		81	0		177	3
Queue Length 95th (ft)				#244		22		102	0		m161	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			702	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				270		239		2651	1583		2651	1335
Starvation Cap Reductn				0		0		0	0		93	0
Spillback Cap Reductn				0		0		0	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.78		0.09		0.24	0.31		0.90	0.39

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 93 (93%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 7.7		Intersection LOS: A	
Intersection Capacity Utilization 77.3%		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: 3: North Ramp & Centennial Rd

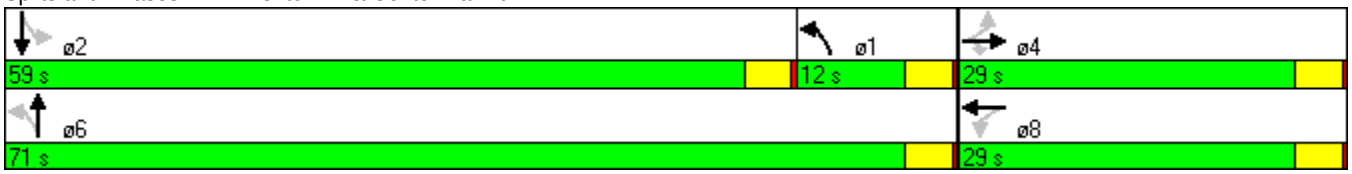


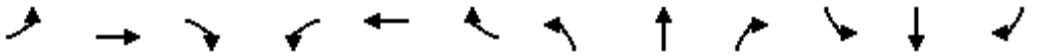
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	2	423	177	9	79	107	595	140	22	1755	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		632			937			782			1308	
Travel Time (s)		14.4			21.3			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	460	192	96	0	116	799	0	24	1940	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0	0.0	12.0	71.0	0.0	59.0	59.0	0.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%	0.0%	12.0%	71.0%	0.0%	59.0%	59.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		23.9	23.9	23.9	23.9		68.1	68.1		57.2	57.2	
Actuated g/C Ratio		0.24	0.24	0.24	0.24		0.68	0.68		0.57	0.57	
v/c Ratio		0.05	0.94	0.58	0.21		0.59	0.34		0.07	0.96	
Control Delay		28.9	53.8	40.9	9.4		34.0	4.6		4.6	13.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		28.9	53.8	40.9	9.4		34.0	4.6		4.6	13.0	
LOS		C	D	D	A		C	A		A	B	
Approach Delay		52.9			30.4			8.4			12.9	
Approach LOS		D			C			A			B	
Queue Length 50th (ft)		8	201	106	5		24	38		4	335	
Queue Length 95th (ft)		26	#396	180	45		66	68		m3	m215	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		552			857			702			1228	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		387	509	350	471		216	2365		336	2021	
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		0.04	0.90	0.55	0.20		0.54	0.34		0.07	0.96	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 98 (98%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 95.4%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd



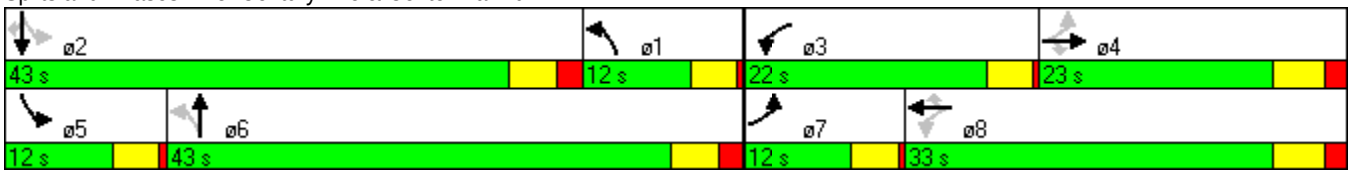


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	64	415	1147	475	62	182	399	38	44	1921	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		505			579			1308			512	
Travel Time (s)		9.8			11.3			22.3			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	70	451	1247	516	67	198	475	0	48	2088	188
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	23.0	23.0	22.0	33.0	33.0	12.0	43.0	0.0	12.0	43.0	43.0
Total Split (%)	12.0%	23.0%	23.0%	22.0%	33.0%	33.0%	12.0%	43.0%	0.0%	12.0%	43.0%	43.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	26.0	17.3	17.3	41.0	30.2	30.2	44.0	42.5		39.0	37.5	37.5
Actuated g/C Ratio	0.26	0.17	0.17	0.41	0.30	0.30	0.44	0.42		0.39	0.38	0.38
v/c Ratio	0.18	0.11	1.17	1.13	0.48	0.13	0.88	0.32		0.14	1.57	0.29
Control Delay	20.7	35.5	130.3	98.9	31.3	7.8	63.8	14.1		20.3	288.2	12.1
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	20.7	35.5	130.3	98.9	31.3	7.8	63.8	14.1		20.3	288.2	12.1
LOS	C	D	F	F	C	A	E	B		C	F	B
Approach Delay		109.0			76.5			28.7			260.4	
Approach LOS		F			E			C			F	
Queue Length 50th (ft)	19	20	~271	~445	145	0	75	80		19	~1000	39
Queue Length 95th (ft)	43	40	#467	#608	200	32	#231	100		42	#1138	89

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		425			499			1228			432	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	305	612	384	1101	1068	525	226	1490		345	1327	653
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	0.17	0.11	1.17	1.13	0.48	0.13	0.88	0.32		0.14	1.57	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 5 (5%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.57			
Intersection Signal Delay: 153.1		Intersection LOS: F	
Intersection Capacity Utilization 124.2%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



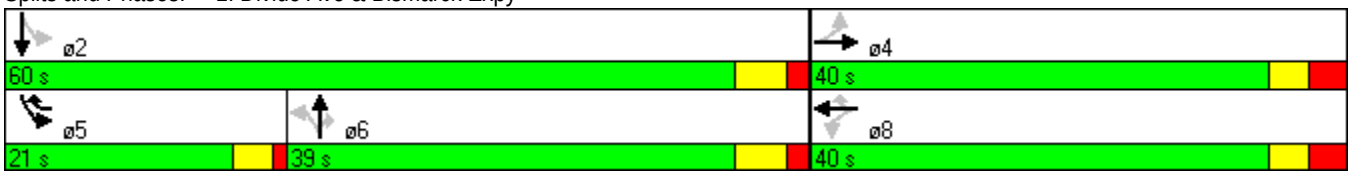
Appendix CC: 2059 - Signal at Trenton & NE Loop Ramp PM (4C2)

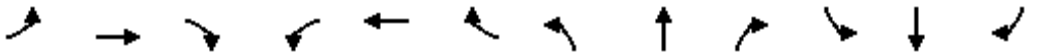
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	80	35	213	174	778	32	1148	81	291	1240	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	443	125	0	232	189	846	35	1248	88	316	1552	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	21.0	39.0	39.0	39.0	21.0	60.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	21.0%	39.0%	39.0%	39.0%	21.0%	60.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	34.0	34.0		34.0	34.0	57.0	33.3	33.3	33.3	56.0	54.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.57	0.33	0.33	0.33	0.56	0.54	
v/c Ratio	1.18	0.20		0.59	0.32	1.12	0.51	1.11	0.17	0.91	0.83	
Control Delay	136.5	19.8		34.6	26.4	93.3	56.3	95.2	9.9	50.3	17.4	
Queue Delay	0.0	0.0		0.0	0.0	16.9	0.0	0.0	0.0	0.0	1.2	
Total Delay	136.5	19.8		34.6	26.4	110.1	56.3	95.2	9.9	50.3	18.6	
LOS	F	B		C	C	F	E	F	A	D	B	
Approach Delay		110.8			83.8			88.7			23.9	
Approach LOS		F			F			F			C	
Queue Length 50th (ft)	~340	45		121	89	~624	18	~481	10	128	362	
Queue Length 95th (ft)	#531	88		204	147	#861	#66	#614	45	m#285	412	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	376	626		394	587	757	69	1124	503	348	1859	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	133	
Spillback Cap Reductn	0	0		0	0	26	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.18	0.20		0.59	0.32	1.16	0.51	1.11	0.17	0.91	0.90	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 20 (20%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.18			
Intersection Signal Delay: 66.1		Intersection LOS: E	
Intersection Capacity Utilization 115.6%		ICU Level of Service H	
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: Divide Ave & Bismarck Expy



