Appendix A
Permits

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Appendix A: Permits

This appendix lists environmental permits or other agreements that may need to be obtained by the U.S. Department of Veterans Affairs (VA) to implement the actions included in the alternatives in this environmental impact statement. Key federal, state, and local requirements are identified for both construction and operation.

Agency	Project Stage	Environmental Permit, Compliance, or Coordination	Key Requirements
Air Quality			
Louisville Metro Air Pollution Control District (APCD)	Construction	Dust control plan	Prepare and implement plan to control fugitive particulate emissions (APCD Regulation 1.14).
Louisville Metro APCD	Construction/ Operation	Permit(s) to construct and operate	Calculate potential to emit for operating units (such as boilers, generators, others) based on maximum capacity of emission sources to determine type of permit application (Title V or minor source).
Louisville Metro APCD	Operation	Gasoline dispensing facility permit	Submit application for gasoline dispensing equipment.
Louisville Metro APCD	Operation	Permit	Apply for and obtain Title V Air Quality Permit.
Cultural Resources			
Kentucky Heritage Council (State Historic Preservation Office [SHPO])	Planning/ Construction	Consultation in accordance with Section 106 of the National Historic Preservation Act	Archaeological consultation and above-ground surveys completed during EAs, pending SHPO re-confirmation of concurrence with finding of no adverse effect to historic properties.
Geology and Soils			
Natural Resource Conservation Service (U.S. Department of Agriculture)	Construction	Farmland Conversion Impact Rating (Form AD-1006)	If Alternative B is selected – Evaluate prime, unique, statewide, or local important farmland that may be impacted, in accordance with the Farmland Protection Policy Act.
Jefferson County Metro Government	Construction	Blasting notification (if blasting is determined to be needed)	In accordance with Kentucky Revised Statute 350.430, VA will provide advance written notice of the blasting schedule to the Louisville-Jefferson County Metro Government and area residents within one-half mile of the project site.
Hydrology and Water Quality			
Kentucky Department for Environmental Protection (KDEP) Division of Water	Construction	Kentucky Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction Activities	File Notice of Intent with Division of Water prior to start of construction activities; prepare and implement a stormwater pollution prevention plan to control stormwater discharges (runoff) from project site during construction.
Louisville-Jefferson County Metropolitan Sewer District	Construction	Site disturbance permit	File permit application with detailed Erosion Prevention and Sediment Control Plan.

Agency	Project Stage	Environmental Permit, Compliance, or Coordination	Key Requirements
Kentucky Energy and Environment Cabinet	Construction	Groundwater protection plan (GPP)	Prepared by borehole driller in accordance with 40 KAR 5:037. Driller would use KDEP's generic GPP and provide project-specific conditions, identifying the groundwater-protective construction practices. Approval of GPP by Energy and Environment Cabinet, available for 30-day public review.
KDEP Division of Water	Operation	Application for Emergency Authorization to Withdraw Water	Submit in the case of an emergency situation requiring a withdrawal rate greater than 10,000 gallons per day.
KDEP Division of Water	Operation	Kentucky Pollutant Discharge Elimination System Permit	File application with Division of Water to discharge groundwater from foundation dewatering system to surface water.
Wildlife and Habitat			
U.S. Fish and Wildlife Service (FWS) – Southeast Region	Planning/ Construction	Consultation with the FWS under Section 7 of the Endangered Species Act	Under Alternative A, consult with FWS regarding northern long-eared bats. Under Alternative B, consult with FWS regarding northern long-eared bats, Indiana bats, and running buffalo clover.
Land Use			
Louisville Metro Planning Commission	Planning/ Construction	Zoning	Consult with local officials and consider recommendations on zoning issues, including landscaping, setbacks, building heights, and exterior facades in accordance with 40 U.S.C. 619(c) and (d).
Federal Aviation Administration	Planning/ Construction	Notice of Proposed Construction or Alteration, FAA Form 7460-1	Provide notice for approval for construction of water tower that exceeds height restrictions within 20,000 feet of an airport.
Kentucky Airport Zoning Commission	Planning/ Construction	Form TC 56-50	File form for final design and location of water tower
Floodplains and Wetlands			
U.S. Army Corps of Engineers and KDEP	Construction	Clean Water Act Section 401/404 permit(s)	Under Alternative B, permits under Sections 401 and 404 of the Clean Water Act may be required before construction activities commence if wetlands are present.
Solid Waste and Hazardous Materials			
KDEP / State Fire Marshal	Construction	Underground storage tank (UST)/Aboveground Storage Tank (AST) Facility Registration Form	All UST systems must be registered with the KDEP UST Branch. Owners and operators of ASTs that contain petroleum and hazardous substances must obtain a permit from the state fire marshal.
Utilities			
Louisville Gas & Electric (LGE)	Planning/ Construction	LGE would obtain right of way permits and approvals from the Kentucky Public Service Commission to provide a primary and backup electrical feed to the site.	VA to coordinate and provide information to LGE as needed.

Appendix B
Traffic Study

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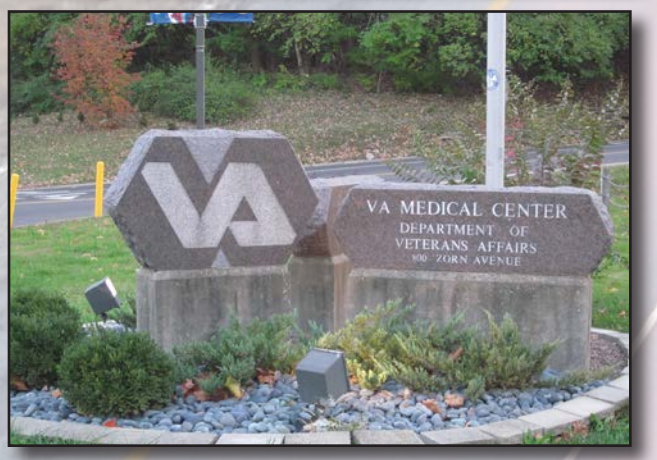
Veterans Affairs Medical Center
Traffic Impact Study

Louisville, KY



October 2016

Prepared by
Palmer Engineering

Palmer ENGINEERING

APPENDIX B
Final Environmental Impact Statement
Replacement Robley Rex VAMC April 2017

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Acronyms and Abbreviations

ADT	Average Daily Traffic
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
ITE	Institute of Transportation Engineers
KYTC	Kentucky Transportation Cabinet
LOS	Level of Service
SPUI	Single Point Urban Interchange
VA	Veterans Affairs

1.0 Introduction

This traffic study was undertaken to assess the traffic impact of a proposed replacement medical center campus, also referred to as proposed hospital in this report, by the Department of Veterans Affairs in Jefferson County, KY. The study analyzed and compared three sites:

- Existing Site (Zorn Avenue)
- St Joseph Site(Factory Lane)
- Midlands Site (KY 22)

The intersections within each study area were analyzed for levels of service and delay. The study also measures travel time data for each site. Travel time data are measured between the interstate and the VA Medical Center for the AM and PM peak periods for all three sites. The analyses determine the impacts that the proposed hospital will have on the street network surrounding each of the sites.

The Existing Site (Zorn Avenue) was studied for the AM and PM peak hours in the 2015 Existing and the 2025 No Build conditions. The St Joseph Site (Factory Lane) was studied for the AM and PM peak hours in the 2015 Existing, 2025 No Build, and 2025 Build (with VA Medical Center) conditions. The Midlands Site (KY 22) was studied for the AM and PM peak hours in both the 2015 Existing and the 2025 Build conditions. Two scenarios for the Midlands Site Build conditions were analyzed: 1) with the VA Medical Center, and 2) with a Mixed Use Development in place of the VA Medical Center. Those conditions were also studied both with and without the new Single Point Urban Interchange (SPUI) planned for construction by the Kentucky Transportation Cabinet (KYTC Item No. 5-804.00).

A vicinity map (Figure 1) displays the location of each site while the study area maps (Figures 2, 3, and 4) show the limits of each site. The proposed hospital will have 1,030,500 square feet of gross floor space and is anticipated to be complete by 2022.

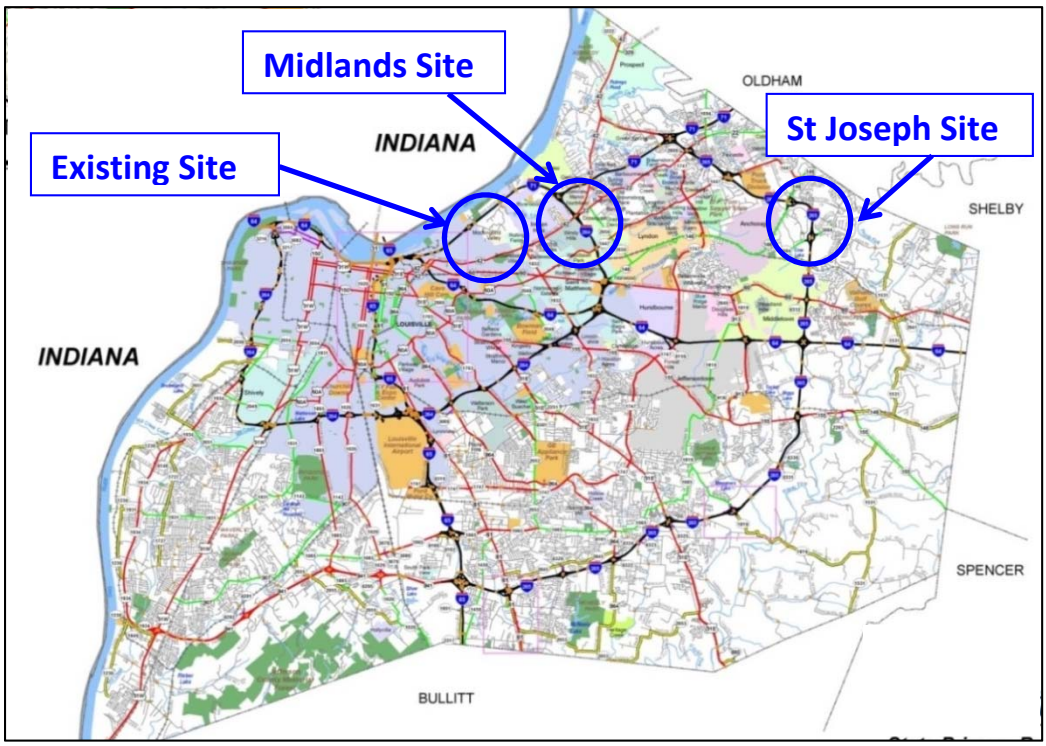


Figure 1: Vicinity Map

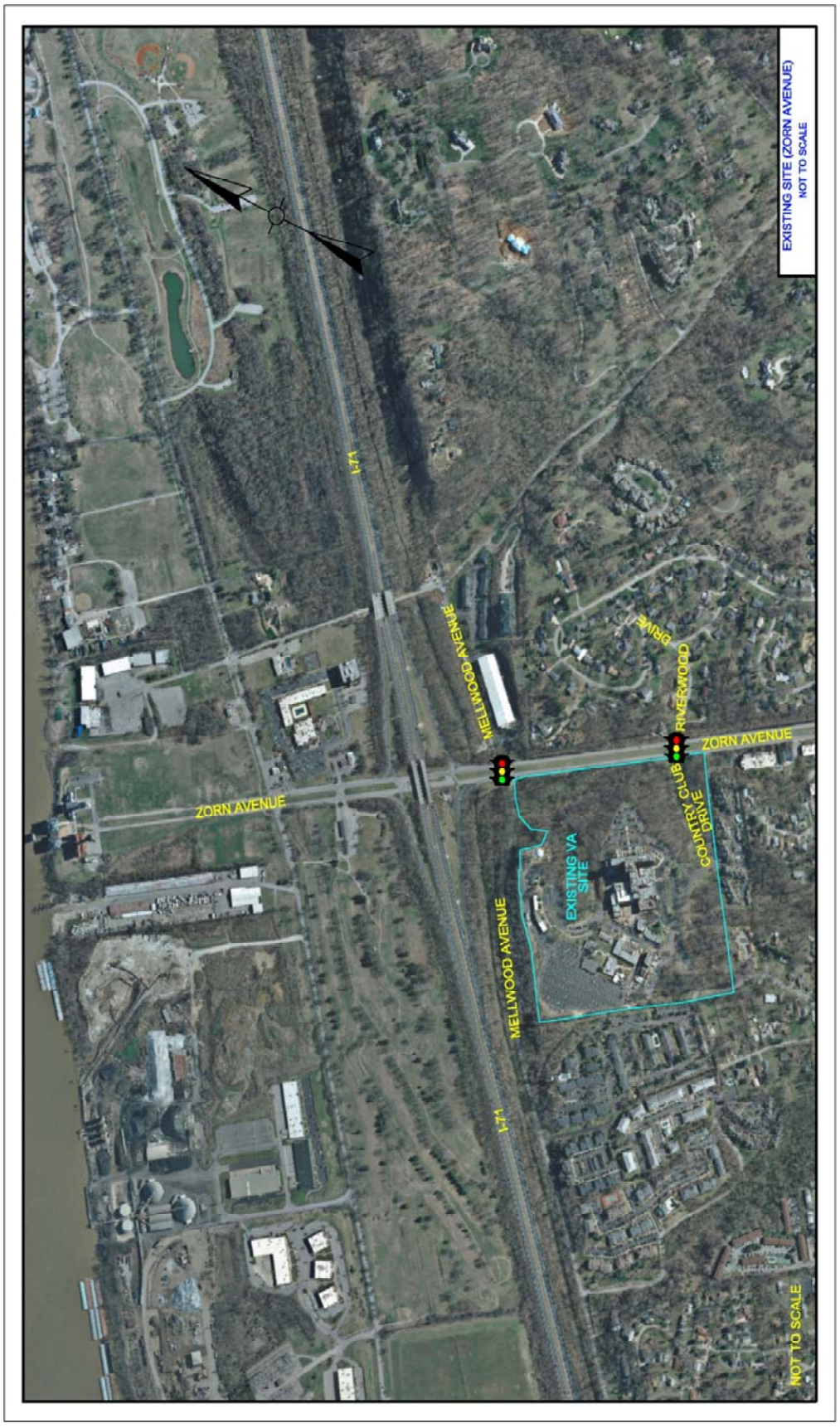


Figure 2: Study Area – Existing Site (Zorn Avenue)

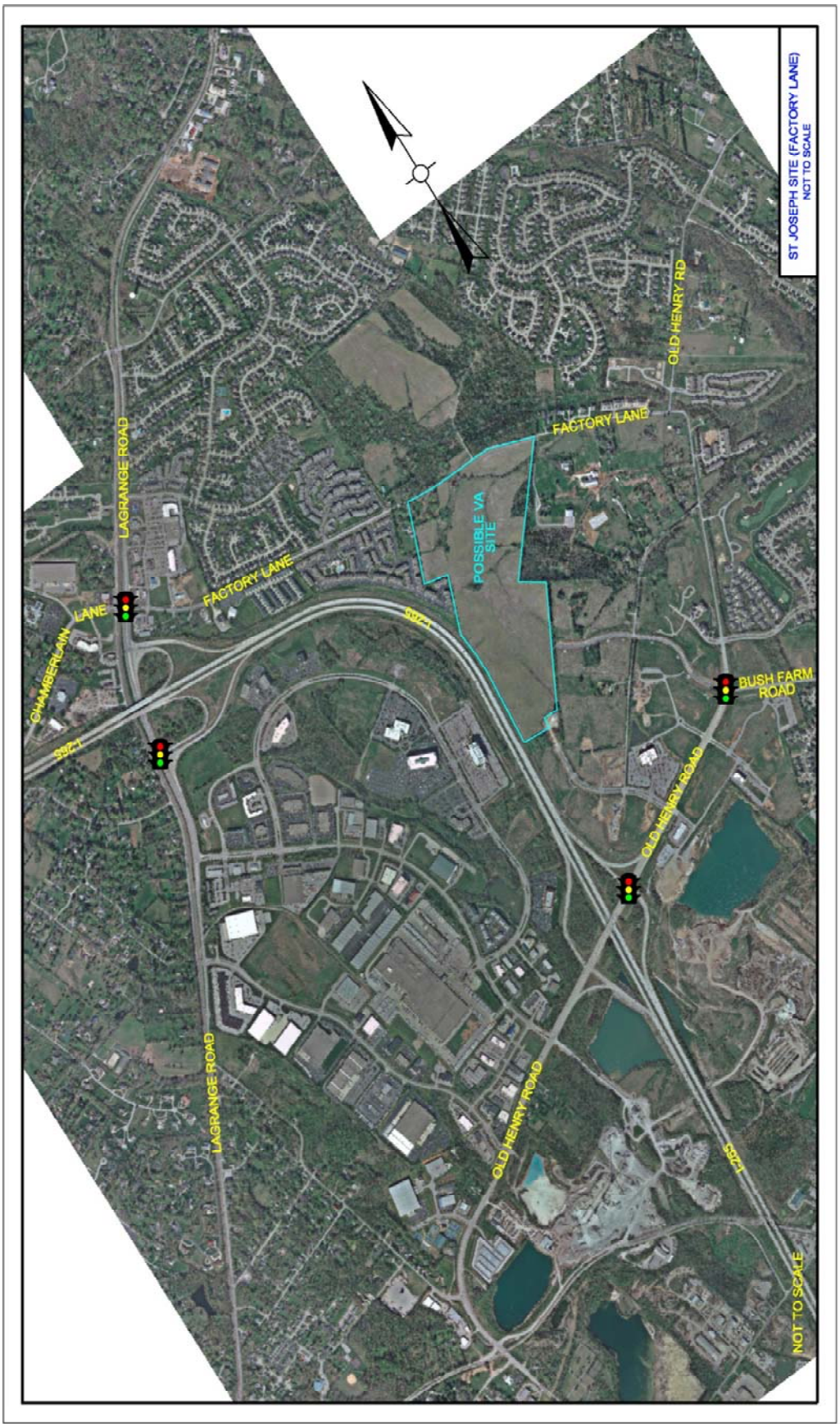


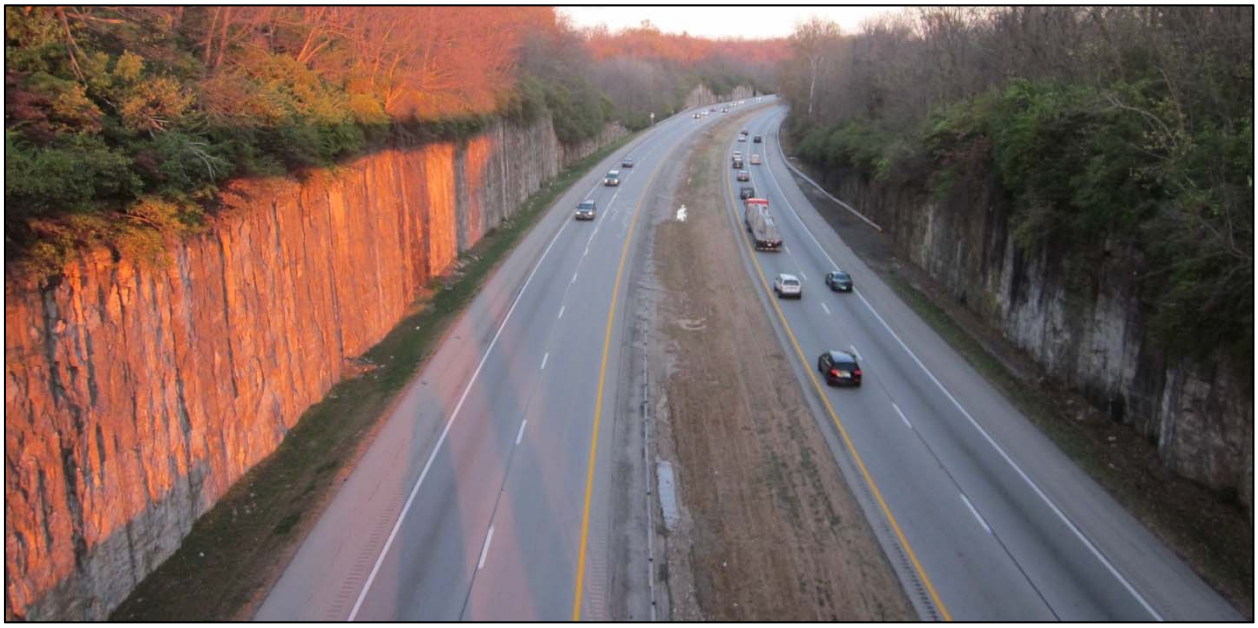
Figure 3: Study Area – St. Joseph Site (Factory Lane)

Figure 4: Study Area – Midlands Site (KY 22)

2.0 Study Area

2.1 Existing Site (Zorn Avenue)

I-71 is an urban expressway that connects Louisville, KY and Cincinnati, OH. I-71 in this area is four lanes and the average daily traffic (ADT) is approximately 64,000 vehicles per day[1].