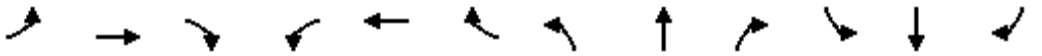


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	418	0	561	0	0	0	0	1862	182	46	939	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	454	0	610	0	0	0	0	2024	198	50	1021	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	24.0	0.0	24.0	0.0	0.0	0.0	0.0	76.0	76.0	76.0	76.0	0.0
Total Split (%)	24.0%	0.0%	24.0%	0.0%	0.0%	0.0%	0.0%	76.0%	76.0%	76.0%	76.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	17.8		17.8					71.7	71.7	71.7	71.7	
Actuated g/C Ratio	0.18		0.18					0.72	0.72	0.72	0.72	
v/c Ratio	0.75		0.83					0.84	0.20	0.72	0.43	
Control Delay	47.4		31.7					8.6	0.8	67.1	7.6	
Queue Delay	0.0		0.7					12.2	0.0	0.0	0.1	
Total Delay	47.4		32.4					20.8	0.8	67.1	7.6	
LOS	D		C					C	A	E	A	
Approach Delay								19.0			10.4	
Approach LOS								B			B	
Queue Length 50th (ft)	140		113					327	3	17	110	
Queue Length 95th (ft)	195		#193					m275	m0	m#98	122	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	643		760					2398	968	69	2376	
Starvation Cap Reductn	0		0					393	0	0	0	
Spillback Cap Reductn	0		26					0	0	0	301	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.71		0.83					1.01	0.20	0.72	0.49	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 92 (92%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 21.7		Intersection LOS: C	
Intersection Capacity Utilization 71.2%		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 Ramp & Centennial Rd

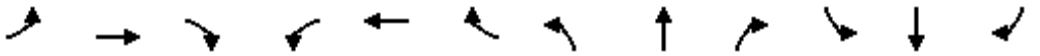


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	210	0	45	0	1424	501	0	838	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			788	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	228	0	49	0	1548	545	0	911	253
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	29.0	0.0	29.0	0.0	71.0	0.0	0.0	71.0	71.0
Total Split (%)	0.0%	0.0%	0.0%	29.0%	0.0%	29.0%	0.0%	71.0%	0.0%	0.0%	71.0%	71.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				16.8		16.8		72.6	100.0		72.6	72.6
Actuated g/C Ratio				0.17		0.17		0.73	1.00		0.73	0.73
v/c Ratio				0.75		0.17		0.61	0.34		0.36	0.21
Control Delay				53.9		12.0		6.1	0.3		6.4	2.2
Queue Delay				0.0		0.0		0.2	0.0		0.0	0.0
Total Delay				53.9		12.0		6.3	0.3		6.4	2.2
LOS				D		B		A	A		A	A
Approach Delay								4.7			5.5	
Approach LOS								A			A	
Queue Length 50th (ft)				140		2		142	0		121	16
Queue Length 95th (ft)				205		31		276	m0		m145	m31

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			708	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				435		391		2545	1583		2545	1230
Starvation Cap Reductn				0		0		0	0		0	0
Spillback Cap Reductn				0		4		318	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.52		0.13		0.70	0.34		0.36	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 8.3		Intersection LOS: A	
Intersection Capacity Utilization 58.8%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

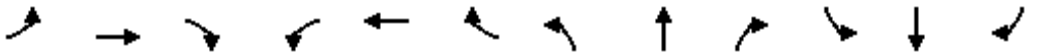


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	5	170	236	2	149	194	2017	365	51	800	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		604			932			788			1302	
Travel Time (s)		13.7			21.2			13.4			22.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	185	257	164	0	211	2589	0	55	894	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	16.0	68.0	0.0	12.0	64.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	16.0%	68.0%	0.0%	12.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		19.1	19.1	19.1	19.1		64.0	64.0		59.8	58.7	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.64	0.64		0.60	0.59	
v/c Ratio		0.13	0.41	0.98	0.40		0.51	1.16		0.28	0.43	
Control Delay		37.4	8.7	94.9	12.9		8.5	95.0		13.6	6.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.4	8.7	94.9	12.9		8.5	95.0		13.6	6.5	
LOS		D	A	F	B		A	F		B	A	
Approach Delay		13.3			63.0			88.5			6.9	
Approach LOS		B			E			F			A	
Queue Length 50th (ft)		19	0	~184	15		23	~1030		7	58	
Queue Length 95th (ft)		48	59	#353	74		37	#1170		m13	59	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		524			852			708			1222	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		263	453	262	414		436	2228		216	2126	
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	0.41	0.98	0.40		0.48	1.16		0.25	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 39 (39%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 64.6		Intersection LOS: E	
Intersection Capacity Utilization 101.3%		ICU Level of Service G	
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: 4: Trenton Dr & Centennial Rd

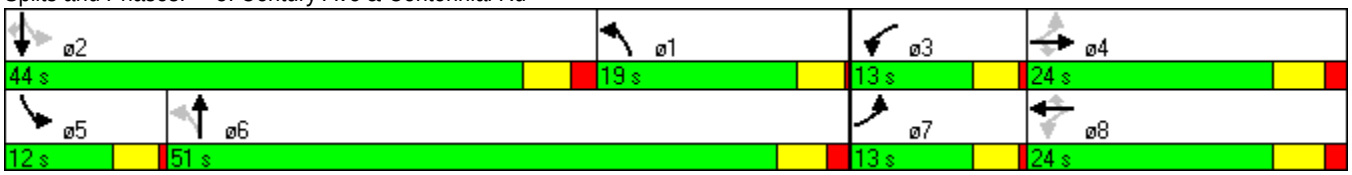


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	459	387	235	189	46	252	798	343	78	534	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		637			607			1302			516	
Travel Time (s)		12.4			11.8			22.2			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	499	421	255	205	50	274	1240	0	85	580	72
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	13.0	24.0	24.0	13.0	24.0	24.0	19.0	51.0	0.0	12.0	44.0	44.0
Total Split (%)	13.0%	24.0%	24.0%	13.0%	24.0%	24.0%	19.0%	51.0%	0.0%	12.0%	44.0%	44.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	28.8	18.3	18.3	28.9	18.3	18.3	49.7	48.2		40.2	38.7	38.7
Actuated g/C Ratio	0.29	0.18	0.18	0.29	0.18	0.18	0.50	0.48		0.40	0.39	0.39
v/c Ratio	0.42	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.41	0.42	0.11
Control Delay	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
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	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
LOS	C	D	B	C	D	B	A	A		C	C	A
Approach Delay		32.0			30.2			7.4			22.1	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	76	161	30	60	60	0	59	200		34	140	0
Queue Length 95th (ft)	129	218	136	91	94	32	m55	m161		65	188	27

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		557			527			1222			436	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	391	648	589	495	649	332	546	1674		217	1369	656
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	0.41	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.39	0.42	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 64 (64%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