I-71

Zorn Avenue is classified as an urban minor arterial connecting US 42 and I-71 and is surrounded by residential and commercial land-uses. Zorn Avenue in this area has four lanes with an ADT of 15,000 vehicles per day.

Zorn Avenue

[1] The source for all ADT data in this study comes from the Kentucky Transportation Cabinet's Traffic Count Website. http://maps.kytc.ky.gov/photolog/?config=TrafficCounts

Country Club Drive is an urban local street. It is a two-lane roadway and serves as the entrance to the VA Hospital. It is located approximately 1800 ft south of I-71.

Country Club Drive

Mellwood Avenue is a 1.7 mile long urban local street with an offset intersection at Zorn Avenue. Mellwood Avenue is a two-lane roadway with an ADT of 5,000 vehicles per day located approximately 500 ft south of I-71.

Mellwood Avenue

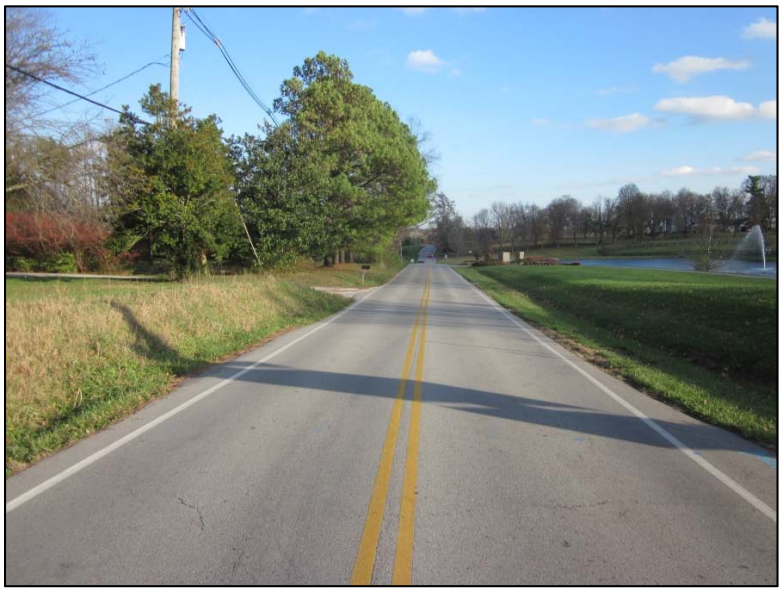
2.2 St Joseph Site (Factory Lane)

LaGrange Road is classified as an urban minor arterial in this section of roadway. LaGrange Road is a five-lane section with an ADT of about 18,000 vehicles per day in the project area. LaGrange Road is a

congested roadway that serves as a major route for commuters into and out of the Louisville Metro Area. The CSX railroad runs parallel along the north side of LaGrange Road and periodically blocks traffic from being able to access Chamberlain Lane.

LaGrange Road

Factory Lane is classified as an urban minor arterial in the project vicinity. This 1.5-mile, two-lane road serves as a connection between LaGrange Road and Old Henry Road. The ADT is approximately 3,800 vehicles per day. Factory Lane serves mostly residential neighborhoods except for the commercial area located near the LaGrange Road intersection.



Factory Lane

Old Henry Road is classified as an urban minor arterial with a five-lane section in the vicinity of the I-265 interchange. Current ADT on Old Henry Road is 15,200 vehicles per day between I-265 and Bush Farm

Road. Old Henry Road reduces to a two-lane urban collector east of Bush Farm Road and the ADT drops to 8,100 vehicles per day between Bush Farm Road and Factory Lane. KYTC is currently designing an interchange congestion improvement project with I-265 (KYTC Item No. 5-474.00) as well as a widening and improvement project along Old Henry Road (KYTC Item No. 5-367.20) to increase capacity out to Ash Avenue. The proposed three lane section will have one lane in each direction and a center turn lane from Bush Farm Road to KY 362 in Oldham County.

Old Henry Road – 2 Lane Section

Old Henry Road – 5 Lane Section

Bush Farm Road is a half-mile two-lane road that connects Old Henry Road and Aiken Road. Several large subdivisions and an elementary school use Bush Farm Road as an access route to and from I-265 via Old Henry Road. The current ADT on Bush Farm Road is 8,300 vehicles per day.

Bush Farm Road

I-265 (Gene Snyder Freeway) is an urban expressway that connects I-65 in southern Jefferson County to I-71 in northeastern Jefferson County. I-265 in this area is four lanes and the ADT ranges from 50,000 to 75,000 vehicles per day.

I-265

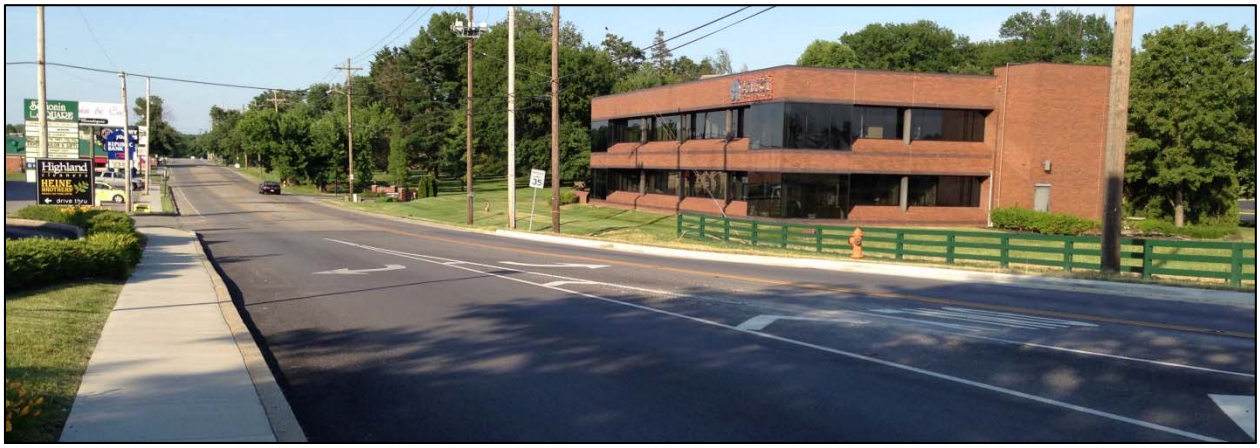
2.3 Midlands Site (KY 22)

US 42 is classified as an urban principal arterial in this section of roadway. It is a five-lane section with an ADT of approximately 56,000 vehicles per day in the project area. US 42 is a congested roadway that serves as a major route for commuters into and out of the Louisville Metro Area. A reconstruction and widening project is planned for the interchange in 2019 which will replace a diamond interchange with a SPUI[2] interchange (KYTC Item No. 5-804.00). An Interchange Modification Report has been submitted and approved pending approval of the Categorical Exclusion document which is currently under review by the Federal Highway Administration.

US 42

[2] The SPUI is a type of interchange where the arterial and ramp entrances/exits are controlled by a single traffic signal. This type of interchange can be more efficient than a standard diamond interchange and takes up less space. (Kentucky Transportation Cabinet)

KY 22 (Old Brownsboro Rd) is classified as an urban minor arterial and is a three-lane section with a current ADT of approximately 22,000 vehicles per day. KY 22 provides a connection to Herr Lane and Seminary Drive and is surrounded by residential and commercial land-uses including Ballard High School.



KY 22

I-264 (Watterson Expressway) is an urban expressway that connects I-64 in eastern Jefferson County to I-71 in northeastern Jefferson County. I-264 in this area is currently four lanes and the ADT ranges from 57,000 to 72,000 vehicles per day. An eastbound auxiliary lane is located between the interchange ramps between Westport Rd and US 42 and between US 42 and Interstate 71 to provide three lanes for weaving in that direction. As part of the US 42 interchange reconstruction project, KYTC plans to widen I-264 to three basic lanes in each direction with auxiliary lanes (KYTC Item No. 5-594.00).

I-264

3.0 Traffic Forecasting

3.1 Existing Site (Zorn Avenue)

Manual traffic counts were taken from 6:00-9:00 AM and 2:00-6:30 PM on Thursday, September 10, 2015 at the following intersections:

- Zorn Avenue at I-71 Southbound Ramps
- Zorn Avenue at I-71 Northbound Ramps
- Zorn Avenue at Mellwood Avenue
- Zorn Avenue at Country Club Road / Riverwood Drive

The counts were used to determine base level traffic conditions along the study corridor. All counts were conducted in 15-minute intervals to obtain peak hour factors. (See Appendix D for raw count data.)

Using the Kentucky Transportation Cabinet's CTS Traffic Count program, historical growth rates for the study area were analyzed. Available count data were identified along Zorn Avenue, between Hillcrest Avenue and River Road (Station 757). These data were analyzed to develop historical growth rate trend lines and to predict future growth. Data indicated a 1.4% growth rate would be applicable for traffic projections. Based on these historical growth trends in the area, the existing (2015) traffic volumes were then increased by 1.4% per year to reach the design year (2025) traffic projections. See Appendix A for 2015 Existing traffic volumes and 2025 No Build traffic volumes.

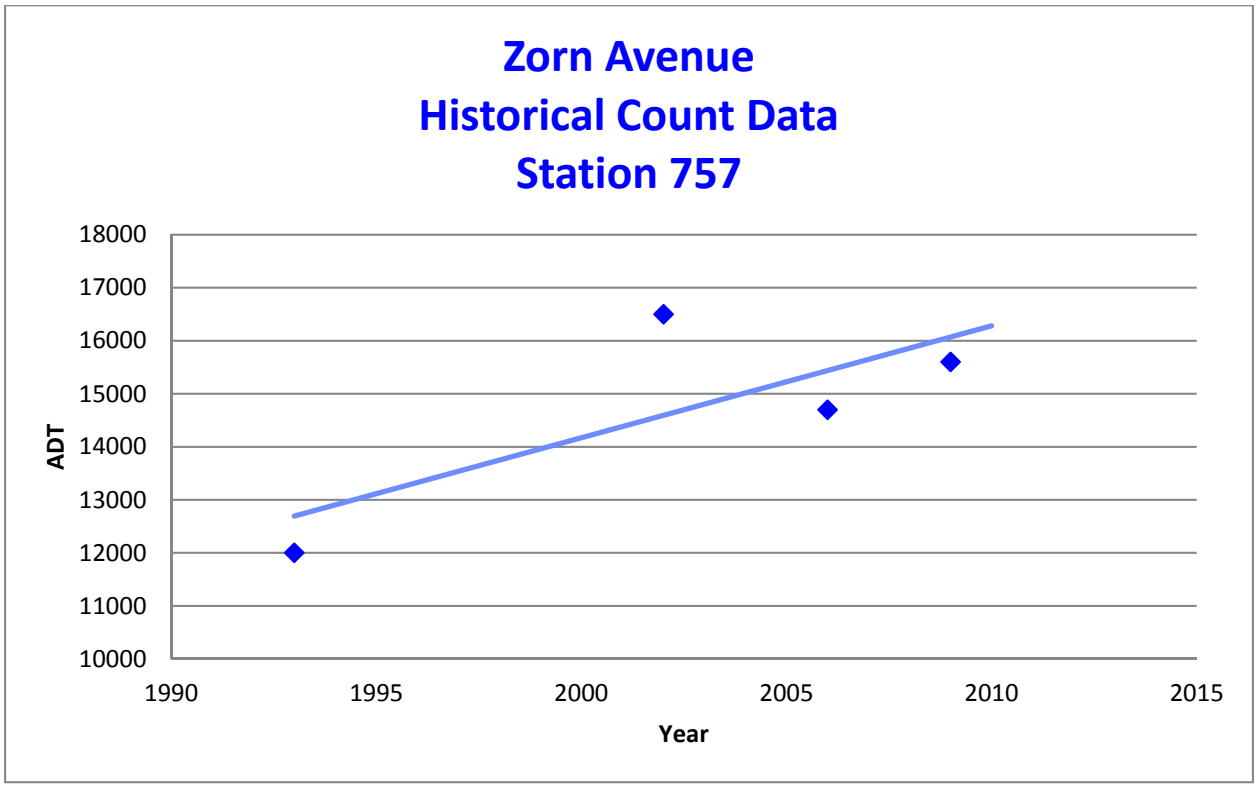


Figure 5: Historical Count Data along Zorn Avenue

Traffic entering and exiting Country Club Road (VA Access) was not grown between 2015 and 2025. Since the VA Hospital is at maximum capacity, it was assumed traffic into and out of the facility would remain constant.

3.2 St. Joseph Site (Factory Lane)

The 2012 *VA Medical Center, Factory Lane Site, Traffic Impact Analysis* completed by BTM Engineering was used for the base forecasts of the Factory Lane Site update.

AM and PM peak hour turning movement counts were provided in the *2012 Traffic Impact Analysis (2012 TIA)* for the following intersections:

- KY 146 (LaGrange Road) at Southbound I-265 Ramps
- KY 146 (LaGrange Road) at Chamberlain Lane / Factory Lane
- Old Henry Road at Factory Lane
- Old Henry Road at Bush Farm Road
- Old Henry Road at Northbound I-265 Ramps

Additionally, manual traffic counts were taken from 7:00-9:00 AM and 4:00-6:00 PM on Tuesday, October 6, 2015 at the KY 146 (LaGrange Road) intersection with the northbound I-265 ramps (See Appendix D for raw count data at the LaGrange Road and northbound I-265 ramps intersection). This intersection was not counted in the 2012 study since it is not signalized. Due to the increase in traffic created by the potential hospital construction, a signal may become warranted, so additional counts were performed.

The *2012 TIA* forecasted 2018 traffic volumes based on the following growth rates:

- LaGrange Road – 1.1% up to 2015, 1.0% after 2015
- Factory Lane – 6.5% up to 2015, 3.0% after 2015
- Old Henry Road – 2.0% up to 2015, 3.6% after 2015
- Bush Farm Road – 3.6% up to 2015, 2.8% after 2015

Per the *2012 TIA,* these growth rates were based on a Data Needs Analysis and Pre-Design Scoping Study for the proposed improvements to Old Henry Road (anticipated construction in 2016). This forecast grows the baseline 2018 traffic data from the *2012 TIA* at the same growth rates used in that study, to obtain 2015 Existing and 2025 No Build traffic data (See Appendix B for 2015 Existing and 2025 No Build traffic data).

3.2.1 Factory Lane Site Trip Generation

The study site for the VA Medical Center, which is to the East of I-265, between Exits 29 and 30, would be located on an undeveloped tract of land and would include a gross floor area of 1,030,500 square feet. The size of the VA Medical Center will be a larger facility than was anticipated in the *2012 TIA* (anticipated to be 800,000 square feet).

To estimate traffic generated by the VA Medical Center, information found in *Trip Generation, 9th Edition,* for a Hospital (ITE Code 610) was used. This manual is a nationally recognized resource of trip generation rates published by the Institute of Transportation Engineers (ITE). The area of the anticipated

VA Medical Center was used in conjuction with the Hospital rates to establish the number of trips generated. AM (80% entering/20% exiting) and PM (20% entering/80% exiting) peak hour distributions were based on the current Louisville VA Medical Center (located along Zorn Avenue), as well as studies at two other VA sites.

This study does recognize that part of the 1,030,500 square feet VA Medical Center (approximately 132,000 square feet) will be the Veterans Benefits Administration building. The analysis however, generates traffic for the entire site as if it were a hospital, as opposed to a mixed hospital and office use facility. Analyzing the site as 100% hospital use provides a higher trip generation rate than would actually be anticipated with the hospital / office use mix, resulting in a more conservative modeling approach that errs on the side of overestimating the traffic impact.

Table 1 summarizes the trip generation data for the Hospital.

Table 1: Trip Generation for VA Medical Center

ITE Code	610				
Land Use	Hospital				
Area (sf)	1,030,500				
Trip Generation per 1000 Sq. Ft. Gross Floor Area					
Weekday					
Daily					
Equation	Volume	% Entering	Volume Entering	% Exiting	Volume Exiting
T=6.91X+2923.63	**10,044**	50%	**5,022**	50%	**5,022**
AM Peak Hour					
Equation	Volume	% Entering	Volume Entering	% Exiting	Volume Exiting
Ln(T)=0.66Ln(X)+2.11	**803**	80%	**642**	20%	**161**
PM Peak Hour					
Equation	Volume	% Entering	Volume Entering	% Exiting	Volume Exiting
Ln(T)=0.64Ln(X)+2.22	**781**	20%	**156**	80%	**625**

The study site for the VA Medical Center has one proposed access point for entering and exiting traffic located along Factory Lane. The distribution of traffic to the existing network is based upon the *2012 TIA*. Appendix B illustrates the entering and exiting trip distributions, as well as the total entering and exiting trips generated by the VA Medical Center.

The trips generated by the VA Medical Center were added to the 2025 No Build volumes, to produce 2025 Build traffic (See Appendix B).

3.3 Midlands Site (KY 22)

The 2016 *I-264/US 42 Brownsboro Interchange Traffic Forecast (2016 Traffic Forecast)* completed by Palmer Engineering / URS was used for the base work of the KY 22 Site update.

The study site for the VA Medical Center, which is to the East of I-264, at Exit 22, would be located on an undeveloped tract of land and would include a gross floor area of 1,030,500 square feet. The size of the VA Medical Center will be a smaller facility than was anticipated in the *2016 Traffic Forecast* (anticipated to be 1,286,731 square feet).

The *2016 Traffic Forecast* provided 2020 and 2040 traffic forecasts (which included traffic associated with the VA Medical Center). Since the size of the VA Medical Center is different than what was analyzed in the *2016 Traffic Forecast*, the trips generated by the VA were revised. This process included:

- Reducing the 2020 and 2040 traffic forecasts for the VA Medical Center traffic included in the original study (based on 1,286,731 square feet size facility)
- Determining the growth rate between 2020 and 2040
- Calculating design year 2025 base traffic volumes
- Adding the revised trips generated by the smaller VA Medical Center (based on 1,030,500 square feet) to the 2025 base traffic volumes

3.3.1 KY 22 Site Trip Generation

As noted above, the study site for the VA Medical Center will be a smaller facility (1,030,500 square feet) than was anticipated in the *2016 Traffic Forecast* (anticipated to be 1,286,731 square feet). The traffic generated by the VA Medical Center, and the associated entering/exiting trip distributions is consistent with Table 1, found in the Factory Lane section. As with the St Joseph Site (Factory Lane), the entire VA Medical Center has been assumed as 100% hospital use, as opposed to a mixed hospital / office use, resulting in a more conservative modeling approach that errs on the side of overestimating the traffic impact.

The study site for the VA Medical Center has one proposed access point for entering and exiting traffic located along KY 22 (Old Brownsboro Road). The distribution of traffic to the existing network is based upon the *2016 Traffic Forecast* (which references a 2013 Traffic Impact Study performed by Olsson Associates for the VA Medical Center). Appendix C illustrates the entering and exiting trip distributions, and the total entering and exiting trips generated by the VA Medical Center.

The trips generated by the VA Medical Center were added to the 2025 No Build volumes, to produce 2025 Build traffic (See Appendix C for 2025 Build traffic).

3.3.2 KY 22 Alternative Scenario

The KY 22 study site is located in a densely developed area of Louisville. It is lined with existing residential and commercial developments. The few unimproved tracts within the study area are

currently approved for development and are in various stages of planning and/or construction. If the VA Medical Center were to choose another site for their location, the tract of land they are currently considering, is still expected to be developed by the U.S. government or a subsequent property owner. Therefore, in addition to the analysis of traffic conditions with the VA Medical Center, this study evaluated the traffic conditions from non-VA use, as described in the following paragraph.