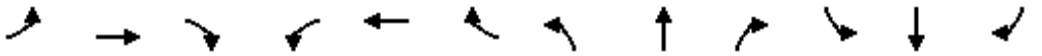
Appendix DD: 2059 - Signal at Trenton & NE/SW Loop Ramps AM (4D1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	173	25	267	182	623	34	578	97	462	1584	353
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	215	0	290	198	677	37	628	105	502	2106	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	34.0	34.0	0.0	34.0	34.0	35.4	30.6	30.6	30.6	35.4	66.0	0.0
Total Split (%)	34.0%	34.0%	0.0%	34.0%	34.0%	35.4%	30.6%	30.6%	30.6%	35.4%	66.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	28.0	28.0		28.0	28.0	61.3	29.0	29.0	29.0	62.0	60.3	
Actuated g/C Ratio	0.28	0.28		0.28	0.28	0.61	0.29	0.29	0.29	0.62	0.60	
v/c Ratio	0.60	0.41		1.12	0.41	0.82	0.54	0.64	0.22	0.86	1.02	
Control Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.5	37.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	
Total Delay	41.3	31.2		127.6	32.4	23.2	65.0	35.8	7.4	28.5	74.6	
LOS	D	C		F	C	C	E	D	A	C	E	
Approach Delay		35.7			50.7			33.3			65.7	
Approach LOS		D			D			C			E	
Queue Length 50th (ft)	97	108		~214	103	263	21	193	0	205	~605	
Queue Length 95th (ft)	172	176		#377	168	435	#77	259	41	m258	#885	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	291	522		259	484	878	69	978	474	634	2055	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	167	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.60	0.41		1.12	0.41	0.77	0.54	0.64	0.22	0.79	1.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 44 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 54.7	Intersection LOS: D
Intersection Capacity Utilization 105.0%	ICU Level of Service G
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: Divide Ave & Bismarck Expy

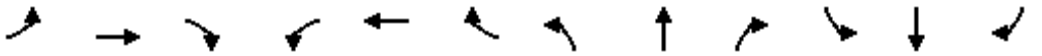


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	0	764	0	0	0	0	926	135	0	1528	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	0		222
Storage Lanes	2		2	0		0	0		1	0		1
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	0	830	0	0	0	0	1007	147	0	1661	42
Turn Type	custom		custom						Perm			Free
Protected Phases								6			2	
Permitted Phases	4		4						6			Free
Detector Phase	4		4					6	6		2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0		6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4		21.4	
Total Split (s)	38.0	0.0	38.0	0.0	0.0	0.0	0.0	62.0	62.0	0.0	62.0	0.0
Total Split (%)	38.0%	0.0%	38.0%	0.0%	0.0%	0.0%	0.0%	62.0%	62.0%	0.0%	62.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9		3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5		1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min		C-Min	
Act Effct Green (s)	31.6		31.6					57.9	57.9		57.9	100.0
Actuated g/C Ratio	0.32		0.32					0.58	0.58		0.58	1.00
v/c Ratio	0.19		0.92					0.52	0.18		0.87	0.03
Control Delay	25.0		47.5					13.3	3.1		14.8	0.0
Queue Delay	0.0		4.2					0.2	0.0		20.6	0.0
Total Delay	25.0		51.7					13.5	3.1		35.4	0.0
LOS	C		D					B	A		D	A
Approach Delay								12.1			34.6	
Approach LOS								B			C	
Queue Length 50th (ft)	47		272					177	9		373	0
Queue Length 95th (ft)	74		#395					194	m15		503	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200									222
Base Capacity (vph)	1119		940					1935	798		1917	1583
Starvation Cap Reductn	0		0					257	0		0	0
Spillback Cap Reductn	0		64					0	0		311	0
Storage Cap Reductn	0		0					0	0		0	0
Reduced v/c Ratio	0.18		0.95					0.60	0.18		1.03	0.03

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 20 (20%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 31.1	Intersection LOS: C
Intersection Capacity Utilization 77.7%	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: 2: South Ramp & Centennial Rd

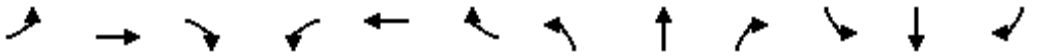


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	193	0	19	0	573	447	0	2128	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			782	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	210	0	21	0	623	486	0	2313	516
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	20.0	0.0	20.0	0.0	80.0	0.0	0.0	80.0	80.0
Total Split (%)	0.0%	0.0%	0.0%	20.0%	0.0%	20.0%	0.0%	80.0%	0.0%	0.0%	80.0%	80.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				13.8		13.8		75.6	100.0		75.6	75.6
Actuated g/C Ratio				0.14		0.14		0.76	1.00		0.76	0.76
v/c Ratio				0.83		0.09		0.24	0.31		0.87	0.39
Control Delay				69.3		16.1		5.4	0.5		5.2	0.6
Queue Delay				0.0		0.0		0.0	0.0		0.5	0.0
Total Delay				69.3		16.1		5.4	0.5		5.7	0.6
LOS				E		B		A	A		A	A
Approach Delay								3.2			4.8	
Approach LOS								A			A	
Queue Length 50th (ft)				130		0		81	0		177	3
Queue Length 95th (ft)				#244		22		102	0		m161	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			702	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				270		239		2651	1583		2651	1335
Starvation Cap Reductn				0		0		0	0		93	0
Spillback Cap Reductn				0		0		0	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.78		0.09		0.24	0.31		0.90	0.39

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 89 (89%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 7.7		Intersection LOS: A	
Intersection Capacity Utilization 77.3%		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: 3: North Ramp & Centennial Rd

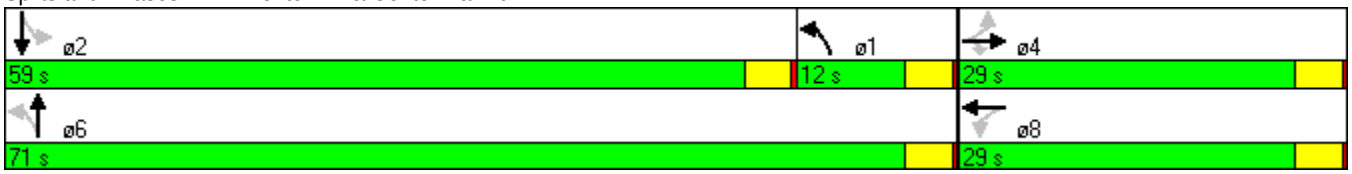


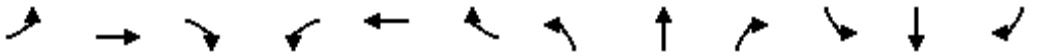
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	2	423	177	9	79	107	595	140	22	1755	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		632			937			782			1308	
Travel Time (s)		14.4			21.3			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	460	192	96	0	116	799	0	24	1940	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	29.0	29.0	29.0	29.0	29.0	0.0	12.0	71.0	0.0	59.0	59.0	0.0
Total Split (%)	29.0%	29.0%	29.0%	29.0%	29.0%	0.0%	12.0%	71.0%	0.0%	59.0%	59.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		23.9	23.9	23.9	23.9		68.1	68.1		57.2	57.2	
Actuated g/C Ratio		0.24	0.24	0.24	0.24		0.68	0.68		0.57	0.57	
v/c Ratio		0.05	0.94	0.58	0.21		0.59	0.34		0.07	0.96	
Control Delay		28.9	53.8	40.9	9.4		34.0	4.6		4.6	13.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		28.9	53.8	40.9	9.4		34.0	4.6		4.6	13.0	
LOS		C	D	D	A		C	A		A	B	
Approach Delay		52.9			30.4			8.4			12.9	
Approach LOS		D			C			A			B	
Queue Length 50th (ft)		8	201	106	5		24	38		4	335	
Queue Length 95th (ft)		26	#396	180	45		66	68		m3	m215	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		552			857			702			1228	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		387	509	350	471		216	2365		336	2021	
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		0.04	0.90	0.55	0.20		0.54	0.34		0.07	0.96	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 94 (94%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 95.4%		ICU Level of Service F	
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: 4: Trenton Dr & Centennial Rd