Based on a 2006 Traffic Impact Study for The Midlands, the existing land use, and current zoning, it has been assumed that if the vacant site was developed by others, it would be a mixed use facility. It has been assumed, based on the 2006 Traffic Impact Study, that the site would be composed of:

- Multi-Family Residential (192 Units)
- Condos/Townhomes (117 Units)
- Hotel (150 Units)
- Office (66,400 square feet)
- High-Turnover Restaurant (17,000 square feet)
- Retail (119,550 square feet)

3.3.3 KY 22 Alternative Scenario - Site Trip Generation

To estimate traffic generated by the alternative scenario, the 2006 Traffic Impact Study was updated with information found in *Trip Generation, 9th Edition,* for Apartment (ITE Code 220), Residential Condominium/Townhouse (ITE Code 230), Hotel (ITE Code 310), General Office Building, (ITE Code 710), High-Turnover (Sit Down) Restaurant (ITE Code 932), and Shopping Center (ITE Code 820) were used. Since this is a mixed use development, internal circulation and pass-by trips would be anticipated. The trips generated by the development have been reduced by these anticipated trips. Table 2 summarizes the trip generation data for the alternative scenario.

Table 2: Trip Generation for Mixed Use Development

Code	Land Use	Size	A.M. Peak Hour			P.M. Peak Hour			24-hour total
			Enter	Exit	Total	Enter	Exit	Total	
220	Multi Family Residential	192 units	**20**	**78**	**98**	**80**	**43**	**123**	**1287**
	-Internal Circulation Capture		-2	-8	-10	-8	-4	-12	-129
230	Condos/Townhomes	117 units	**10**	**49**	**59**	**46**	**23**	**68**	**737**
	-Internal Circulation Capture		-1	-5	-6	-5	-2	-7	-74
310	Hotel	150 units	**47**	**33**	**80**	**46**	**44**	**90**	**969**
	-Internal Circulation Capture		-5	-3	-8	-5	-4	-9	-97
710	Office	66,400 s.f.	**121**	**17**	**138**	**26**	**127**	**153**	**962**
	-Internal Circulation Capture		-12	-2	-14	-3	-13	-15	-96
932	High Turnover Restaurant	17,000 s.f.	**101**	**83**	**184**	**100**	**67**	**167**	**2162**
	-Internal Circulation Capture		-10	-8	-18	-10	-7	-17	-216
	High-Turnover less internal capture		**91**	**75**	**166**	**90**	**60**	**150**	**1946**
	-Pass-by (P.M.- 34%)		-31	-26	-56	-31	-20	-51	-662
820	Retail	119,550 s.f.	**108**	**66**	**174**	**324**	**351**	**675**	**7627**
	-Internal Circulation Capture		-11	-7	-17	-32	-35	-68	-763
	Retail less internal capture		**97**	**59**	**157**	**292**	**316**	**607**	**6864**
	-Pass-by (P.M.- 34%)		-33	-20	-53	-99	-107	-206	-2334
	Gross Trips		**407**	**326**	**733**	**622**	**655**	**1276**	**13744**
	-Reductions		-105	-79	-182	-193	-192	-385	-4371
	Net Generated Trips		302	247	**551**	429	463	**891**	**9373**

The distribution of traffic to the existing network is consistent with the VA Medical Center distribution pattern. Appendix C illustrates the total entering and exiting trips generated by the mixed use development.

The trips generated by the mixed use development were added to the 2025 No Build volumes, to produce 2025 Build traffic (See Appendix C).

4.0 Analyses

4.1 Performance Measures

Level of Service (LOS) and delay were used as the measures of effectiveness for each turning movement. According to the Highway Capacity Manual (HCM), the level of service is defined in terms of delay (See Tables 3 and 4). Delay results in driver discomfort, frustration, fuel consumption, and lost travel time and may be caused by a number of factors including traffic signal timing, geometrics, and traffic congestion. Level of service is based on a grade scale from A to F with A being excellent and F being failure. A Level of Service C is desirable, and D is acceptable in an urban setting.

Table 3: Unsignalized Intersections

Level of Service	Delay (Seconds per Vehicle)
A	<=10
B	>10 and <=15
C	>15 and <=25
D	>25 and <=35
E	>35 and <=50
F	>50

Table 4: Signalized Intersections

Level of Service	Delay (Seconds per Vehicle)
A	<=10
B	>10 and <=20
C	>20 and <=35
D	>35 and <=55
E	>55 and <=80
F	>80

Analyses were completed using HCS 2010, a standard analysis tool, which uses the *Highway Capacity Manual* methodologies to evaluate roadway corridors. Level of Service and delay were measures of effectiveness used for this study. (HCS Results can be found in Appendix E.)

VISSIM, a behavior-based, microscopic simulation model software package that provides a graphic and numeric representation of lane geometry, driver behavior, signal timing, and traffic volumes, was used to evaluate no build and build conditions. The VISSIM simulations model the interaction of closely spaced signals and how congestion at one signal impacts the upstream signals. Simulations were run 10 times in order to obtain an average travel time measurement for each selected route. The travel time measurements were extracted from these simulations as a comparison tool between no build and build conditions.

4.2 Existing Site (Zorn Avenue)

The HCS results indicate that much of the Zorn Avenue corridor operates at an acceptable level of service in the AM and PM peak periods of 2015 and 2025. The movements that operate beyond capacity are discussed further below. The HCS results for the Existing Site (Zorn Avenue) can be found in Table 5.

Zorn Avenue @ I-71 Southbound Ramp (Unsignalized)

The I-71 southbound ramp currently operates at a LOS F in the 2015 peak periods. The ramp will continue to operate at a LOS F in the 2025 No Action peak periods, but will have a significant increase in delay to this approach.

Zorn Avenue @ I-71 Northbound Ramp (Signalized)

The Zorn Avenue at I-71 northbound Ramp operates at a LOS F in the 2015 and 2025 PM peak period. This is in large part due to the volume turning left from Zorn Avenue onto the I-71 northbound on ramp.

The northbound Zorn Avenue right turn onto the I-71 northbound ramp operates at a LOS D in the 2015 PM peak. This movement is anticipated to operate at a LOS E in the 2025 No Action PM peak.

The southbound Zorn Avenue left turn onto the I-71 northbound Ramp operates at a LOS F in the 2015 PM peak. This movement will continue to operate at a LOS F in the 2025 No Action peak period, but will have a significant increase in delay to this movement.

Zorn Avenue @Mellwood Avenue (Unsignalized)

The eastbound shared left/thru lane operates at a LOS F in the AM and PM peaks for both 2015 and 2025. A significant increase in delay is anticipated in the 2025 No Action scenario.

Zorn Avenue at Country Club Road / Riverwood Drive- Existing VA Access Signalized Intersection

The northbound Zorn Avenue shared left/thru lane operates at a LOS E in the 2015 AM peak. The movement is anticipated to drop to a LOS F in the 2015 AM peak.

Table 5: Existing Site (Zorn Avenue) HCS Results – LOS and Delay

Existing Site (Zorn Avenue) Level of Service and Delay (sec)						
Year			2015 Existing		2025 No Action	
Peak			AM	PM	AM	PM
Zorn Ave @ I-71 SB Ramp (Unsignalized)	I-71 SB Ramp	WB L	F / 73	F / 56	F / 389	F / 132
		WB R	B / 13	B / 11	B / 13	B / 12
	Zorn Ave	NB L	A / 10	A / 9	B / 11	A / 10
Zorn Ave @ I-71 NB Ramp (Signalized)	I-71 NB Ramp	EB L	C / 30	C / 30	D / 42	C / 32
		EB R	C / 29	C / 28	C / 29	C / 29
	Zorn Ave	NB T	C / 29	C / 30	C / 30	C / 30
		NB R	D / 37	D / 50	D / 42	E / 73
	Zorn Ave	SB L	D / 41	F / 276	D / 41	F / 370
		SB T	B / 13	B / 14	B / 14	B / 14
	Overall		C / 29	F / 91	C / 34	F / 118
Zorn Ave @ Mellwood Ave (Unsignalized)	Mellwood Ave	EB Lt/Th	F / 97	F / 295	F / 239	F / 648
		EB R	B / 14	B / 12	C / 16	B / 12
		WB Lt/Th/Rt	C / 17	C / 19	C / 20	C / 24
	Zorn Ave	NB Lt/Th	B / 11	A / 10	B / 12	B / 10
	Zorn Ave	SB Lt/Th	A / 9	A / 10	A / 9	B /10
Zorn Ave @ Country Club Rd / Riverwood Dr (Signalized)	Country Club Rd	EB Lt/Th	C / 21	D / 38	C / 21	D / 38
		EB R	B / 19	C / 20	B / 19	C / 20
	Riverwood Dr	WB Lt/Th/Rt	B / 20	B / 19	B / 20	B / 19
	Zorn Ave	NB Lt/Th	E / 67	B / 13	F / 96	B / 14
		NB Th/Rt	B / 15	B / 13	B / 17	B / 13
	Zorn Ave	SB Lt/Th	B / 14	B / 13	B / 16	B / 14
		SB Th/Rt	C / 22	B / 13	C / 22	B / 14
	Overall		C / 25	B / 20	C / 30	B / 20

*WB = Westbound; EB = Eastbound; NB = Northbound; SB = Southbound

2015 Existing and 2025 No Action travel time measurements were extracted from VISSIM simulations for the following conditions:

- Southbound I-71 Off Ramp to Country Club Road (VA)
- Northbound I-71 Off Ramp to Country Club Road (VA)

- Country Club Road (VA) to Southbound I-71 On Ramp
- Country Club Road (VA) to Northbound I-71 On Ramp

2025 travel time results for each route either increased from 2015 travel time results, or essentially remained constant between the scenarios. The VISSIM results for the Existing Site (Zorn Avenue) can be found in Table 6.

Table 6: Existing Site (Zorn Avenue) VISSIM Results – Travel Time

Existing Site (Zorn Avenue) Travel Time Measurements (Min)				
Year	2015 Existing		2025 No Action	
Peak	AM	PM	AM	PM
SB I-71 to VA	1.8	1.8	2.0	2.0
NB I-71 to VA	1.3	1.3	1.4	1.3
VA to SB I-71	2.0	2.2	2.2	2.3
VA to NB I-71	1.5	1.5	1.5	1.6

*NB = Northbound; SB = Southbound

4.3 St. Joseph Site (Factory Lane)

The HCS results for the St Joseph Site (Factory Lane) can be found in Table 7. The table compares the AM and PM peak periods for the 2015 Existing scenario, 2025 No Build scenario (no VA Medical Center) and the 2025 Build scenario (with VA Medical Center).

Old Henry Road@I-265 Northbound Ramp (Signalized)

The overall Old Henry Road at I-265 northbound ramp operates at a LOS F in the Existing AM peak period, largely due to the delay of vehicles turning left from the I-265 off ramp. The intersection operates at an acceptable LOS in the Existing PM peak period. With the improvements KYTC is making to the intersection, it will operate at an acceptable LOS in both the AM and PM peak periods for both the No Build and Build conditions.

The left turn movement from Old Henry to the I-265 northbound on ramp falls from a LOS D in the AM peak of the No Build condition to a LOS E in the Build condition.

Old Henry Road @ Bush Farm Road (Signalized)

The Old Henry Road at Bush Farm Road intersection operates at a LOS E in the AM Existing scenario, and falls to a LOS F in the AM No Build and Build scenarios. The PM operates at a LOS C in the Existing conditions, and a LOS D in the No Build conditions. The intersection falls to a LOS E with the Build condition.

The westbound Bush Farm left turns onto Old Henry Road operate at a LOS F in the AM peak for Existing, No Build, and Build scenarios. The movement operates at a LOS C in the Existing PM peak and falls to LOS E in the PM peak for both the No Build and Build scenarios.

For both the No Build and Build conditions, the southbound Old Henry left turns operate at a LOS F in the PM peak. Also, for the Build condition, the northbound Old Henry thru movement operates at a LOS F in the PM peak.

Old Henry Road @ Factory Lane (Existing – Unsignalized; Proposed – Signalized)

Old Henry Road at Factory Lane is currently a three-way stop controlled intersection. The overall intersection (2015 Existing conditions) operates at acceptable levels (LOS C in the AM and LOS D in the PM) under these conditions. The shared thru/right from Old Henry northbound to Old Henry eastbound operates at a LOS E in the PM peak.

With the Old Henry project noted in the background information, Old Henry will be realigned to reduce the tight curve near the Factory Lane intersection. The Old Henry intersection will become a stop controlled intersection on the Factory Lane approach in the 2025 No Build scenario. This results in the Factory Lane left turn operating at a LOS F in the PM peak, while the right turn will operate at a LOS E in the AM peak.

With the addition of the VA Medical Center, a signal will likely be warranted at this location. The Build scenario assumes that a signal will be added to this intersection. The Old Henry left turns onto Factory Lane would operate at a LOS F in the AM peak, while the Factory Lane right turns onto Old Henry would operate at a LOS E in the AM peak. The overall intersection would operate at a LOS E in the AM peak period.

Factory Lane at VA Medical Center Entrance (Signalized)

The VA Medical Center Entrance at Factory Lane was analyzed for the Build scenario. It was assumed the intersection would be signalized and includes left and right turning lanes. This results in a LOS C in the AM and PM peaks for the overall intersection.

LaGrange Road @ Factory Lane (Signalized)

The LaGrange Road at Factory Lane intersection operates at a LOS F in the Existing AM peak conditions. The intersection operates at a LOS E in the Existing PM peak conditions. The intersection operates at LOS F for the AM and PM conditions of the No Build scenario. With the additional traffic generated by the VA Medical Center, the delay is lengthened even further in the AM and PM Build scenarios.

The northbound LaGrange Road thru and right turning movements operate at a LOS D in the AM peak period for the Existing, No Build, and Build scenarios. All other movements exceed capacity.

LaGrange Road @ I-265 Northbound Ramp (Unsignalized)

The LaGrange Road at I-265 northbound ramp is currently an unsignalized intersection that has two right turning movements from the I-265 northbound off ramp to LaGrange Road. HCS 2010 does not have the capabilities to analyze a dual right turn on an unsignalized intersection, so microsimulation models are used to analyze travel time measurements.

LaGrange Road @ I-265 Southbound Ramp (Signalized)

The LaGrange Road at I-265 southbound ramp will operate at a LOS E for the AM and PM peaks of the Existing conditions. The intersection will operate at a LOS F for the AM and PM peaks of the No Build and Build scenarios.

The left turns from I-265 southbound off ramp operates at a LOS F in the AM peak period for all three conditions. The right turning movements operate at LOS F in the PM peak Existing and No Build, and for both the AM and PM peak of the Build condition.

The northbound LaGrange Road thru's operate at a LOS E in the PM Existing and No Build, and falls to a LOS F in the PM Build.

The southbound LaGrange Road left turns operate at a LOS F in the AM and PM peak for all three conditions.

Table 7: St Joseph Site (Factory Lane) HCS Results – LOS and Delay

St Joseph Site (Factory Lane) Level of Service and Delay (sec)								
Year			2015 Existing		2025 No Build		2025 Build	
Peak			AM	PM	AM	PM	AM	PM
Old Henry Rd @ I-265 NB Ramp (Signalized)	I-265 NB Ramp	WB L	F / 287	D / 40	D / 55	D / 37	D / 55	D / 40
		WB R	D / 38	D / 52	C / 33	D / 48	D / 45	D / 55
	Old Henry Road	NB L	C / 28	C / 24	D / 52	D / 36	E / 60	D / 51
		NB T	B / 17	C / 20	C / 26	C / 23	C / 26	C / 22
	Old Henry Rd	SB T	D / 53	D / 39	D / 50	D / 39	D / 53	D / 45
	Overall		F / 141	C / 34	D / 49	C / 34	D / 51	D / 39
Old Henry Rd @ Bush Farm Rd (Signalized)	Bush Farm Road	EB Lt/Th	B / 17	B / 17	C / 22	C / 26	C / 27	C / 26
		EB R	B / 17	B / 17	B / 20	C / 25	C / 24	C / 25
	Bush Farm Road	WB L	F / 109	C / 22	F / 298	E / 68	F / 367	E / 68
		WB Th/Rt	B / 18	B / 17	C / 20	C / 24	C / 25	C / 24
	Old Henry Road	NB L	D / 39	C / 20	C / 35	B / 16	D / 36	B / 17
		NB T	B / 15	C / 27	B / 18	D / 54	C / 23	F / 79
		NB R	B / 15	C / 21	B / 19	C / 27	B / 17	C / 27
	Old Henry Road	SB L	B / 17	D / 39	C / 29	F / 235	D / 38	F / 387
		SB Th/Rt	C / 33	B / 17	D / 50	C / 22	D / 43	C / 24
	Overall		E / 60	C / 23	F / 127	D / 46	F / 131	E / 59
Old Henry Rd @ Factory Ln (Unsignalized - Ex; Signalized - Prop)	Old Henry Road	EB L	N/A	N/A	B / 10	A / 9	F / 117	B / 19
		EB T	N/A	N/A	-	-	A / 5	B / 13
		NB Th/Rt (Ex)	B / 11	E / 41	-	-	-	-
	Old Henry Road	WB T	N/A	N/A	-	-	D / 54	C / 31
		WB R	N/A	N/A	-	-	D / 54	C / 31
		WB Lt/Rt (Ex)	D / 30	C / 16	-	-	-	-
	Factory Lane	SB L	N/A	N/A	D / 26	F / 561	D / 39	C / 35
		SB R	N/A	N/A	E / 40	B / 13	E / 60	D / 46
		SB Lt/Th (Ex)	B / 13	B / 14	-	-	-	-
	Overall		C / 22	D / 30	-	-	E / 69	C / 26
Factory Ln @ VA (Signalized)	VA Site	EB L	-	-	-	-	C / 31	D / 39
		EB R	-	-	-	-	C / 31	D / 42
	Factory Lane	NB L	-	-	-	-	C / 25	B / 11
		NB T	-	-	-	-	A / 9	B / 10
	Factory Lane	SB T	-	-	-	-	B / 17	B / 17
		SB R	-	-	-	-	B / 17	B / 15
	Overall		-	-	-	-	C / 20	C / 24
LaGrange Rd @ Factory Ln (Signalized)	Factory Lane	EB Lt/Th	E / 68	E / 69	E / 69	E / 70	E / 69	E / 70
		EB R	E / 72	E / 68	E / 73	E / 69	E / 73	E / 69
	Factory Lane	WB L	F / 417	F / 138	F / 680	F/ 275	F / 758	F / 593
		WB T	E / 69	E / 68	E / 70	E / 70	E / 71	E / 71
		WB R	E / 66	E / 65	E / 67	E / 66	E / 67	E / 68
	LaGrange Road	NB L	E / 72	E / 67	E / 73	E / 68	E / 73	E / 68
		NB T	D / 46	E / 68	D / 47	F / 87	D / 47	F / 87
		NB R	D / 44	E / 61	D / 45	E / 69	D / 54	F / 85
	LaGrange Road	SB L	F / 83	F / 83	F / 83	F / 83	F / 86	F / 83
		SB T	F / 164	E / 61	F / 212	E / 63	F / 212	E / 63
		SB R	F / 164	E / 61	F / 213	E / 63	F / 213	E / 63
	Overall		F / 174	E / 74	F / 265	F / 104	F / 278	F / 178
LaGrange Rd @ I-265 NB Ramp (Unsignalized)	I-265 NB Ramp	WB L	* Dual Right --> Unable to Analyze	* Dual Right --> Unable to Analyze	* Dual Right --> Unable to Analyze	* Dual Right --> Unable to Analyze	* Dual Right --> Unable to Analyze	* Dual Right --> Unable to Analyze
		WB R						
	LaGrange Road	NB T						
		NB R						
	LaGrange Road	SB L						
		SB T						
	Overall							
LaGrange Rd @ I-265 SB Ramp (Signalized)	I-265 SB Ramp	WB L	F / 84	D / 53	F / 161	D / 54	F / 161	D / 54
		WB R	D / 54	F / 95	D / 54	F / 121	F / 97	F / 178
	LaGrange Road	NB T	D / 37	E / 60	D / 37	E / 79	D / 38	F / 80
	LaGrange Road	SB L	F / 170	F / 85	F / 222	F / 111	F / 224	F / 119
		SB T	B / 10	A / 9	B / 11	A / 9	B / 11	A / 9
	Overall		E / 75	E / 63	F / 105	F / 81	F / 107	F / 92

*WB = Westbound; EB = Eastbound; NB = Northbound; SB = Southbound

2015 Existing, 2025 No Build and 2025 Build travel time measurements were extracted from VISSIM simulations for the following conditions:

- Southbound I-265 Off Ramp at LaGrange Road to VA
- Northbound I-265 Off Ramp at LaGrange Road to VA
- VA to Southbound I-265 On Ramp at LaGrange Road
- VA to Northbound I-265 On Ramp at LaGrange Road
- Northbound I-265 Off Ramp at Old Henry Road to VA
- VA to Northbound I-265 On Ramp at Old Henry Road to VA

2025 Build scenario travel time results for each route either increased (or essentially remained constant for one route) between the scenarios. The VISSIM results for the St Joseph Site (Factory Lane) can be found in Table 8.