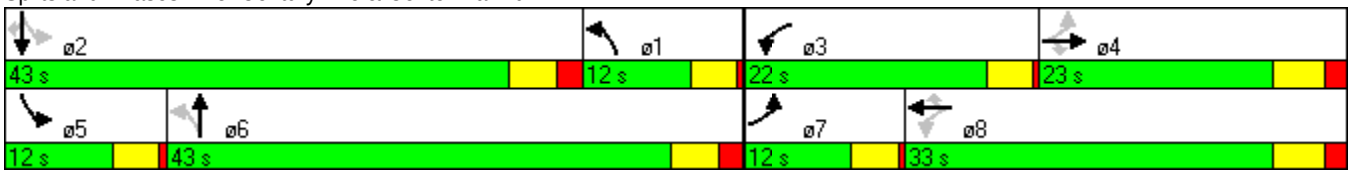


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	64	415	1147	475	62	182	399	38	44	1921	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		505			579			1308			512	
Travel Time (s)		9.8			11.3			22.3			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	70	451	1247	516	67	198	475	0	48	2088	188
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	12.0	23.0	23.0	22.0	33.0	33.0	12.0	43.0	0.0	12.0	43.0	43.0
Total Split (%)	12.0%	23.0%	23.0%	22.0%	33.0%	33.0%	12.0%	43.0%	0.0%	12.0%	43.0%	43.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	26.0	17.3	17.3	41.0	30.2	30.2	44.0	42.5		39.0	37.5	37.5
Actuated g/C Ratio	0.26	0.17	0.17	0.41	0.30	0.30	0.44	0.42		0.39	0.38	0.38
v/c Ratio	0.18	0.11	1.17	1.13	0.48	0.13	0.88	0.32		0.14	1.57	0.29
Control Delay	20.7	35.5	130.3	98.9	31.3	7.8	63.8	14.1		20.3	288.2	12.1
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	20.7	35.5	130.3	98.9	31.3	7.8	63.8	14.1		20.3	288.2	12.1
LOS	C	D	F	F	C	A	E	B		C	F	B
Approach Delay		109.0			76.5			28.7			260.4	
Approach LOS		F			E			C			F	
Queue Length 50th (ft)	19	20	~271	~445	145	0	75	80		19	~1000	39
Queue Length 95th (ft)	43	40	#467	#608	200	32	#231	100		42	#1138	89

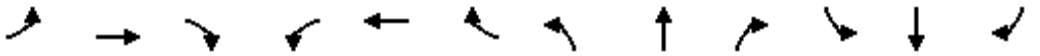
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		425			499			1228			432	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	305	612	384	1101	1068	525	226	1490		345	1327	653
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	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	0.17	0.11	1.17	1.13	0.48	0.13	0.88	0.32		0.14	1.57	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 1 (1%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.57			
Intersection Signal Delay: 153.1		Intersection LOS: F	
Intersection Capacity Utilization 124.2%		ICU Level of Service H	
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.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix EE: 2059 - Signal at Trenton & NE/SW Loop Ramps PM (4D2)

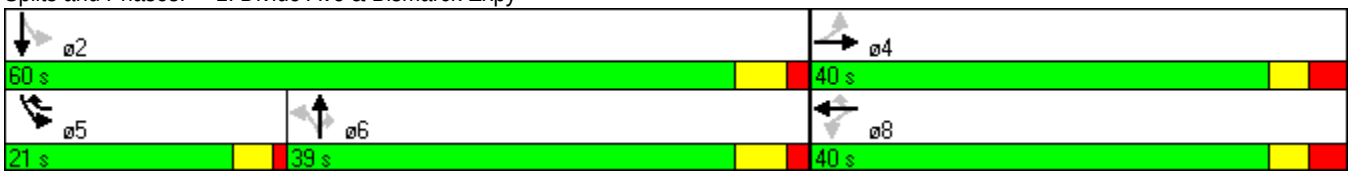


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	80	35	213	174	778	32	1148	81	291	1240	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	443	125	0	232	189	846	35	1248	88	316	1552	0
Turn Type	Perm			Perm		pm+ov	Perm		Perm	pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6		6	2		
Detector Phase	4	4		8	8	5	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0	6.0	5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9	22.9	9.8	28.7	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	21.0	39.0	39.0	39.0	21.0	60.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	21.0%	39.0%	39.0%	39.0%	21.0%	60.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9	3.9	3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8	1.8	1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	5.7	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min	C-Min	None	C-Min	
Act Effct Green (s)	34.0	34.0		34.0	34.0	57.0	33.3	33.3	33.3	56.0	54.3	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.57	0.33	0.33	0.33	0.56	0.54	
v/c Ratio	1.18	0.20		0.59	0.32	1.12	0.51	1.11	0.17	0.91	0.83	
Control Delay	136.5	19.8		34.6	26.4	93.3	56.3	95.2	9.9	50.3	17.4	
Queue Delay	0.0	0.0		0.0	0.0	16.9	0.0	0.0	0.0	0.0	1.2	
Total Delay	136.5	19.8		34.6	26.4	110.1	56.3	95.2	9.9	50.3	18.6	
LOS	F	B		C	C	F	E	F	A	D	B	
Approach Delay		110.8			83.8			88.7			23.9	
Approach LOS		F			F			F			C	
Queue Length 50th (ft)	~340	45		121	89	~624	18	~481	10	128	362	
Queue Length 95th (ft)	#531	88		204	147	#861	#66	#614	45	m#285	412	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400		200	400		
Base Capacity (vph)	376	626		394	587	757	69	1124	503	348	1859	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	133	
Spillback Cap Reductn	0	0		0	0	26	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	1.18	0.20		0.59	0.32	1.16	0.51	1.11	0.17	0.91	0.90	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 20 (20%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.18			
Intersection Signal Delay: 66.1		Intersection LOS: E	
Intersection Capacity Utilization 115.6%		ICU Level of Service H	
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: Divide Ave & Bismarck Expy

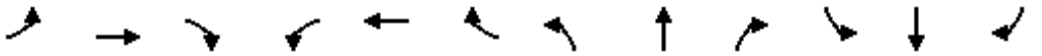


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	418	0	561	0	0	0	0	1862	182	0	939	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	0		222
Storage Lanes	2		2	0		0	0		1	0		1
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	454	0	610	0	0	0	0	2024	198	0	1021	50
Turn Type	custom		custom						Perm			Free
Protected Phases								6			2	
Permitted Phases	4		4						6			Free
Detector Phase	4		4					6	6		2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0		6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4		21.4	
Total Split (s)	24.0	0.0	24.0	0.0	0.0	0.0	0.0	76.0	76.0	0.0	76.0	0.0
Total Split (%)	24.0%	0.0%	24.0%	0.0%	0.0%	0.0%	0.0%	76.0%	76.0%	0.0%	76.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9		3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5		1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	4.0	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min		C-Min	
Act Effct Green (s)	17.8		17.8					71.7	71.7		71.7	100.0
Actuated g/C Ratio	0.18		0.18					0.72	0.72		0.72	1.00
v/c Ratio	0.75		0.83					0.84	0.20		0.43	0.03
Control Delay	47.4		31.7					8.6	0.8		7.6	0.0
Queue Delay	0.0		0.7					12.2	0.0		0.1	0.0
Total Delay	47.4		32.4					20.8	0.8		7.6	0.0
LOS	D		C					C	A		A	A
Approach Delay								19.0			7.3	
Approach LOS								B			A	
Queue Length 50th (ft)	140		113					327	3		110	0
Queue Length 95th (ft)	195		#193					m275	m0		122	m0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200									222
Base Capacity (vph)	643		760					2398	968		2376	1583
Starvation Cap Reductn	0		0					393	0		0	0
Spillback Cap Reductn	0		26					0	0		301	0
Storage Cap Reductn	0		0					0	0		0	0
Reduced v/c Ratio	0.71		0.83					1.01	0.20		0.49	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 92 (92%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 21.0		Intersection LOS: C	
Intersection Capacity Utilization 71.2%		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 Ramp & Centennial Rd