Table 8: St Joseph Site (Factory Lane) VISSIM Results – Travel Time

St Joseph Site (Factory Lane) Travel Time Measurements (Min)						
Year	2015 Existing		2025 No Build		2025 Build	
Peak	AM	PM	AM	PM	AM	PM
SB I-265 LaGrange to VA	3.4	3.1	3.4	3.3	4.0	3.6
NB I-265 LaGrange to VA	2.6	2.9	2.7	3.5	2.8	4.6
VA to SB I-265 LaGrange	4.6	4.1	5.6	4.5	6.7	6.5
VA to NB I-265 LaGrange	3.3	3.2	4.0	3.4	5.0	5.8
NB I-265 Old Henry to VA	4.6	5.1	4.0	4.2	5.0	4.8
VA to NB I-265 Old Henry	4.3	4.0	4.6	4.0	4.5	4.1

*NB = Northbound; SB = Southbound

4.4 Midlands Site (KY 22)

The HCS results for the Midlands Site (KY 22) can be found in Table 9. The table compares the AM and PM peak periods for the following scenarios

- 2015 Existing
- 2025 with VA with Existing Interchange
- 2025 with Mixed Use Development with Existing Interchange
- 2025 with VA with Proposed SPUI
- 2025 with Mixed Use Development with Proposed SPUI

US 42 @ Rudy Lane

The US 42 at Rudy Lane intersection performs at an overall acceptable LOS for all scenarios in both the AM and PM peak hours.

The southbound left turn from US 42 operates at a LOS E for all scenarios for the AM and PM peak hours. The northbound left turn from US 42 operates at a LOS E for all AM peak hour scenarios.

The eastbound left turn and the westbound right turn from Rudy Lane operates at a LOS E for all scenarios for the AM and PM peak hours. The westbound left/thru movement operates at a LOS E in the AM peak for all scenarios.

US 42 @ I-264

The US 42 @ I-264 southbound ramps intersection operates at an acceptable LOS in the 2015 AM and PM peak periods. The intersection drops to a LOS E for the 2025 AM peak in the No Build (with VA) and No Build (with Mixed Use Development) scenarios.

The US 42 @ I-264 northbound ramps intersection operate at acceptable LOS for the AM and PM peak periods for all scenarios.

The proposed US 42 @ I-264 SPUI configuration operates at acceptable LOS for the AM and PM peak periods for all scenarios.

US 42 @ KY 22/Northfield Drive

The US 42 intersection with KY 22 / Northfield Drive operates at a LOS E in the 2015 AM peak period. All 2025 AM and PM No Build (with VA and with Development) peak scenarios operate at a LOS F. The 2025 AM Build (with VA and with Development) peak scenarios operate at a LOS E. The 2025 PM Build (with VA and with Development) peak scenarios operate at a LOS F.

KY 22 @ Slip Ramp/VA Entrance

The KY 22 intersection with the Slip Ramp / VA entrance will operate at a LOS D in the 2025 No Build AM peak and a LOS F in the 2025 No Build PM peak. The entrance will operate at a LOS C in the 2025 Build AM and PM peak.

The KY 22 intersection with the Slip Ramp / Mixed Use Development will operate at a LOS D in the 2025 No Build AM peak and a LOS F in the 2025 No Build PM peak. The entrance will operate at a LOS C in the 2025 AM and PM peak.

Table 9: Midlands Site (KY 22) HCS Results – LOS and Delay

Midlands Site (KY 22) Level of Service and Delay (sec)												
Year			2015 Existing		2025 No Build (with VA)		2025 No Build (With Develop)		2025 Build (with VA)		2025 Build (with Develop)	
Peak			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
US 42 @ Rudy Ln (Signalized)	Rudy Lane	EB L	E / 62	E / 57	E / 61	E / 70	E / 61	E / 70	E / 61	E / 70	E / 61	E / 70
		EB T	D / 53	D / 46	D / 51	D / 45	D / 52	D / 45	D / 51	D / 45	D / 52	D / 45
		EB R	D / 55	D / 48	D / 53	D / 47	D / 53	D / 47	D / 53	D / 47	D / 53	D / 47
	Rudy Lane	WB Lt/Th	E / 56	D / 48	E / 56	D / 47	E / 56	D / 47	E / 56	D / 47	E / 56	D / 47
		WB R	E / 62	F / 81	E / 61	E / 64	E / 62	E / 64	E / 61	E / 64	E / 62	E / 64
	US 42	NB L	E / 70	D / 54	E / 68	D / 51	E / 68	D / 52	E / 68	D / 51	E / 68	D / 52
		NB T	B / 14	C / 33	B / 17	D / 39	B / 17	D / 41	B / 17	D / 39	B / 17	D / 41
		NB R	B / 11	C / 26	B / 13	C / 29	B / 13	C / 30	B / 13	C / 29	B / 13	C / 30
	US 42	SB L	E / 65	E / 62	E / 65	E / 60	E / 65	E / 60	E / 65	E / 60	E / 65	E / 60
		SB T	B / 16	C / 34	C / 24	D / 49	C / 24	D / 47	C / 24	D / 49	C / 24	D / 47
		SB R	B / 11	C / 33	B / 13	D / 42	B / 13	D / 42	B / 13	D / 42	B / 13	D / 42
	Overall		C / 24	D / 43	C / 29	D / 49	C / 28	D / 49	C / 29	D / 49	C / 28	D / 49
US 42 @ I-264 SB Ramp (Signalized)	I-264 SB Ramp	EB L	D / 41	E / 58	D / 50	E / 61	D / 47	E / 66	-	-	-	-
		EB R	E / 63	D / 50	F / 192	D / 47	F / 192	D / 45	-	-	-	-
	US 42	NB T	D / 47	C / 28	D / 40	E / 63	D / 39	F / 73	-	-	-	-
		NB R	D / 53	C / 26	D / 48	D / 40	D / 48	D / 40	-	-	-	-
	US 42	SB L	D / 42	D / 52	F / 97	F / 75	F / 105	F / 74	-	-	-	-
		SB T	B / 10	A / 8	A / 9	B / 11	A / 10	B / 12	-	-	-	-
	Overall		D / 35	C / 33	E / 61	D / 51	E / 64	D / 54	-	-	-	-
US 42 @ I-264 NB Ramp (Signalized)	I-264 NB Ramp	WB L	D / 49	D / 39	D / 48	D / 35	D / 48	D / 35	-	-	-	-
		WB R	D / 52	D / 53	E / 70	D / 54	E / 70	D / 54	-	-	-	-
	US 42	NB L	E / 63	E / 63	E / 62	E / 62	E / 62	E / 62	-	-	-	-
		NB T	A / 6	B / 14	A / 8	C / 21	A / 7	C / 24	-	-	-	-
	US 42	SB T	B / 18	B / 20	C / 28	C / 31	C / 29	C / 29	-	-	-	-
		SB R	C / 23	B / 17	D / 40	C / 26	D / 44	C / 25	-	-	-	-
	Overall		C / 25	C / 26	C / 34	C / 32	D / 35	C / 32	-	-	-	-
US 42 @ I-264 SPUI (Signalized)	I-264 SPUI	EB L	-	-	-	-	-	-	E / 55	E / 58	D / 53	E / 65
		EB R	-	-	-	-	-	-	D / 54	D / 46	D / 54	D / 45
	I-264 SPUI	WB L	-	-	-	-	-	-	E / 56	D / 40	E / 57	D / 39
		WB R	-	-	-	-	-	-	C / 26	C / 29	C / 26	C / 30
	US 42	NB L	-	-	-	-	-	-	E / 72	E / 72	E / 72	E / 72
		NB T	-	-	-	-	-	-	D / 39	E / 56	D / 39	E / 55
		NB R	-	-	-	-	-	-	C / 29	C / 27	C / 30	C / 26
	US 42	SB L	-	-	-	-	-	-	D / 50	E / 55	D / 50	E / 57
		SB T	-	-	-	-	-	-	B / 19	C / 25	B / 19	C / 25
		SB R	-	-	-	-	-	-	B / 12	B / 15	B / 11	B / 14
	Overall		-	-	-	-	-	-	D / 40	D / 45	D / 40	D / 47
US 42 @ KY 22 / Northfield Dr (Signalized)	Northfield Drive	EB Lt/Th	E / 62	F / 87	E / 69	F / 92	E / 65	F / 102	E / 69	F / 368	E / 65	F / 403
		EB R	E / 68	E / 67	F / 150	E / 61	F / 150	E / 61	F / 150	E / 75	F / 150	E / 75
	KY 22	WB L	D / 49	E / 71	F / 242	F / 382	F / 294	F / 280	F / 148	F / 280	F / 190	F / 193
		WB Th/Rt	C / 27	D / 38	C / 32	C / 31	C / 32	C / 31	C / 27	C / 31	C / 27	C / 31
	US 42	NB L	F / 82	D / 45	F / 92	F / 138	F / 93	F / 138	D / 45	F / 141	D / 45	F / 141
		NB T	E / 57	D / 48	D / 55	F / 148	D / 55	F / 148	D / 44	F / 148	D / 44	F / 148
		NB R	C / 28	B / 19	C / 25	C / 25	C / 24	C / 27	C / 31	C / 28	C / 29	C / 30
	US 42	SB L	E / 61	E / 66	E / 63	E / 61	E / 63	E / 61	E / 63	E / 75	E / 63	E / 75
		SB T	F / 85	B / 19	F / 126	C / 27	F / 126	C / 27	D / 37	C / 25	D / 37	C / 25
		SB R	F / 85	B / 19	F / 127	C / 27	F / 127	C / 27	D / 43	C / 26	D / 43	C / 26
	Overall		E / 69	D / 40	F / 126	F / 152	F / 139	F / 125	E / 60	F / 133	E / 70	F / 113
Old Brownsboro Rd @ VA (Signalized)	KY 22	EB L	E / 55	E / 69	D / 52	F / 256	D / 53	F / 256	C / 30	C / 31	C / 30	C / 30
		EB T	-	-	D / 45	D / 44	D / 41	D / 49	B / 20	B / 13	B / 18	B / 15
	VA Site	WB T	-	-	E / 62	F / 200	E / 59	F / 83	D / 46	C / 30	F / 145	C / 30
		WB R	-	-	E / 56	D / 39	D / 52	D / 36	C / 30	C / 25	C / 31	C / 24
	Ramp Split	NB T	A / 7	B / 12	C / 34	D / 39	C / 31	D / 43	C / 21	C / 26	B / 17	C / 24
		NB R	-	-	C / 30	C / 25	C / 24	C / 30	B / 19	B / 18	B / 14	B / 19
	Old Brownsboro Road	SB L	-	-	E / 60	C / 25	E / 65	C / 27	C / 32	B / 18	D / 36	B / 17
		SB R	B / 12	B / 12	D / 38	C / 24	D / 51	C / 24	B / 17	B / 20	B / 17	B / 17
	Overall		C / 20	C / 32	D / 43	F / 128	D / 47	F / 92	C / 23	C / 26	C / 32	C / 23

*WB = Westbound; EB = Eastbound; NB = Northbound; SB = Southbound

2015 Existing, 2025 No Build, 2025 Build with VA, and 2025 Build with Mixed Use Development travel time measurements were extracted from VISSIM simulations for the following movements:

- I-264 eastbound at Westport Road to US 42 eastbound at Lime Kiln
- I-264 westbound at I-71 to KY 22 at Lime Kiln
- US 42 westbound at Lime Kiln to I-264 westbound at Westport Road
- KY 22 at Lime Kiln to I-264 westbound at Westport Road
- I-264 eastbound at Westport Road to VA
- I-264 westbound at I-71 to VA
- US 42 eastbound west of Rudy Lane to VA
- US 42 westbound at Lime Kiln to VA
- KY 22 at Lime Kiln to VA
- VA to I-264 westbound at Westport Road
- VA to I-264 eastbound at I-71
- VA to US 42 westbound east of Rudy Lane
- VA to US 42 eastbound at Lime Kiln
- VA to KY 22 at Lime Kiln

The VISSIM results for the Midlands Site (KY 22) can be found in Table 10.

In general, the SPUI configuration (in comparison to the existing interchange) reduces the travel times for most of the 2025 Build scenario with VA routes. However, the PM peak movements from the VA to I-264 and US 42 are longer.

The SPUI configuration (in comparison to the existing interchange) reduces, or maintains, the travel times for all of the 2025 Build scenario AM peak with Mixed Use Development routes. The PM scenario for the Mixed Use Development has a little less than half of the routes (most of the routes from the development) with an increase in travel time.

In comparison to the Mixed Use Development, the travel times for the existing interchange with the VA were shorter, or maintained, in the AM and PM peaks, with the exception of 2 routes.

The travel times for the SPUI configuration with the VA were shorter, or maintained for every route but four in the AM peak, and half of the routes with the PM peak.

Table 10: Midlands Site (KY 22) VISSIM Results – Travel Time

Midlands Site (KY 22) Travel Time Measurements (Min)										
Year	2015 Existing		2025 Build (with VA) Existing Interchange		2025 Build (with Develop) Existing Interchange		2025 Build (with VA) SPUI		2025 Build (with Develop) SPUI	
Peak	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-264 EB to Lime Kiln	3.2	4.6	3.4	5.9	3.4	6.4	2.8	3.0	2.7	3.0
I-264 WB to Lime Kiln	3.1	3.0	3.6	3.2	3.6	3.3	3.3	2.9	3.2	3.2
US 42 WB to I-264 WB	3.4	3.1	4.3	3.3	4.2	3.3	3.5	3.2	3.5	3.1
KY 22 to I-264 WB	3.7	3.4	5.6	4.2	5.9	4.1	3.7	3.3	3.8	3.2
I-264 EB to VA	-	-	1.9	1.9	1.6	1.9	1.6	1.4	1.6	1.5
I-264 WB to VA	-	-	2.8	2.5	2.9	2.6	2.6	2.4	2.5	2.6
US 42 EB to VA	-	-	3.2	2.6	3.2	2.8	3.1	3.2	3.1	3.5
US 42 WB to VA	-	-	3.1	2.9	3.4	3.6	2.8	3.0	2.4	3.1
Old Brownsboro to VA	-	-	2.2	-	2.4	-	1.4	1.7	1.4	1.7
VA to I-264 WB	-	-	6.6	4.0	8.0	4.0	3.7	4.6	3.7	4.4
VA to I-264 EB	-	-	4.7	2.7	6.2	2.7	2.3	3.6	2.4	3.4
VA to US 42 WB	-	-	5.1	2.7	6.7	2.6	2.4	3.7	2.7	3.5
VA to US 42 EB	-	-	5.5	3.0	6.7	3.1	2.7	3.6	2.7	3.3
VA to Old Brownsboro	-	-	1.2	0.8	1.6	0.9	0.6	0.8	0.6	0.7

*WB = Westbound; EB = Eastbound

5.0 Conclusions and Recommendations

Three sites were evaluated from a traffic standpoint to determine traffic impacts from the potential construction of a VA Medical Center. Travel times to and from an interstate highway were compared for each. The Existing site (Zorn Avenue) does not show a significant increase in travel time to and from the VA Hospital between the existing 2015 conditions and the 2025 No Action scenario since the hospital is restricted from expanding and no additional traffic is anticipated (see Table 6). The St. Joseph Site (Factory Lane) would be expected to encounter increases in travel time with the construction of a new VA Hospital, particularly in the PM peak periods travelling to the LaGrange Road interchange with I-265 (see Table 8). These increases in travel times in the 2025 Build condition as opposed to the 2025 No Build condition are mainly attributable to the lack of improvements proposed by the KYTC along LaGrange Road.

The Midlands Site (KY 22) is expected to experience reductions in travel time to and from I-264 for the 2025 Build condition with the new SPUI interchange compared to the 2025 Build condition without the new SPUI being constructed. With the new interchange constructed, the 2025 Build travel times are generally the same or slightly lower than existing 2015 conditions due to construction of the new interchange. Since the Midlands site is anticipated to develop prior to 2025 if the VA is not constructed, and since traffic volumes for a mixed use development at the Midlands site are anticipated to be similar to those anticipated with a VA Hospital, very little difference is seen between travel times for the 2025 Build condition with the VA and 2025 Build conditions with a different mixed-use development.

Recommendations for each of the three studied sites are discussed below. Many of the recommendations would involve the inclusion of a new project in Kentucky's 6-year Highway Plan to move forward.

5.1 Existing Site (Zorn Avenue)

The Existing VA Medical Center location at Zorn Avenue is currently constrained by its location, so no growth was assumed to and from the VA site. Several recommendations have been identified for consideration to improve congestion along the Zorn Avenue corridor. These recommendations for improvements to the Zorn Avenue study area include:

- Evaluate signalizing the I-71 southbound ramp at Zorn Avenue
- Evaluate turn lane lengths at I-71 northbound ramp with Zorn Avenue intersection
- Evaluate realignment and intersection improvements of Mellwood Drive at Zorn Avenue intersection, including adequate turning lanes
- Evaluate signalizing the Mellwood Drive intersection with Zorn Avenue
- Improve Country Club Road / Riverwood Drive and Zorn Avenue intersection with adequate turn lanes, and consider using protected/permitted phasing for Zorn Avenue turns

5.2 St Joseph Site (Factory Lane)

The addition of the VA Medical Center to the St Joseph Site will add considerable traffic to the corridor, which further exacerbates the congestion at the LaGrange Road intersection with Factory Lane, as well as causing queue storage concerns at several other locations (northbound I-265 ramps with Old Henry and the southbound I-265 ramps with LaGrange Road). The Factory Lane intersection with Old Henry Road will also be congested during the peak hours. Several recommendations have been identified for consideration to improve congestion along the corridor. These recommendations for improvements to the Factory Lane study area include:

- Widen Old Henry Road (Currently under design by KYTC)
- Evaluate the Old Henry Road with Bush Farm Road intersection for capacity improvements and additional turn lanes, appropriate storage lengths
- Signalize the Old Henry Road intersection with Factory Lane and provide adequate turn lane storage
- Widen Factory Lane to three lanes
- Evaluate capacity improvements at the LaGrange Road intersection with Factory Lane with additional turn lanes
- Evaluate the LaGrange Road intersection with I-265 northbound ramps for signalization
- Evaluate the I-265 southbound ramps at LaGrange Road for additional turning lanes along the exit ramp
- Evaluate the LaGrange Road intersection at I-265 southbound ramps for dual left turns onto the southbound entrance ramp

5.3 Midlands Site (KY 22)

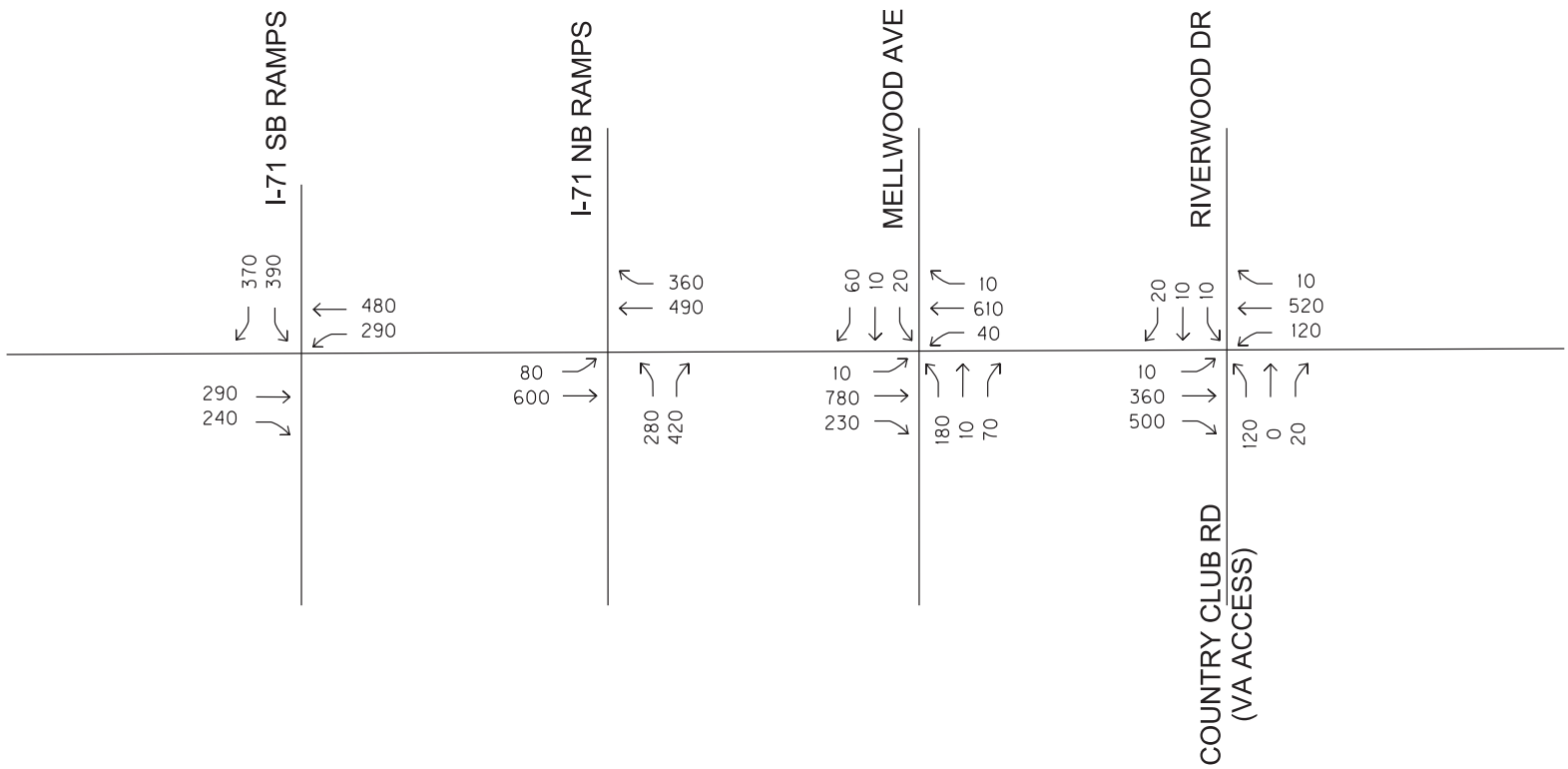
Construction of the proposed SPUI (KYTC Item No. 5-804.00) near the KY 22 corridor will greatly improve congestion in the area. The analyses find that both the VA and a mixed use development will add similar levels of traffic to the corridor, with the mixed use development anticipated to add more traffic to the corridor than the VA in the PM peak while the VA will add more traffic during the AM peak. Several possible solutions have been identified for consideration to further improve congestion along the corridor. These possible solutions for improvement to the KY 22 study area include:

- Widen KY 22 to five lanes
- Widen Herr Lane to three or five lanes to improve the connection between US 42 and Westport Road
- Convert the US 42 intersection with KY 22 and Northfield Drive to right-in/right-out. This option was recommended in the 2011 Scoping Study for the US 42 interchange, but was not carried forward into Phase I Design or included in the Interchange Modification Report recently submitted. Reductions in traffic from the opening of the Westport Road interchange and the ramp split from the I-264 eastbound off-ramp directly to KY 22 along with heavy public opposition led the KYTC to drop converting the intersection from consideration.

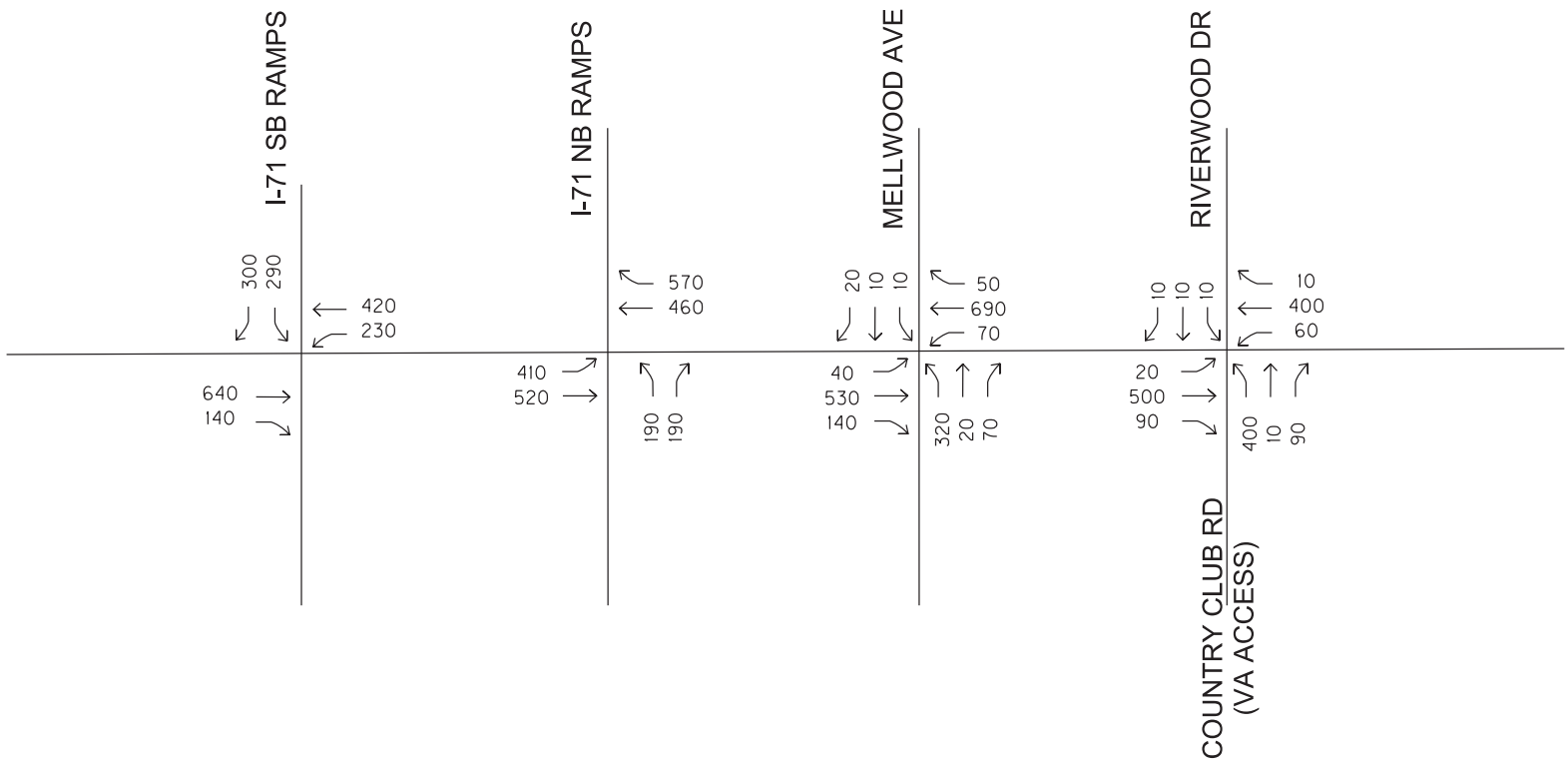
- Relocate the US 42/KY 22 intersection to Glenview Avenue and construct a connector road. This option was explored as part of the 2011 Scoping Study for the US 42 interchange and as part of the construction of the ramp split from the eastbound I-264 off-ramp directly to KY 22. The connector road would be needed if the US 42 intersection with KY 22 and Northfield Drive were converted to right-in/right-out.
- Consider adding an interchange along I-71 at the US 42 underpass
- Consider a direct connection between KY 22 and I-264 westbound using a flyover ramp. As part of the Value Engineering Study performed for the US 42 interchange in December 2014, the KYTC considered a direct flyover ramp connection from KY 22 at the VA entrance to the I-264 westbound on-ramp. This flyover ramp took both VA and KY 22 traffic directly over the I-264 eastbound off-ramp and I-264 before merging with the I-264 westbound on-ramp. This addition would remove a considerable amount of traffic from the SPUI intersection and from the US 42 intersection with KY 22 and Northfield Drive. The additional construction cost of $4.4 million and concerns for driver expectancy with this configuration led the KYTC to drop this option. The current design of the SPUI will be, however, developed to not preclude the option of adding a direct flyover connection.

TRAFFIC STUDY
APPENDIX A

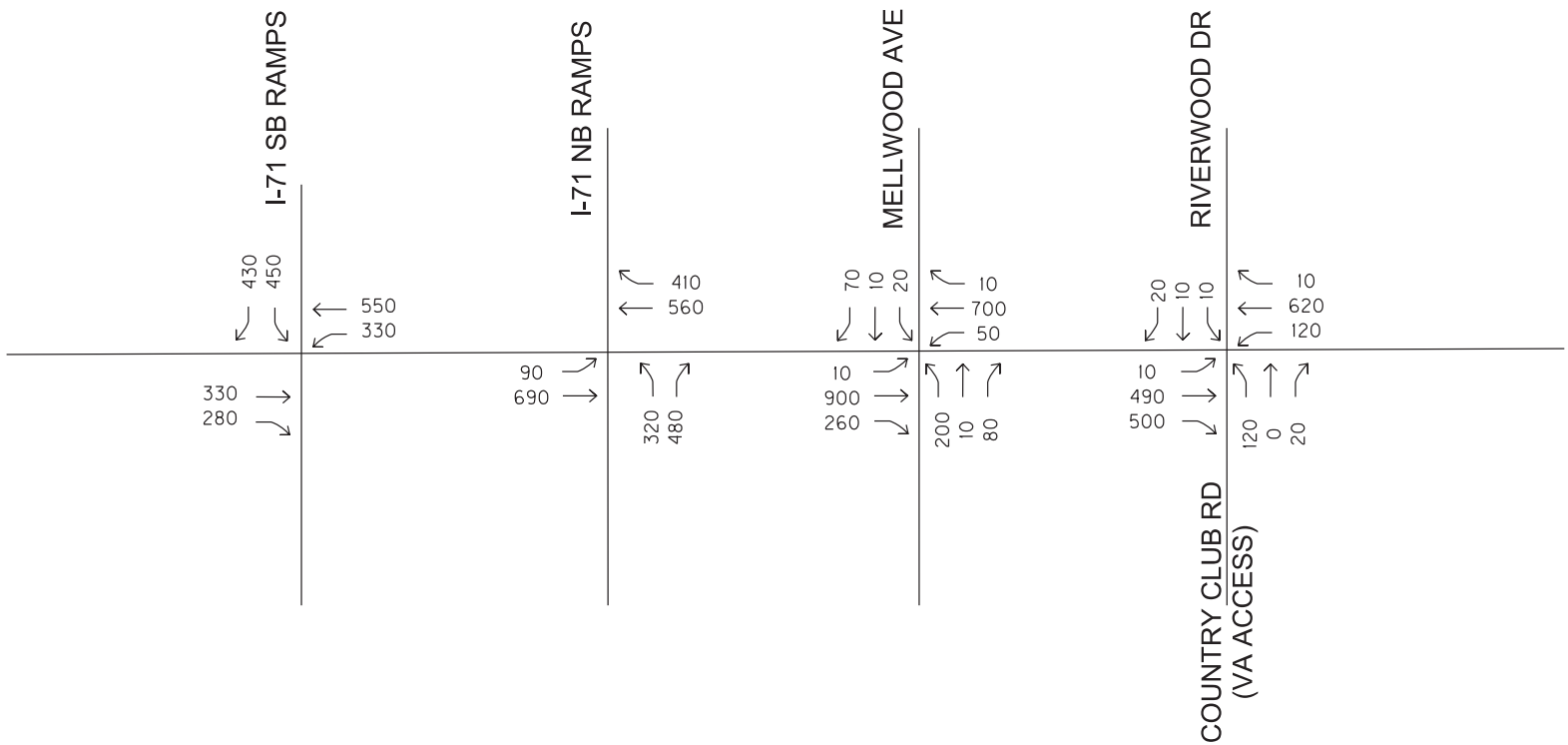
Existing Site (Zorn Avenue) Traffic Volumes
(Vehicles per Hour)



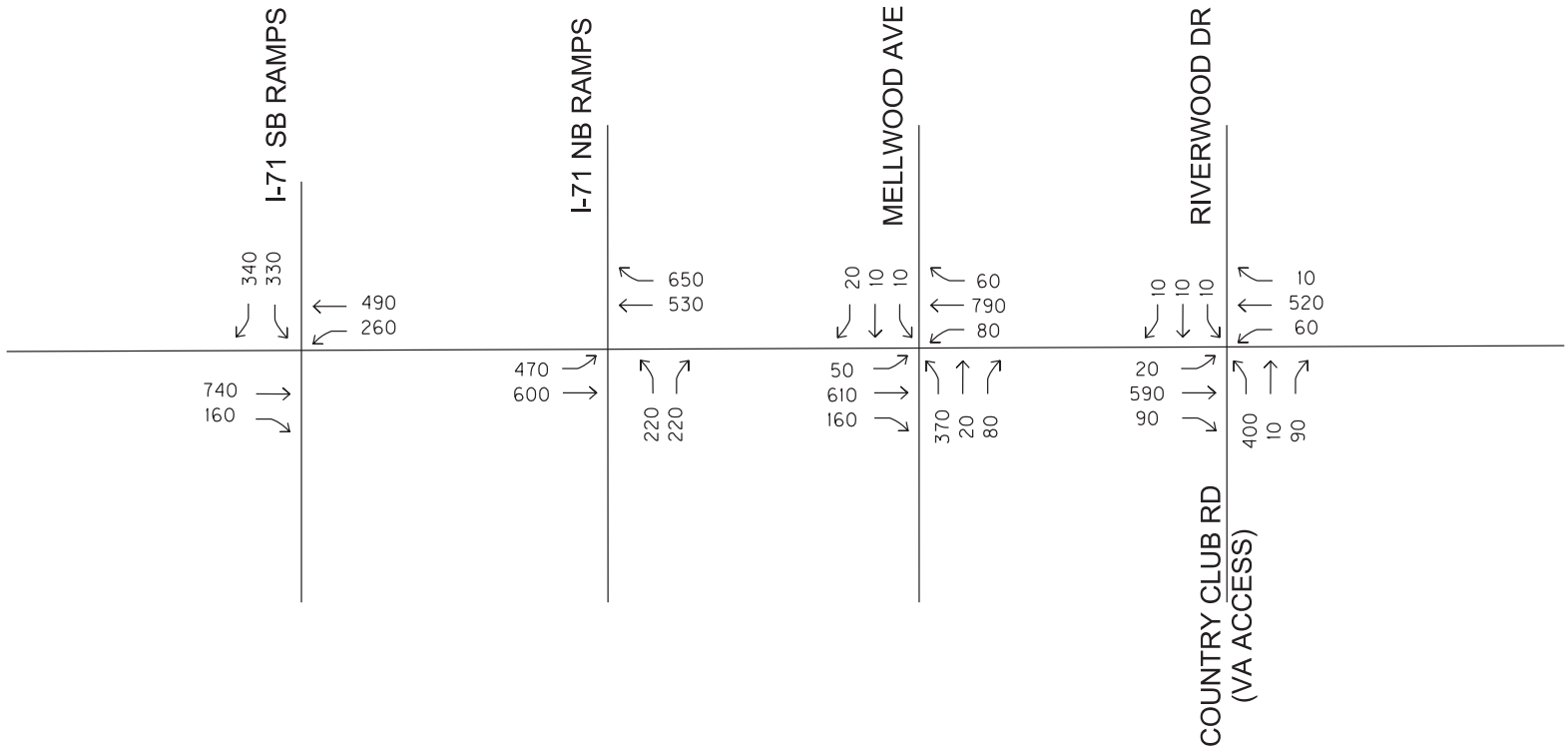
2015 EXISTING
AM PEAK TURNING MOVEMENTS



2015 EXISTING
PM PEAK TURNING MOVEMENTS



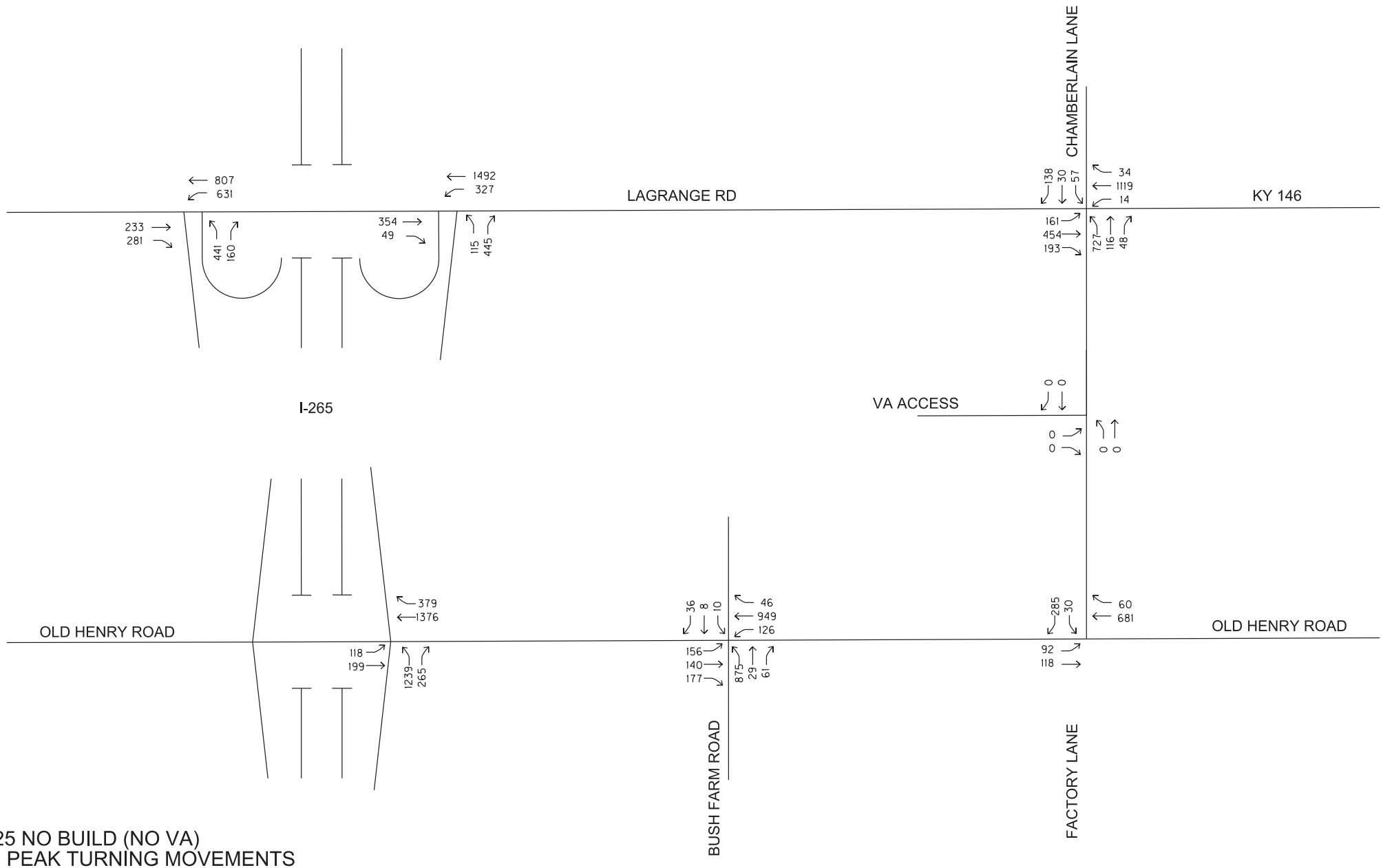
2025 NO ACTION
AM PEAK TURNING MOVEMENTS