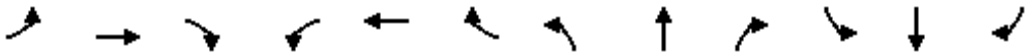


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	210	0	45	0	1424	501	0	838	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			788	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	228	0	49	0	1548	545	0	911	253
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	29.0	0.0	29.0	0.0	71.0	0.0	0.0	71.0	71.0
Total Split (%)	0.0%	0.0%	0.0%	29.0%	0.0%	29.0%	0.0%	71.0%	0.0%	0.0%	71.0%	71.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				16.8		16.8		72.6	100.0		72.6	72.6
Actuated g/C Ratio				0.17		0.17		0.73	1.00		0.73	0.73
v/c Ratio				0.75		0.17		0.61	0.34		0.36	0.21
Control Delay				53.9		12.0		6.1	0.3		6.4	2.2
Queue Delay				0.0		0.0		0.2	0.0		0.0	0.0
Total Delay				53.9		12.0		6.3	0.3		6.4	2.2
LOS				D		B		A	A		A	A
Approach Delay								4.7			5.5	
Approach LOS								A			A	
Queue Length 50th (ft)				140		2		142	0		121	16
Queue Length 95th (ft)				205		31		276	m0		m145	m31

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			708	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				435		391		2545	1583		2545	1230
Starvation Cap Reductn				0		0		0	0		0	0
Spillback Cap Reductn				0		4		318	0		0	0
Storage Cap Reductn				0		0		0	0		0	0
Reduced v/c Ratio				0.52		0.13		0.70	0.34		0.36	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 12 (12%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 8.3		Intersection LOS: A	
Intersection Capacity Utilization 58.8%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

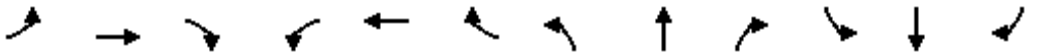


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	5	170	236	2	149	194	2017	365	51	800	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		604			932			788			1302	
Travel Time (s)		13.7			21.2			13.4			22.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	185	257	164	0	211	2589	0	55	894	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	0.0	16.0	68.0	0.0	12.0	64.0	0.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	20.0%	0.0%	16.0%	68.0%	0.0%	12.0%	64.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		19.1	19.1	19.1	19.1		64.0	64.0		59.8	58.7	
Actuated g/C Ratio		0.19	0.19	0.19	0.19		0.64	0.64		0.60	0.59	
v/c Ratio		0.13	0.41	0.98	0.40		0.51	1.16		0.28	0.43	
Control Delay		37.4	8.7	94.9	12.9		8.5	95.0		13.6	6.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		37.4	8.7	94.9	12.9		8.5	95.0		13.6	6.5	
LOS		D	A	F	B		A	F		B	A	
Approach Delay		13.3			63.0			88.5			6.9	
Approach LOS		B			E			F			A	
Queue Length 50th (ft)		19	0	~184	15		23	~1030		7	58	
Queue Length 95th (ft)		48	59	#353	74		37	#1170		m13	59	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		524			852			708			1222	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		263	453	262	414		436	2228		216	2126	
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	0.41	0.98	0.40		0.48	1.16		0.25	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 39 (39%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 64.6		Intersection LOS: E	
Intersection Capacity Utilization 101.3%		ICU Level of Service G	
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: 4: Trenton Dr & Centennial Rd

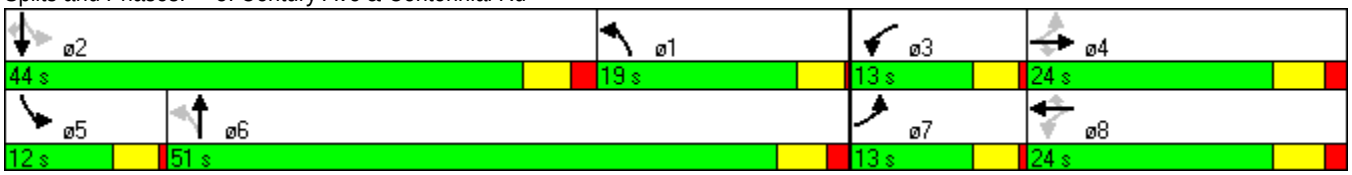


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	459	387	235	189	46	252	798	343	78	534	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		637			607			1302			516	
Travel Time (s)		12.4			11.8			22.2			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	499	421	255	205	50	274	1240	0	85	580	72
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	6.0
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	11.5
Total Split (s)	13.0	24.0	24.0	13.0	24.0	24.0	19.0	51.0	0.0	12.0	44.0	44.0
Total Split (%)	13.0%	24.0%	24.0%	13.0%	24.0%	24.0%	19.0%	51.0%	0.0%	12.0%	44.0%	44.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	3.6
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	1.9
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	5.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	C-Max
Act Effct Green (s)	28.8	18.3	18.3	28.9	18.3	18.3	49.7	48.2		40.2	38.7	38.7
Actuated g/C Ratio	0.29	0.18	0.18	0.29	0.18	0.18	0.50	0.48		0.40	0.39	0.39
v/c Ratio	0.42	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.41	0.42	0.11
Control Delay	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
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	28.9	47.9	14.4	28.5	37.0	11.2	9.4	6.9		25.0	23.7	5.3
LOS	C	D	B	C	D	B	A	A		C	C	A
Approach Delay		32.0			30.2			7.4			22.1	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	76	161	30	60	60	0	59	200		34	140	0
Queue Length 95th (ft)	129	218	136	91	94	32	m55	m161		65	188	27

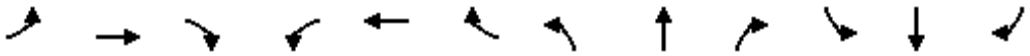
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		557			527			1222			436	
Turn Bay Length (ft)	215		215	215		215	215			215		215
Base Capacity (vph)	391	648	589	495	649	332	546	1674		217	1369	656
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	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	0.41	0.77	0.71	0.52	0.32	0.15	0.50	0.74		0.39	0.42	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 64 (64%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix FF: 2059 - Signal at Trenton & NE Loop Ramp 6-Lane AM (4C1-6)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	173	25	267	182	623	34	578	97	462	1584	353
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	215	0	290	198	677	37	733	0	502	2106	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	4	4		8	8	5	6	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0		5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9		9.8	28.7	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	33.0	27.0	27.0	0.0	33.0	60.0	0.0
Total Split (%)	40.0%	40.0%	0.0%	40.0%	40.0%	33.0%	27.0%	27.0%	0.0%	33.0%	60.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9		3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8		1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	4.0	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag		Lead		
Lead-Lag Optimize?						Yes	Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	32.0	32.0		32.0	32.0	65.0	25.3	25.3		58.0	56.3	
Actuated g/C Ratio	0.32	0.32		0.32	0.32	0.65	0.25	0.25		0.58	0.56	
v/c Ratio	0.51	0.36		0.94	0.36	0.78	0.54	0.61		0.90	0.76	
Control Delay	33.1	26.5		73.6	27.7	18.9	67.6	35.4		37.6	11.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.3	
Total Delay	33.1	26.5		73.6	27.7	18.9	67.6	35.4		37.6	12.0	
LOS	C	C		E	C	B	E	D		D	B	
Approach Delay		29.5			34.0			37.0			16.9	
Approach LOS		C			C			D			B	
Queue Length 50th (ft)	87	97		173	93	232	22	153		180	220	
Queue Length 95th (ft)	154	159		#332	153	389	#77	198		#406	247	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400			400		
Base Capacity (vph)	364	633		326	587	894	69	1206		582	2768	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	191	
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	0.34		0.89	0.34	0.76	0.54	0.61		0.86	0.82	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 44 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 25.1		Intersection LOS: C	
Intersection Capacity Utilization 88.4%		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.			