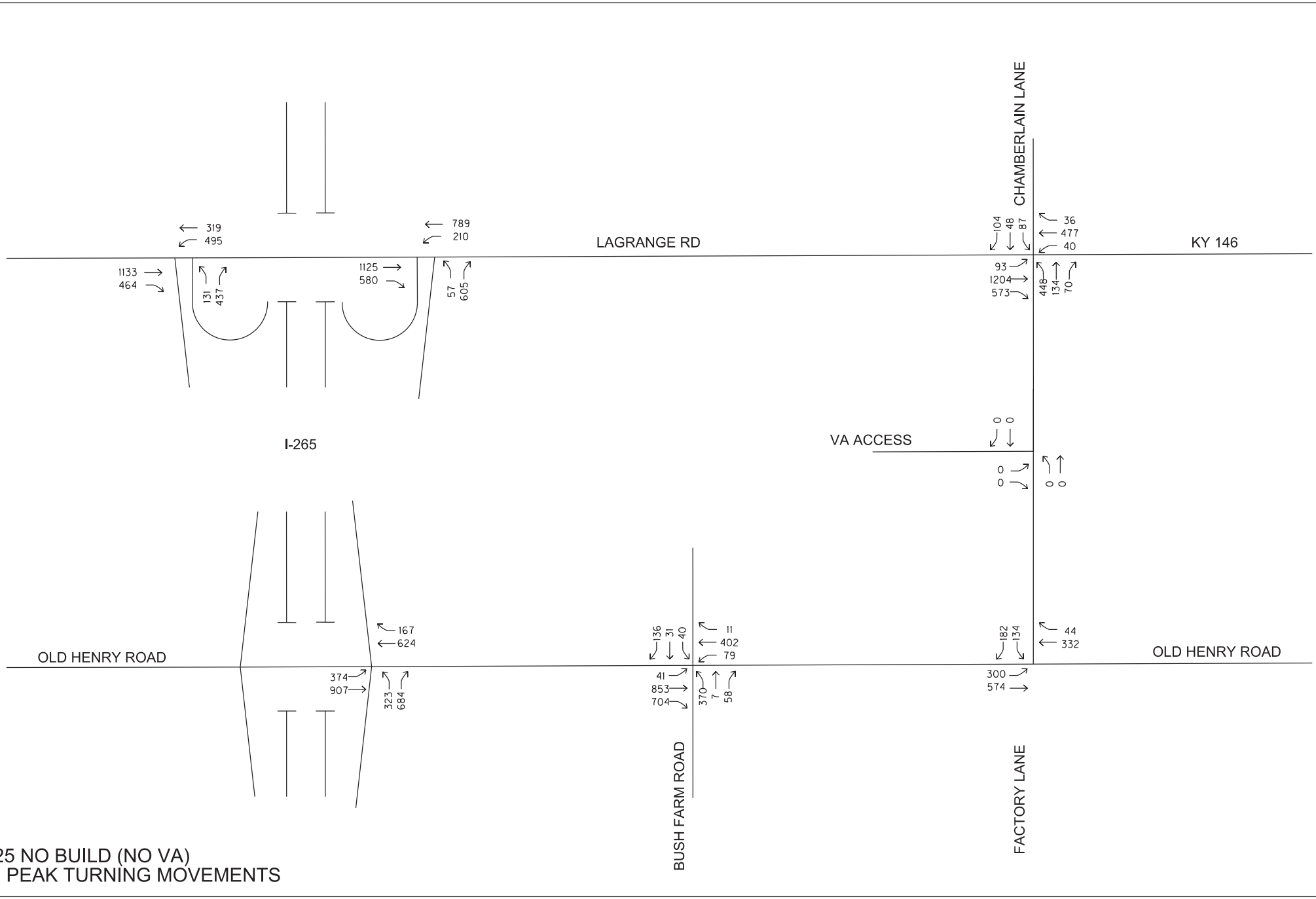
2025 NO ACTION
PM PEAK TURNING MOVEMENTS

TRAFFIC STUDY
APPENDIX B

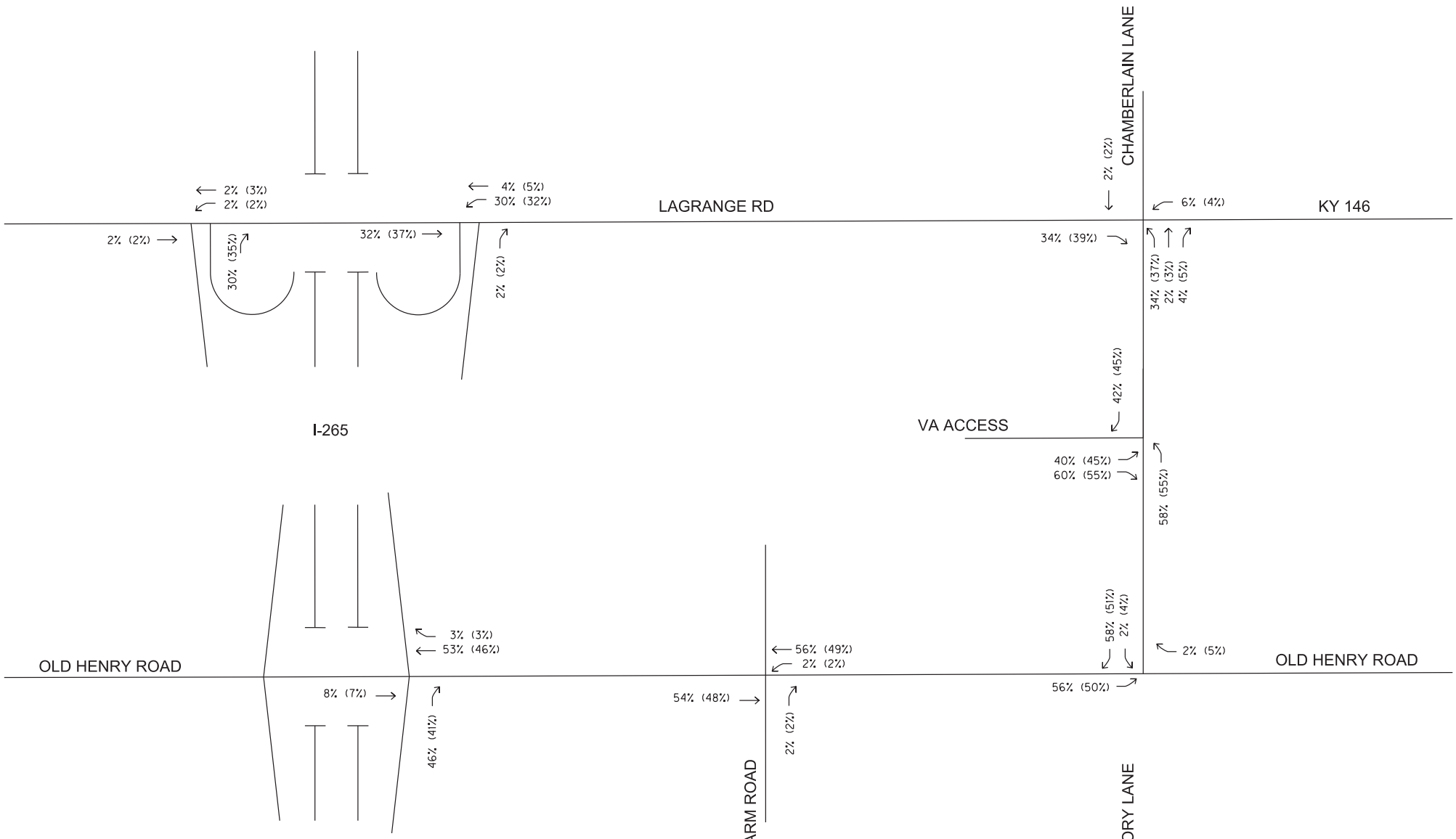
St Joseph Site (Factory Lane) Traffic Volumes
(Vehicles per Hour)



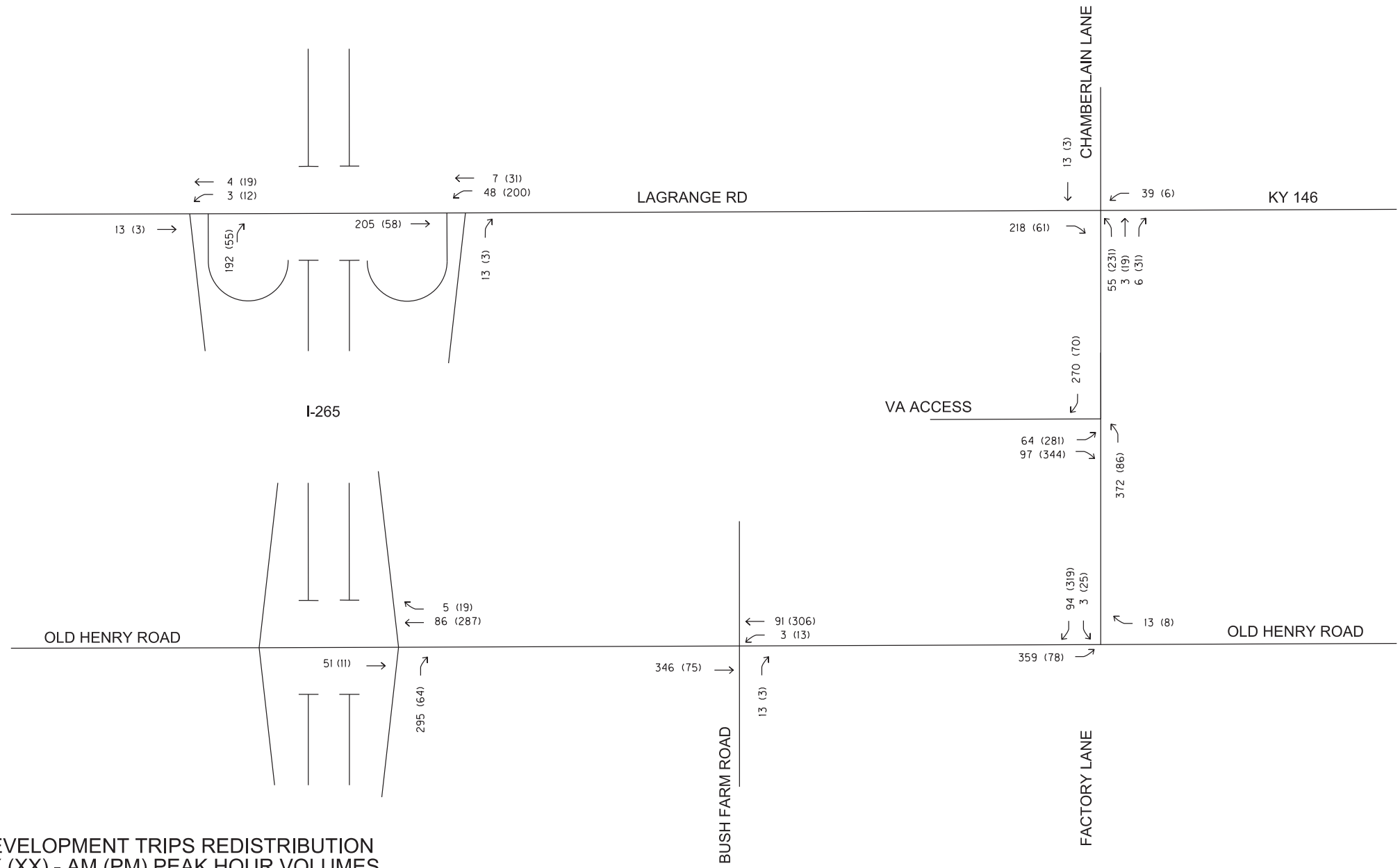
2025 NO BUILD (NO VA)
AM PEAK TURNING MOVEMENTS



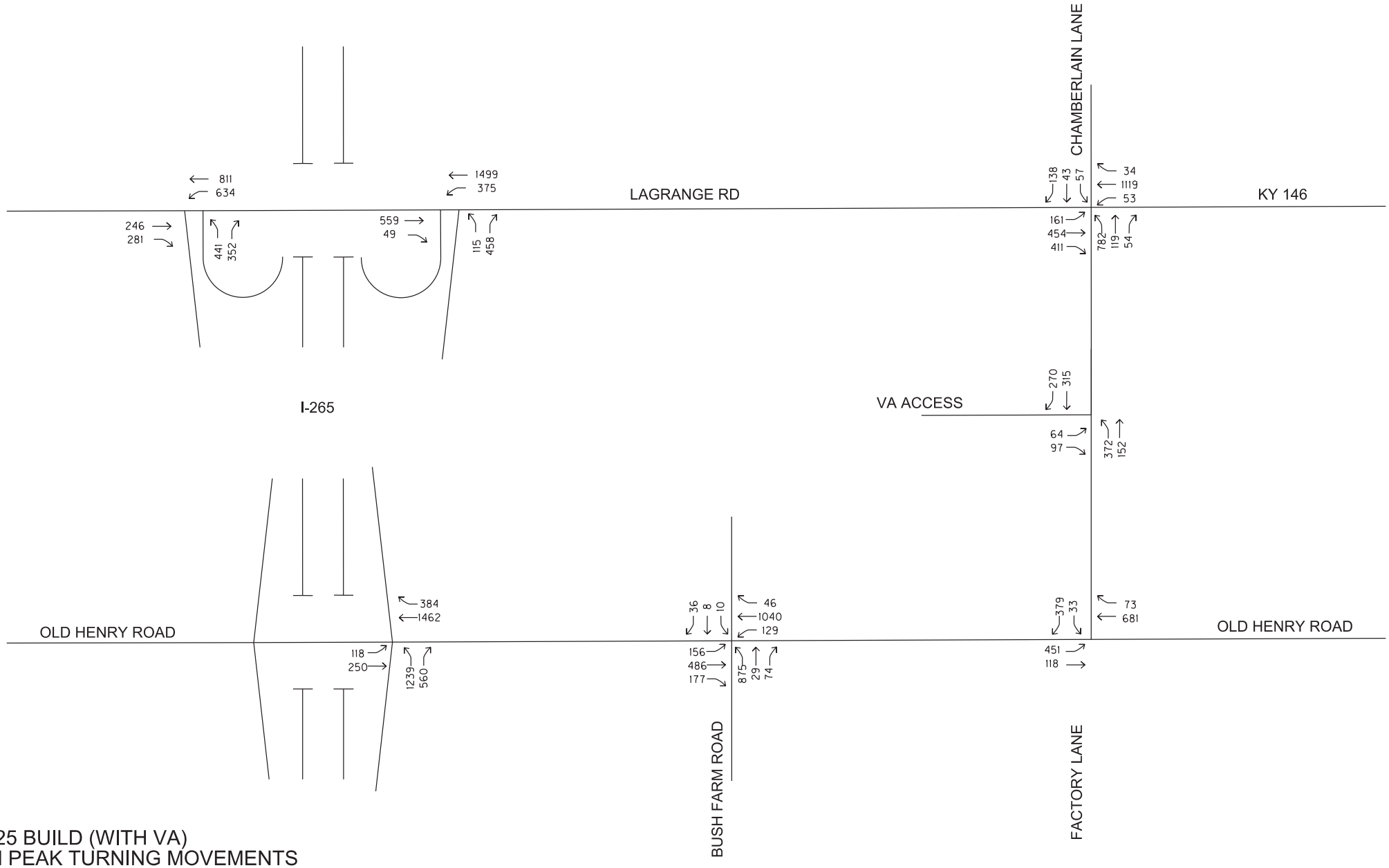
2025 NO BUILD (NO VA)
PM PEAK TURNING MOVEMENTS



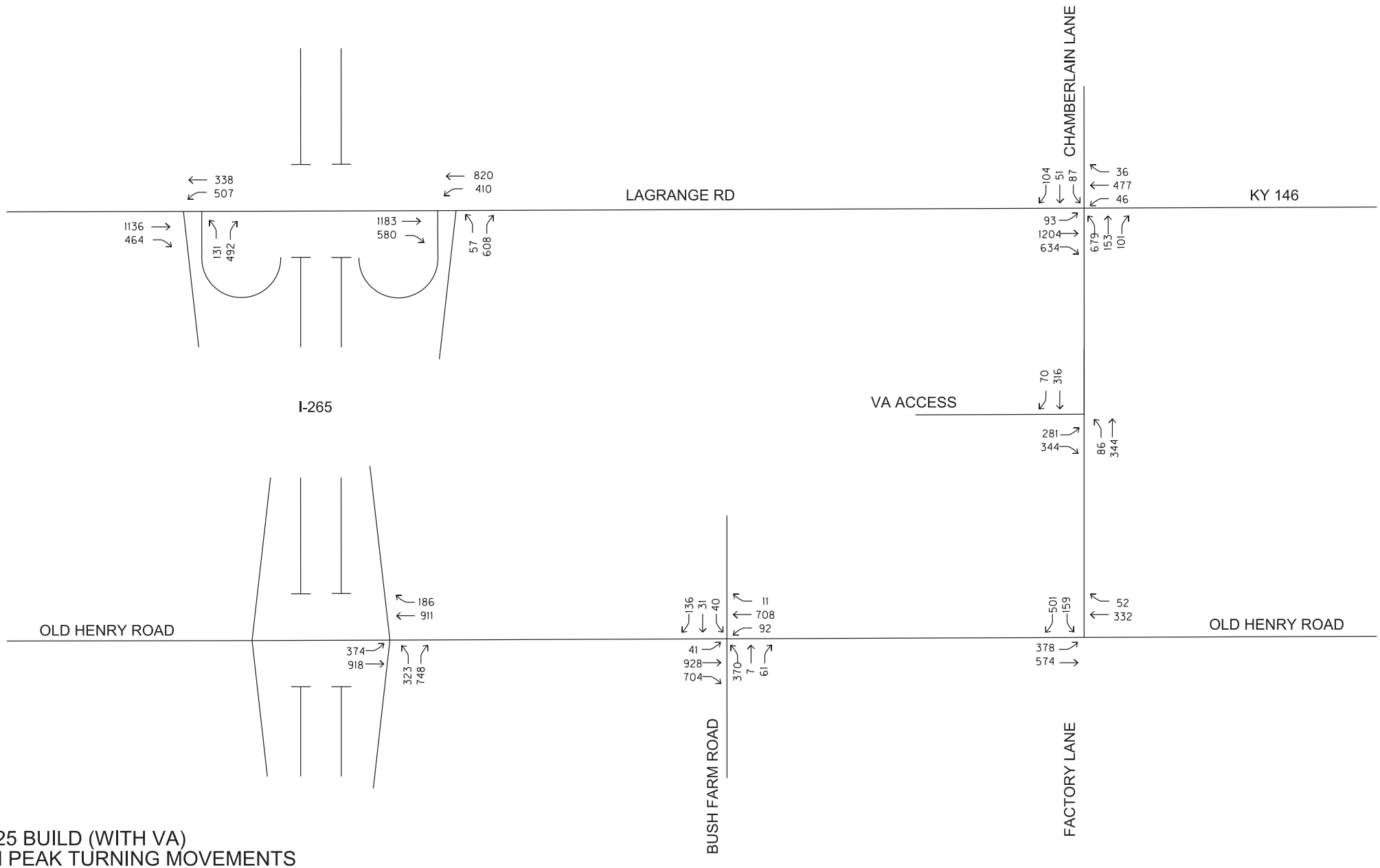
TRIP DISTRIBUTION
XX (XX) - AM (PM) PEAK HOUR TRIP DISTRIBUTION



DEVELOPMENT TRIPS REDISTRIBUTION
XX (XX) - AM (PM) PEAK HOUR VOLUMES



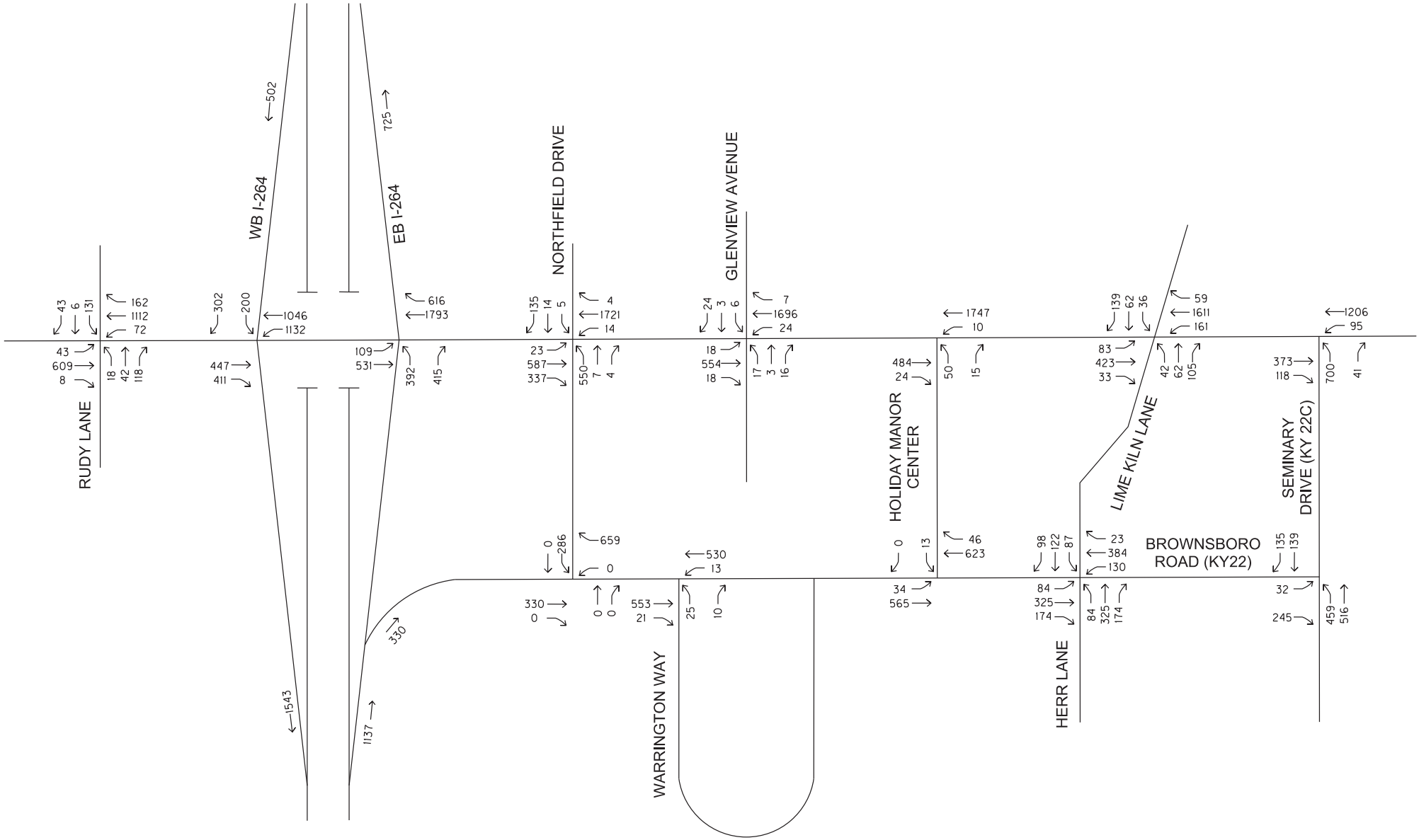
2025 BUILD (WITH VA)
AM PEAK TURNING MOVEMENTS



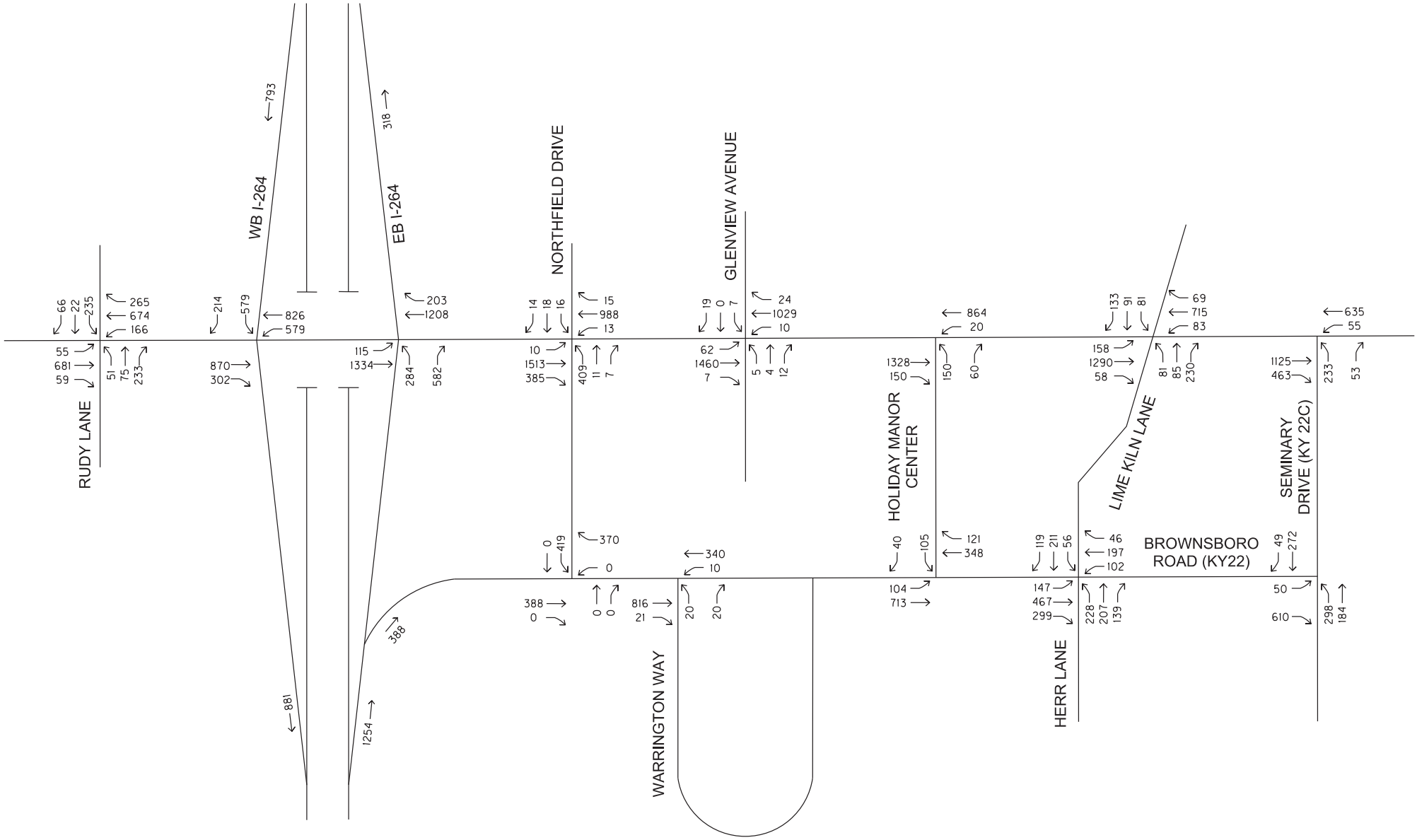
2025 BUILD (WITH VA)
PM PEAK TURNING MOVEMENTS

TRAFFIC STUDY
APPENDIX C

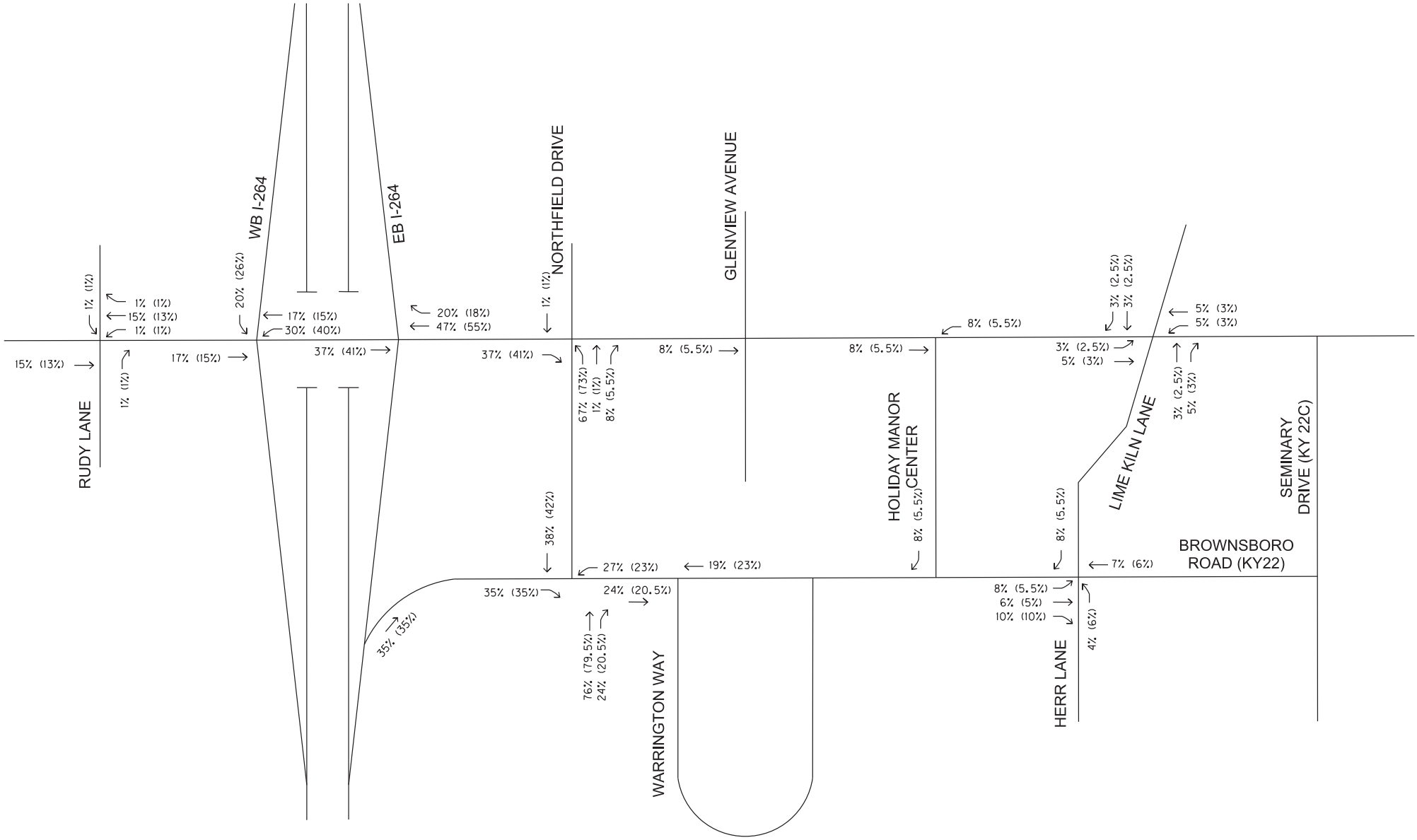
Midlands Site (KY 22)
Traffic Volumes
(Vehicles per Hour)