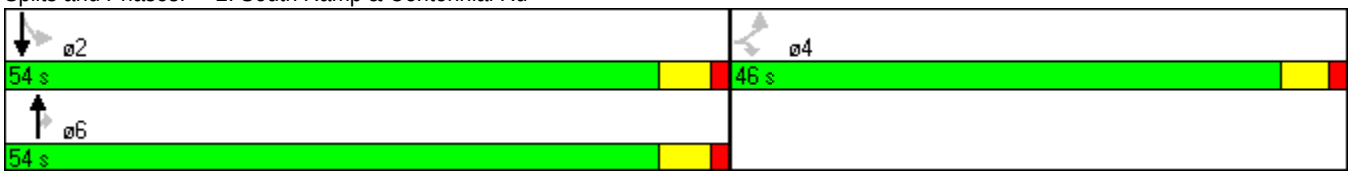
Splits and Phases: 1: Divide Ave & Bismarck Expy

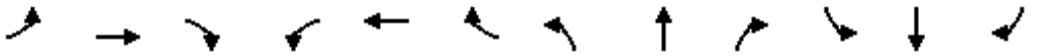
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	188	0	764	0	0	0	0	926	135	39	1528	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	204	0	830	0	0	0	0	1007	147	42	1661	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	46.0	0.0	46.0	0.0	0.0	0.0	0.0	54.0	54.0	54.0	54.0	0.0
Total Split (%)	46.0%	0.0%	46.0%	0.0%	0.0%	0.0%	0.0%	54.0%	54.0%	54.0%	54.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	35.2		35.2					54.3	54.3	54.3	54.3	
Actuated g/C Ratio	0.35		0.35					0.54	0.54	0.54	0.54	
v/c Ratio	0.17		0.84					0.39	0.19	0.19	0.64	
Control Delay	21.7		37.1					13.2	3.6	9.1	12.7	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	21.7		37.1					13.2	3.6	9.1	12.7	
LOS	C		D					B	A	A	B	
Approach Delay								12.0			12.6	
Approach LOS								B			B	
Queue Length 50th (ft)	44		263					120	9	9	253	
Queue Length 95th (ft)	64		322					145	m20	m15	259	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	1391		1150					2608	758	226	2584	
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	0.15		0.72					0.39	0.19	0.19	0.64	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 22 (22%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 65.0%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: South Ramp & Centennial Rd



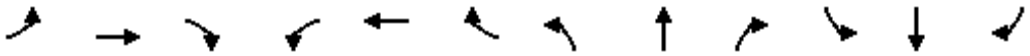


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	193	0	19	0	573	447	0	2128	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			782	
Travel Time (s)		6.1			10.6			13.1			13.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	210	0	21	0	623	486	0	2313	516
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	28.0	0.0	28.0	0.0	72.0	0.0	0.0	72.0	72.0
Total Split (%)	0.0%	0.0%	0.0%	28.0%	0.0%	28.0%	0.0%	72.0%	0.0%	0.0%	72.0%	72.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				15.8		15.8		73.6	100.0		73.6	73.6
Actuated g/C Ratio				0.16		0.16		0.74	1.00		0.74	0.74
v/c Ratio				0.73		0.08		0.17	0.31		0.62	0.39
Control Delay				54.2		13.8		4.9	1.1		3.6	0.8
Queue Delay				0.0		0.0		0.0	0.0		0.0	0.0
Total Delay				54.2		13.8		4.9	1.1		3.6	0.8
LOS				D		B		A	A		A	A
Approach Delay								3.2			3.1	
Approach LOS								A			A	
Queue Length 50th (ft)				129		0		54	14		101	3
Queue Length 95th (ft)				193		20		69	34		115	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			702	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				416		357		3706	1583		3706	1313
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				0.50		0.06		0.17	0.31		0.62	0.39

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 90 (90%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 5.7		Intersection LOS: A	
Intersection Capacity Utilization 59.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 3: North Ramp & Centennial Rd

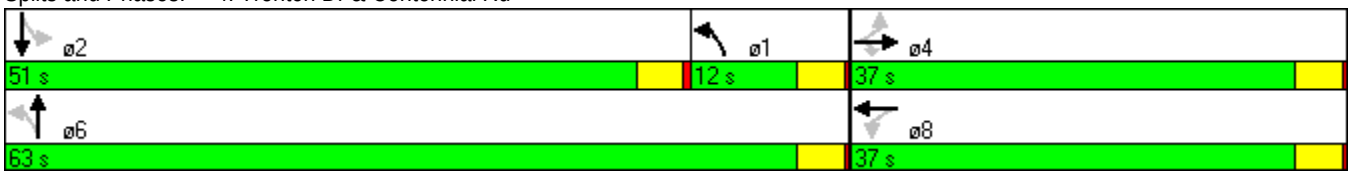


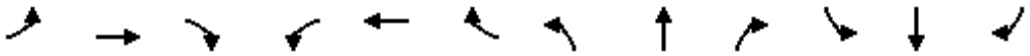
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	2	423	177	9	79	107	595	140	22	1755	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		632			937			782			1308	
Travel Time (s)		14.4			21.3			13.3			22.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	17	460	192	96	0	116	799	0	24	1940	0
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			8		1	6			2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		20.0	20.0	
Total Split (s)	37.0	37.0	37.0	37.0	37.0	0.0	12.0	63.0	0.0	51.0	51.0	0.0
Total Split (%)	37.0%	37.0%	37.0%	37.0%	37.0%	0.0%	12.0%	63.0%	0.0%	51.0%	51.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)		25.5	25.5	25.5	25.5		66.5	66.5		55.7	55.7	
Actuated g/C Ratio		0.26	0.26	0.26	0.26		0.66	0.66		0.56	0.56	
v/c Ratio		0.04	0.88	0.54	0.20		0.60	0.24		0.07	0.69	
Control Delay		24.6	40.4	36.6	7.8		38.4	6.4		6.4	9.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		24.6	40.4	36.6	7.8		38.4	6.4		6.4	9.0	
LOS		C	D	D	A		D	A		A	A	
Approach Delay		39.8			27.0			10.4			9.0	
Approach LOS		D			C			B			A	
Queue Length 50th (ft)		8	186	104	5		12	24		4	177	
Queue Length 95th (ft)		23	293	159	39		83	69		m4	m180	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		552			857			702			1228	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		508	631	459	590		216	3314		336	2829	
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		0.03	0.73	0.42	0.16		0.54	0.24		0.07	0.69	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 96 (96%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 14.8		Intersection LOS: B	
Intersection Capacity Utilization 80.6%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Trenton Dr & Centennial Rd





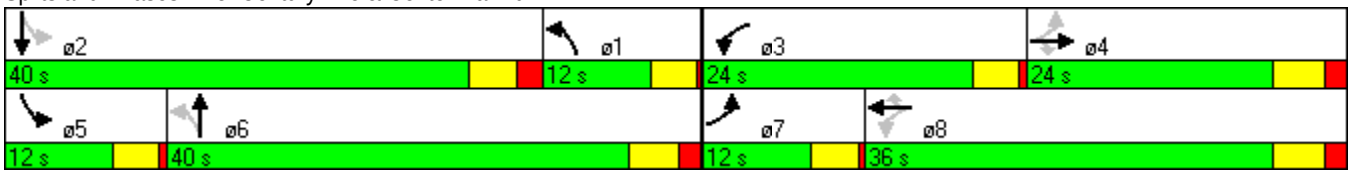
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	64	415	1147	475	62	182	399	38	44	1921	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		505			579			1308			512	
Travel Time (s)		9.8			11.3			22.3			8.7	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	70	451	1247	516	67	198	475	0	48	2276	0
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	
Total Split (s)	12.0	24.0	24.0	24.0	36.0	36.0	12.0	40.0	0.0	12.0	40.0	0.0
Total Split (%)	12.0%	24.0%	24.0%	24.0%	36.0%	36.0%	12.0%	40.0%	0.0%	12.0%	40.0%	0.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	
Act Effct Green (s)	27.0	18.3	18.3	44.0	33.2	33.2	41.0	39.5		36.0	34.5	
Actuated g/C Ratio	0.27	0.18	0.18	0.44	0.33	0.33	0.41	0.40		0.36	0.34	
v/c Ratio	0.17	0.11	1.12	1.04	0.44	0.12	0.88	0.24		0.15	1.31	
Control Delay	19.1	34.6	111.3	64.6	28.4	7.1	62.4	12.9		22.3	171.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	19.1	34.6	111.3	64.6	28.4	7.1	62.4	12.9		22.3	171.4	
LOS	B	C	F	E	C	A	E	B		C	F	
Approach Delay		93.7			52.3			27.5			168.3	
Approach LOS		F			D			C			F	
Queue Length 50th (ft)	18	20	~259	~377	138	0	76	57		20	~688	
Queue Length 95th (ft)	40	40	#455	#576	191	30	#206	58		44	#786	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		425			499			1228			432	
Turn Bay Length (ft)	215		215	215		215	215			215		
Base Capacity (vph)	313	648	401	1195	1176	571	226	1991		340	1744	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.16	0.11	1.12	1.04	0.44	0.12	0.88	0.24		0.14	1.31	

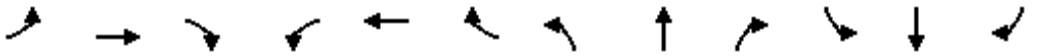
Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 98 (98%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.31
Intersection Signal Delay: 103.5 Intersection LOS: F
Intersection Capacity Utilization 112.1% ICU Level of Service H
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.

Splits and Phases: 5: Century Ave & Centennial Rd



Appendix GG: 2059 - Signal at Trenton & NE Loop Ramp 6-Lane PM (4C2-6)

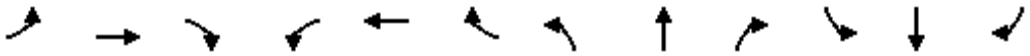


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	408	80	35	213	174	778	32	1148	81	291	1240	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	150		0	110		100	400		200	400		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	100		25	100		100	100		150	100		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			40			40	
Link Distance (ft)		371			341			614			458	
Travel Time (s)		10.1			9.3			10.5			7.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	1%	1%	11%	10%	22%	10%	7%	17%	11%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	443	125	0	232	189	846	35	1336	0	316	1552	0
Turn Type	Perm			Perm		pm+ov	Perm			pm+pt		
Protected Phases		4			8	5		6		5	2	
Permitted Phases	4			8		8	6			2		
Detector Phase	4	4		8	8	5	6	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	5.0	6.0	6.0		5.0	6.0	
Minimum Split (s)	30.0	30.0		30.0	30.0	9.8	22.9	22.9		9.8	28.7	
Total Split (s)	41.0	41.0	0.0	41.0	41.0	26.0	33.0	33.0	0.0	26.0	59.0	0.0
Total Split (%)	41.0%	41.0%	0.0%	41.0%	41.0%	26.0%	33.0%	33.0%	0.0%	26.0%	59.0%	0.0%
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.9	3.9		3.0	3.9	
All-Red Time (s)	3.0	3.0		3.0	3.0	1.0	1.8	1.8		1.0	1.8	
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	0.0
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	4.0	5.7	5.7	4.0	4.0	5.7	4.0
Lead/Lag						Lead	Lag	Lag		Lead		
Lead-Lag Optimize?						Yes	Yes	Yes		Yes		
Recall Mode	None	None		None	None	None	C-Min	C-Min		None	C-Min	
Act Effct Green (s)	35.0	35.0		35.0	35.0	63.0	27.3	27.3		55.0	53.3	
Actuated g/C Ratio	0.35	0.35		0.35	0.35	0.63	0.27	0.27		0.55	0.53	
v/c Ratio	1.14	0.19		0.57	0.31	1.01	0.49	1.02		0.73	0.59	
Control Delay	120.3	19.2		33.1	25.5	54.8	56.4	66.4		36.8	9.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.3	
Total Delay	120.3	19.2		33.1	25.5	54.8	56.4	66.4		36.8	9.7	
LOS	F	B		C	C	D	E	E		D	A	
Approach Delay		98.0			46.5			66.1			14.3	
Approach LOS		F			D			E			B	
Queue Length 50th (ft)	~331	44		119	87	~525	19	~321		132	117	
Queue Length 95th (ft)	#522	86		201	145	#808	#64	#426		m#220	145	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		291			261			534			378	
Turn Bay Length (ft)	150			110		100	400			400		
Base Capacity (vph)	390	644		406	604	835	72	1310		430	2625	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	409	
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	1.14	0.19		0.57	0.31	1.01	0.49	1.02		0.73	0.70	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 19 (19%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.14	
Intersection Signal Delay: 45.7	Intersection LOS: D
Intersection Capacity Utilization 107.8%	ICU Level of Service G
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: Divide Ave & Bismarck Expy

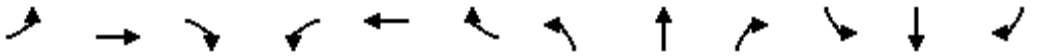


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	418	0	561	0	0	0	0	1862	182	46	939	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	200		200	0		0	0		0	222		0
Storage Lanes	2		2	0		0	0		1	1		0
Taper Length (ft)	25		300	25		25	25		25	150		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		575			383			458			769	
Travel Time (s)		13.1			8.7			7.8			13.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	8%	27%	10%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	454	0	610	0	0	0	0	2024	198	50	1021	0
Turn Type	custom		custom						Perm	Perm		
Protected Phases								6			2	
Permitted Phases	4		4						6	2		
Detector Phase	4		4					6	6	2	2	
Switch Phase												
Minimum Initial (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Minimum Split (s)	21.1		21.1					23.4	23.4	21.4	21.4	
Total Split (s)	26.0	0.0	26.0	0.0	0.0	0.0	0.0	74.0	74.0	74.0	74.0	0.0
Total Split (%)	26.0%	0.0%	26.0%	0.0%	0.0%	0.0%	0.0%	74.0%	74.0%	74.0%	74.0%	0.0%
Yellow Time (s)	3.6		3.6					3.9	3.9	3.9	3.9	
All-Red Time (s)	1.5		1.5					1.5	1.5	1.5	1.5	
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	0.0
Total Lost Time (s)	5.1	4.0	5.1	4.0	4.0	4.0	4.0	5.4	5.4	5.4	5.4	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None		None					C-Min	C-Min	C-Min	C-Min	
Act Effct Green (s)	18.8		18.8					70.7	70.7	70.7	70.7	
Actuated g/C Ratio	0.19		0.19					0.71	0.71	0.71	0.71	
v/c Ratio	0.71		0.82					0.60	0.21	0.56	0.30	
Control Delay	44.3		31.0					4.9	0.4	38.9	4.2	
Queue Delay	0.0		0.0					1.2	0.0	0.0	0.0	
Total Delay	44.3		31.0					6.0	0.4	38.9	4.2	
LOS	D		C					A	A	D	A	
Approach Delay								5.5			5.8	
Approach LOS								A			A	
Queue Length 50th (ft)	138		118					124	1	22	59	
Queue Length 95th (ft)	189		189					m121	m0	#88	70	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		495			303			378			689	
Turn Bay Length (ft)	200		200							222		
Base Capacity (vph)	711		797					3394	957	89	3363	
Starvation Cap Reductn	0		0					1042	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	0.64		0.77					0.86	0.21	0.56	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 15 (15%), Referenced to phase 2:SBTL and 6:NBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 13.2		Intersection LOS: B	
Intersection Capacity Utilization 58.0%		ICU Level of Service B	
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 Ramp & Centennial Rd

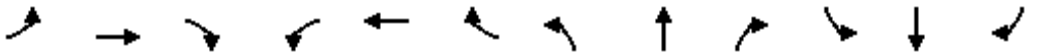


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	210	0	45	0	1424	501	0	838	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		215	0		200
Storage Lanes	0		0	1		1	0		1	0		1
Taper Length (ft)	25		25	25		100	150		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		270			465			769			788	
Travel Time (s)		6.1			10.6			13.1			13.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	12%	2%	8%	6%	3%	2%	2%	3%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	228	0	49	0	1548	545	0	911	253
Turn Type				custom		custom			Free			Perm
Protected Phases								6			2	
Permitted Phases				8		8			Free			2
Detector Phase				8		8		6			2	2
Switch Phase												
Minimum Initial (s)				5.0		5.0		10.0			10.0	10.0
Minimum Split (s)				20.0		20.0		20.0			22.4	22.4
Total Split (s)	0.0	0.0	0.0	36.0	0.0	36.0	0.0	64.0	0.0	0.0	64.0	64.0
Total Split (%)	0.0%	0.0%	0.0%	36.0%	0.0%	36.0%	0.0%	64.0%	0.0%	0.0%	64.0%	64.0%
Yellow Time (s)				3.2		3.2		3.9			3.9	3.9
All-Red Time (s)				2.0		2.0		1.5			1.5	1.5
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	5.2	4.0	5.2	4.0	5.4	4.0	4.0	5.4	5.4
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode				None		None		C-Min			C-Min	C-Min
Act Effct Green (s)				17.0		17.0		72.4	100.0		72.4	72.4
Actuated g/C Ratio				0.17		0.17		0.72	1.00		0.72	0.72
v/c Ratio				0.74		0.18		0.42	0.34		0.25	0.21
Control Delay				53.1		18.1		4.6	0.5		5.7	2.5
Queue Delay				0.0		0.0		0.0	0.0		0.0	0.0
Total Delay				53.1		18.1		4.6	0.5		5.7	2.5
LOS				D		B		A	A		A	A
Approach Delay								3.6			5.0	
Approach LOS								A			A	
Queue Length 50th (ft)				139		10		86	0		84	18
Queue Length 95th (ft)				205		39		134	0		113	m39

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		190			385			689			708	
Turn Bay Length (ft)						150			215			200
Base Capacity (vph)				562		482		3648	1583		3648	1228
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				0.41		0.10		0.42	0.34		0.25	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 20 (20%), Referenced to phase 2:SBT and 6:NBT, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 7.4		Intersection LOS: A	
Intersection Capacity Utilization 47.0%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: North Ramp & Centennial Rd

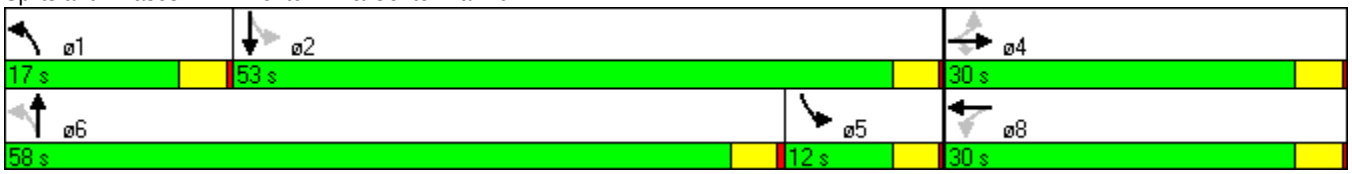


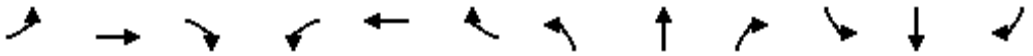
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	5	170	236	2	149	194	2017	365	51	800	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		200	200		200	530		0	215		150
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		604			932			788			1302	
Travel Time (s)		13.7			21.2			13.4			22.2	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	35	185	257	164	0	211	2589	0	55	894	0
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	4	4	4	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		5.0	4.0		5.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		9.0	20.0		9.0	20.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0	0.0	17.0	58.0	0.0	12.0	53.0	0.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%	0.0%	17.0%	58.0%	0.0%	12.0%	53.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
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	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		22.6	22.6	22.6	22.6		60.6	60.6		55.8	54.7	
Actuated g/C Ratio		0.23	0.23	0.23	0.23		0.61	0.61		0.56	0.55	
v/c Ratio		0.11	0.37	0.83	0.34		0.51	0.85		0.28	0.32	
Control Delay		29.8	6.7	59.2	8.0		10.2	15.0		16.4	7.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		29.8	6.7	59.2	8.0		10.2	15.0		16.4	7.5	
LOS		C	A	E	A		B	B		B	A	
Approach Delay		10.4			39.2			14.6			8.0	
Approach LOS		B			D			B			A	
Queue Length 50th (ft)		17	0	153	5		33	387		8	58	
Queue Length 95th (ft)		42	52	#262	54		51	#687		m23	87	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		524			852			708			1222	
Turn Bay Length (ft)			200	200			530			215		
Base Capacity (vph)		364	549	356	528		446	3033		216	2778	
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		0.10	0.34	0.72	0.31		0.47	0.85		0.25	0.32	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 44 (44%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 15.3		Intersection LOS: B	
Intersection Capacity Utilization 81.0%		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: 4: Trenton Dr & Centennial Rd





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	459	387	235	189	46	252	798	343	78	534	66
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	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	215		215	215		215	215		0	215		215
Storage Lanes	1		1	2		1	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		637			607			1302			516	
Travel Time (s)		12.4			11.8			22.2			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	162	499	421	255	205	50	274	1240	0	85	652	0
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		
Detector Phase	7	4	4	3	8	8	1	6		5	2	
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	6.0		4.0	6.0	
Minimum Split (s)	8.0	15.7	15.7	8.0	15.7	15.7	8.0	11.5		8.0	11.5	
Total Split (s)	12.0	33.0	33.0	12.0	33.0	33.0	25.0	43.0	0.0	12.0	30.0	0.0
Total Split (%)	12.0%	33.0%	33.0%	12.0%	33.0%	33.0%	25.0%	43.0%	0.0%	12.0%	30.0%	0.0%
Yellow Time (s)	3.5	3.9	3.9	3.5	3.9	3.9	3.5	3.6		3.5	3.6	
All-Red Time (s)	0.5	1.8	1.8	0.5	1.8	1.8	0.5	1.9		0.5	1.9	
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	0.0
Total Lost Time (s)	4.0	5.7	5.7	4.0	5.7	5.7	4.0	5.5	4.0	4.0	5.5	4.0
Lead/Lag	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	Max	Max	None	Max	Max	None	C-Max		None	C-Max	
Act Effct Green (s)	34.9	27.3	27.3	34.9	27.3	27.3	53.1	42.9		38.1	29.9	
Actuated g/C Ratio	0.35	0.27	0.27	0.35	0.27	0.27	0.53	0.43		0.38	0.30	
v/c Ratio	0.37	0.52	0.58	0.45	0.21	0.11	0.52	0.58		0.43	0.43	
Control Delay	24.8	33.1	7.2	26.7	28.8	8.6	10.6	8.6		29.6	29.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	24.8	33.1	7.2	26.7	28.8	8.6	10.6	8.6		29.6	29.1	
LOS	C	C	A	C	C	A	B	A		C	C	
Approach Delay		21.7			25.7			9.0			29.1	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	68	141	7	54	53	0	28	76		25	120	
Queue Length 95th (ft)	116	193	86	81	83	28	m32	121		50	162	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		557			527			1222			436	
Turn Bay Length (ft)	215		215	215		215	215			215		
Base Capacity (vph)	478	966	727	646	966	469	591	2156		222	1511	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.34	0.52	0.58	0.39	0.21	0.11	0.46	0.58		0.38	0.43	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 59 (59%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 18.7	Intersection LOS: B
Intersection Capacity Utilization 62.8%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 5: Century Ave & Centennial Rd