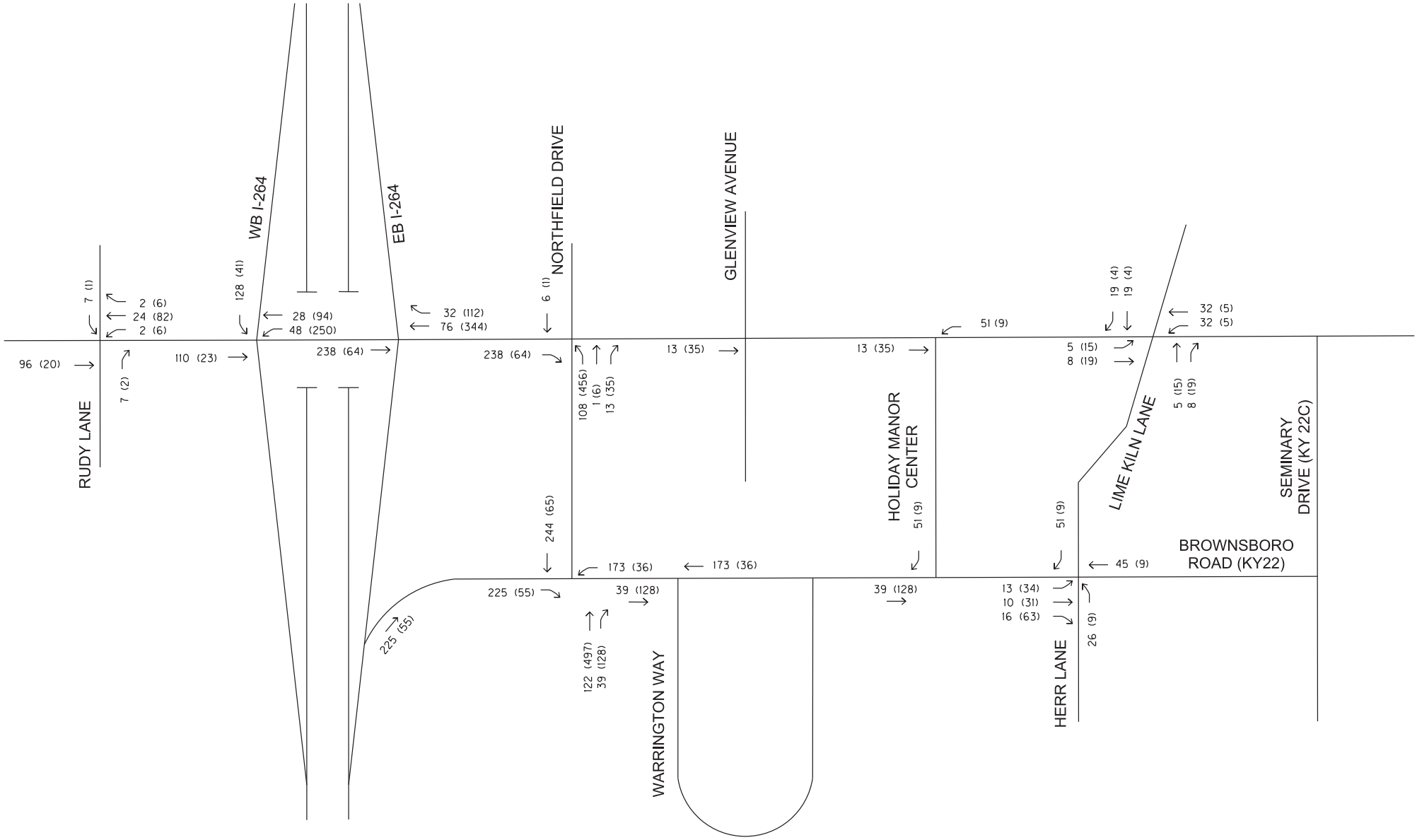
2015 EXISTING
AM PEAK TURNING MOVEMENTS



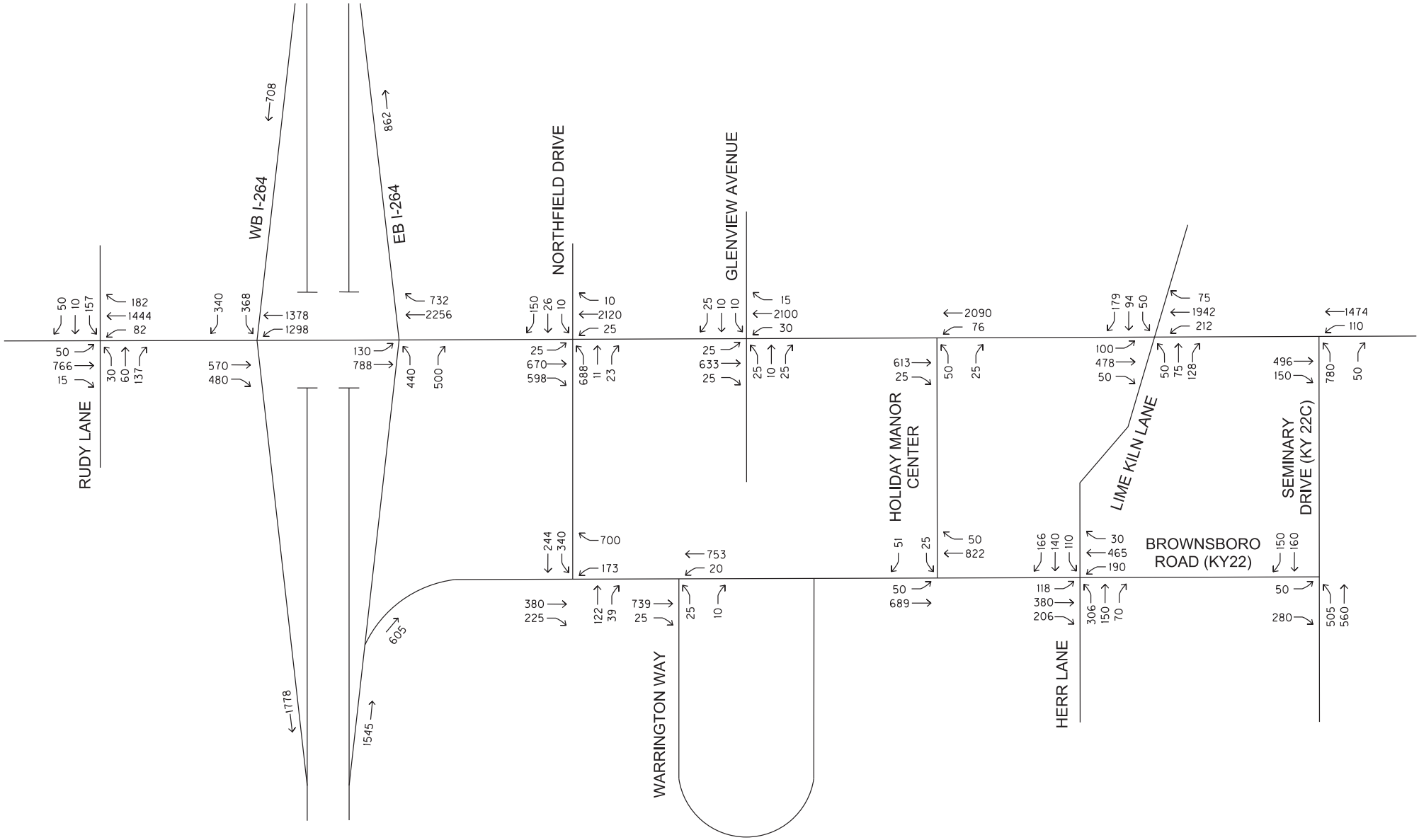
2015 EXISTING
PM PEAK TURNING MOVEMENTS



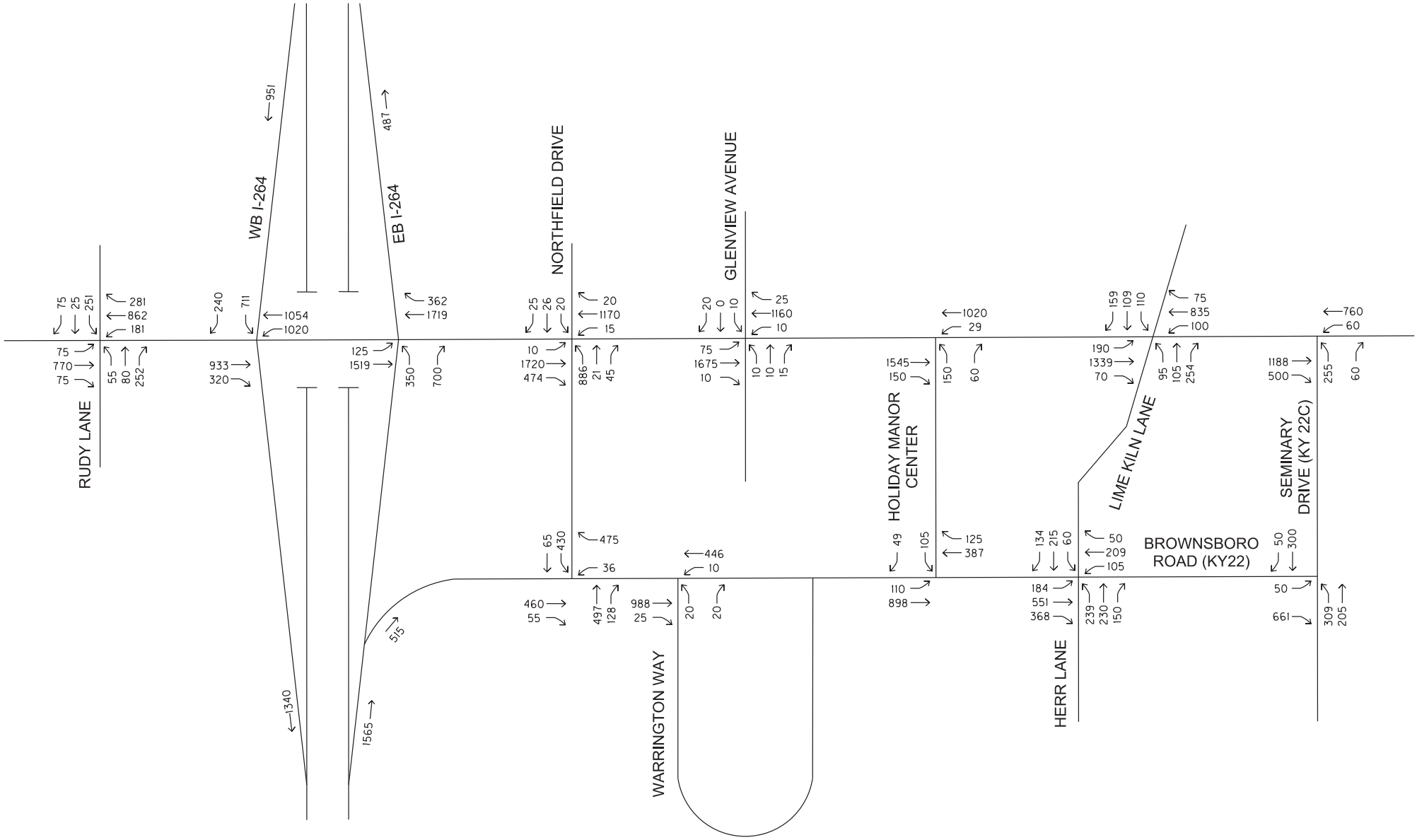
TRIP DISTRIBUTION
XX (XX) - AM (PM) PEAK HOUR TRIP DISTRIBUTION



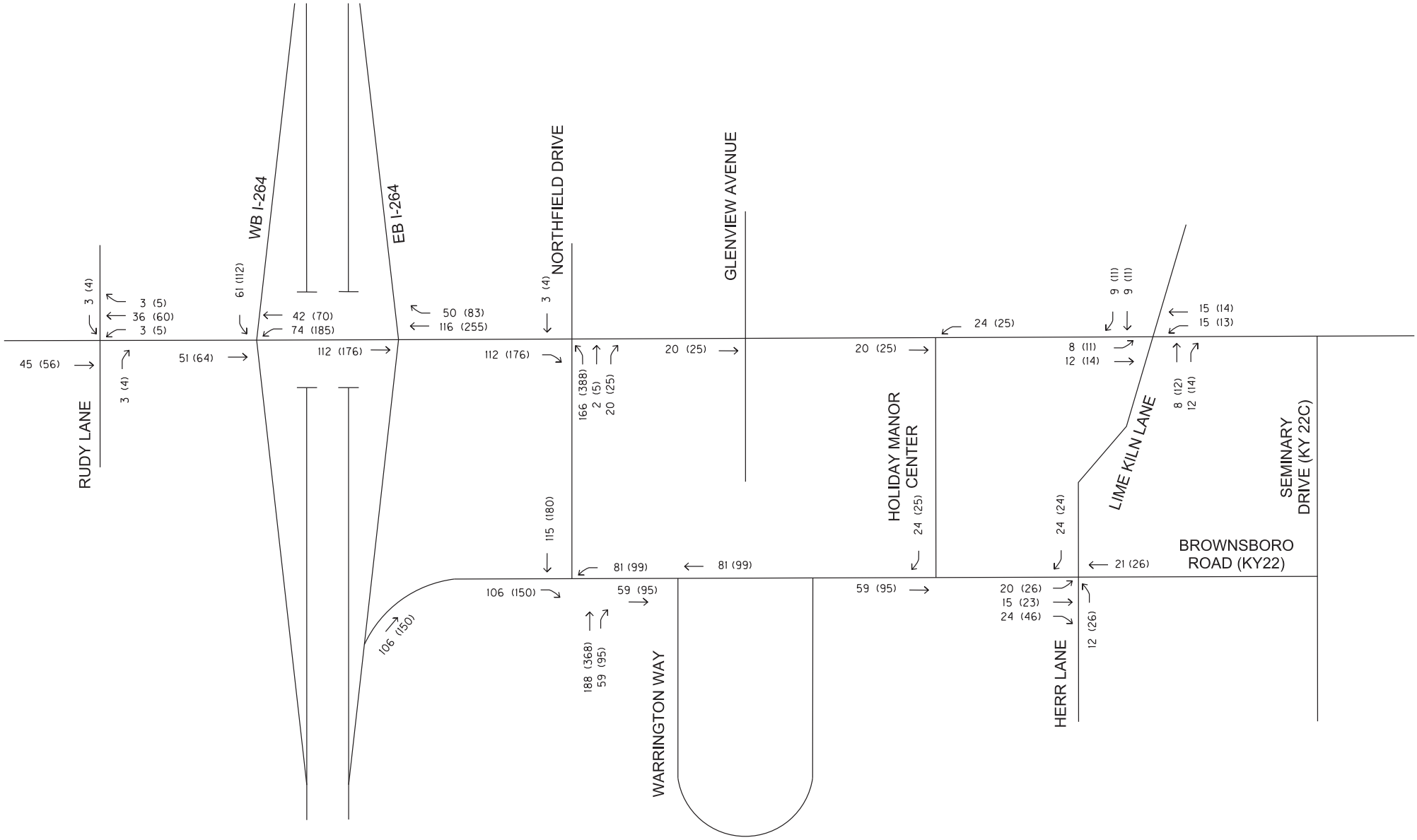
VA TRIPS REDISTRIBUTION
XX (XX) - AM (PM) PEAK HOUR VOLUMES



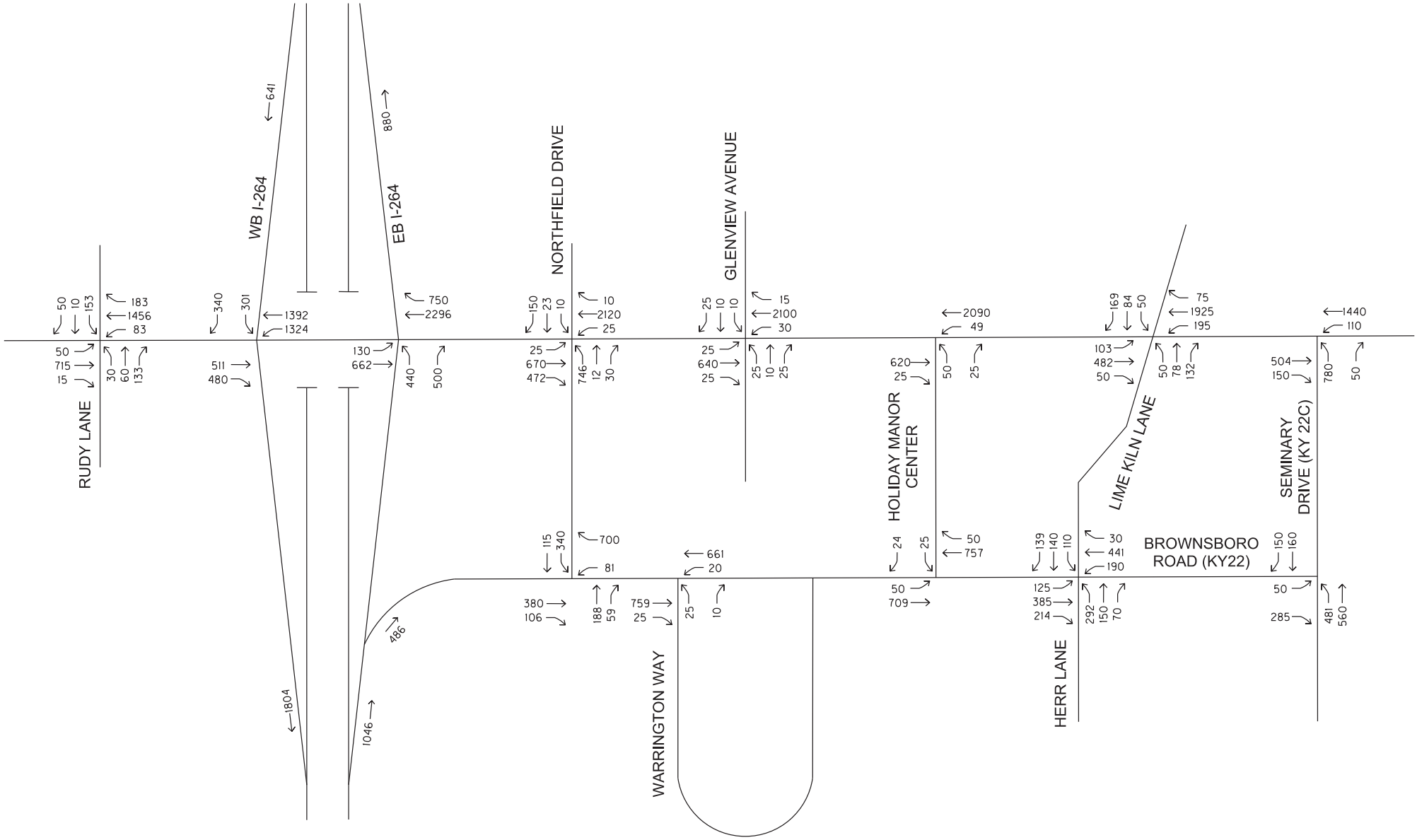
2025 BUILD (WITH VA)
AM PEAK TURNING MOVEMENTS



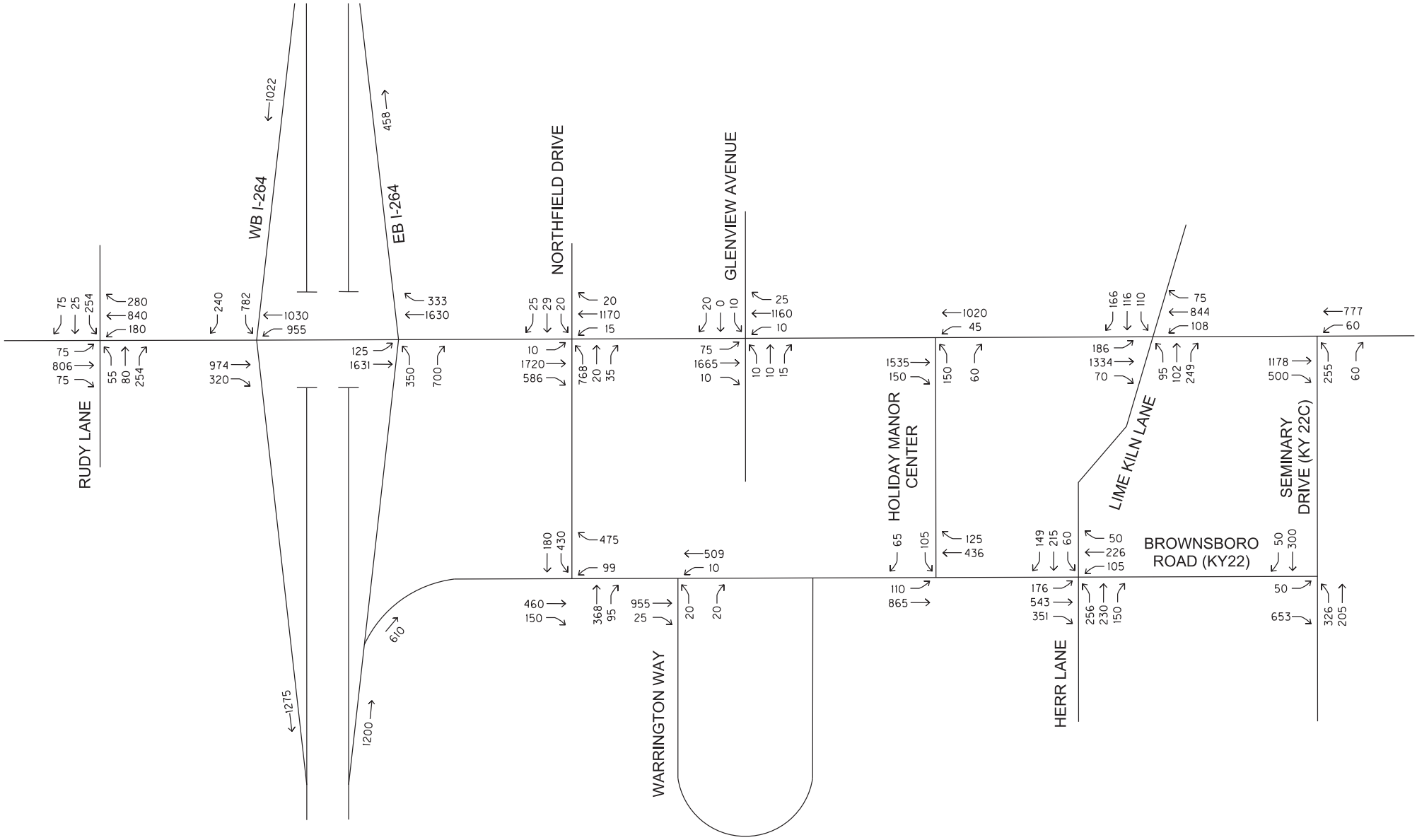
2025 BUILD (WITH VA)
PM PEAK TURNING MOVEMENTS



DEVELOPMENT TRIPS REDISTRIBUTION
XX (XX) - AM (PM) PEAK HOUR VOLUMES



2025 BUILD (WITH DEVELOPMENT)
AM PEAK TURNING MOVEMENTS



2025 BUILD (WITH DEVELOPMENT)
PM PEAK TURNING MOVEMENTS

TRAFFIC STUDY
APPENDIX D

Raw Count Data

Zorn Avenue

Palmer Engineering Company
400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71 SB Ramps

File Name : zorn-71sb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					71SBR From East					Zorn From South					71SBR From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	16	7	0	1	24	17	0	29	0	46	0	30	24	0	54	0	0	0	0	0	124
06:15 AM	23	16	0	1	40	33	0	36	0	69	0	44	37	0	81	0	0	0	0	0	190
06:30 AM	33	23	0	0	56	31	0	37	0	68	0	40	46	0	86	0	0	0	0	0	210
06:45 AM	39	27	0	0	66	51	0	75	0	126	0	73	59	0	132	0	0	0	0	0	324
Total	111	73	0	2	186	132	0	177	0	309	0	187	166	0	353	0	0	0	0	0	848
07:00 AM	64	42	0	0	106	44	0	96	0	140	0	61	60	0	121	0	0	0	0	0	367
07:15 AM	62	91	0	0	153	99	0	105	0	204	0	110	54	0	164	0	0	0	0	0	521
07:30 AM	69	91	0	0	160	87	0	117	0	204	0	94	83	0	177	0	0	0	0	0	541
07:45 AM	60	59	0	0	119	92	0	96	0	188	0	157	62	0	219	0	0	0	0	0	526
Total	255	283	0	0	538	322	0	414	0	736	0	422	259	0	681	0	0	0	0	0	1955
08:00 AM	45	51	0	0	96	87	0	75	0	162	5	110	89	0	204	0	0	0	0	0	462
08:15 AM	42	52	0	0	94	65	0	53	0	118	0	128	74	0	202	0	0	0	0	0	414
08:30 AM	52	53	0	3	108	56	0	60	0	116	0	95	73	0	168	0	0	0	0	0	392
08:45 AM	60	50	0	0	110	59	0	65	0	124	0	101	79	0	180	0	0	0	0	0	414
Total	199	206	0	3	408	267	0	253	0	520	5	434	315	0	754	0	0	0	0	0	1682
*** BREAK ***																					
02:00 PM	47	76	0	0	123	37	0	53	0	90	0	77	55	0	132	0	0	0	0	0	345
02:15 PM	39	73	0	0	112	36	0	69	0	105	0	72	78	0	150	0	0	0	0	0	367
02:30 PM	53	65	0	0	118	25	0	62	0	87	0	80	100	0	180	0	0	0	0	0	385
02:45 PM	56	82	0	0	138	31	1	58	0	90	0	72	87	0	159	0	0	0	0	0	387
Total	195	296	0	0	491	129	1	242	0	372	0	301	320	0	621	0	0	0	0	0	1484
03:00 PM	46	93	0	0	139	26	1	72	0	99	0	84	83	0	167	0	0	0	0	0	405
03:15 PM	67	90	0	0	157	34	0	57	0	91	0	98	68	0	166	0	0	0	0	0	414
03:30 PM	65	101	0	0	166	30	0	63	0	93	0	83	108	0	191	0	0	0	0	0	450
03:45 PM	44	86	0	0	130	41	1	47	0	89	0	98	70	0	168	0	0	0	0	0	387
Total	222	370	0	0	592	131	2	239	0	372	0	363	329	0	692	0	0	0	0	0	1656
04:00 PM	51	120	0	0	171	41	0	54	0	95	0	78	86	0	164	0	0	0	0	0	430
04:15 PM	40	161	0	0	201	61	0	70	0	131	2	80	79	0	161	0	0	0	0	0	493
04:30 PM	51	153	0	0	204	61	0	64	0	125	0	100	82	0	182	0	0	0	0	0	511
04:45 PM	30	158	0	0	188	89	0	80	0	169	0	96	34	0	130	0	0	0	0	0	487
Total	172	592	0	0	764	252	0	268	0	520	2	354	281	0	637	0	0	0	0	0	1921

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71 SB Ramps

File Name : zorn-71sb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 2

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					71SBR From East					Zorn From South					71SBR From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
05:00 PM	16	168	0	0	184	86	0	76	0	162	0	123	32	0	155	0	0	0	0	0	501
05:15 PM	28	146	0	0	174	75	0	58	0	133	0	120	28	0	148	0	0	0	0	0	455
05:30 PM	25	162	0	0	187	98	0	66	0	164	0	90	47	0	137	0	0	0	0	0	488
05:45 PM	24	140	0	0	164	82	0	78	0	160	0	109	34	0	143	0	0	0	0	0	467
Total	93	616	0	0	709	341	0	278	0	619	0	442	141	0	583	0	0	0	0	0	1911
06:00 PM	12	128	0	0	140	84	1	89	0	174	0	91	18	0	109	0	0	0	0	0	423
06:15 PM	15	84	0	0	99	65	0	88	0	153	0	85	57	0	142	0	0	0	0	0	394
Grand Total	1274	2648	0	5	3927	1723	4	2048	0	3775	7	2679	1886	0	4572	0	0	0	0	0	12274
Apprch %	32.4	67.4	0	0.1		45.6	0.1	54.3	0		0.2	58.6	41.3	0		0	0	0	0		
Total %	10.4	21.6	0	0	32	14	0	16.7	0	30.8	0.1	21.8	15.4	0	37.2	0	0	0	0	0	
Unshifted	1140	2518	0	5	3663	1617	4	2006	0	3627	7	2510	1829	0	4346	0	0	0	0	0	11636
% Unshifted	89.5	95.1	0	100	93.3	93.8	100	97.9	0	96.1	100	93.7	97	0	95.1	0	0	0	0	0	94.8
Bank 1	21	65	0	0	86	27	0	13	0	40	0	82	25	0	107	0	0	0	0	0	233
% Bank 1	1.6	2.5	0	0	2.2	1.6	0	0.6	0	1.1	0	3.1	1.3	0	2.3	0	0	0	0	0	1.9
Bank 2	113	65	0	0	178	79	0	29	0	108	0	87	32	0	119	0	0	0	0	0	405
% Bank 2	8.9	2.5	0	0	4.5	4.6	0	1.4	0	2.9	0	3.2	1.7	0	2.6	0	0	0	0	0	3.3

	Zorn From North					71SBR From East					Zorn From South					71SBR From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	62	**91**	0	0	153	**99**	0	105	0	**204**	0	110	54	0	164	0	0	0	0	0	521
07:30 AM	**69**	91	0	0	**160**	87	0	**117**	0	204	0	94	83	0	177	0	0	0	0	0	**541**
07:45 AM	60	59	0	0	119	92	0	96	0	188	0	**157**	62	0	**219**	0	0	0	0	0	526
08:00 AM	45	51	0	0	96	87	0	75	0	162	**5**	110	**89**	0	204	0	0	0	0	0	462
Total Volume	236	292	0	0	528	365	0	393	0	758	5	471	288	0	764	0	0	0	0	0	2050
% App. Total	44.7	55.3	0	0		48.2	0	51.8	0		0.7	61.6	37.7	0		0	0	0	0		
PHF	.855	.802	.000	.000	.825	.922	.000	.840	.000	.929	.250	.750	.809	.000	.872	.000	.000	.000	.000	.000	.947

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71 SB Ramps

File Name : zorn-71sb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 3

	Zorn From North					71SBR From East					Zorn From South					71SBR From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	40	161	0	0	201	61	0	70	0	131	**2**	80	79	0	161	0	0	0	0	0	493
04:30 PM	**51**	153	0	0	**204**	61	0	64	0	125	0	100	**82**	0	**182**	0	0	0	0	0	**511**
04:45 PM	30	158	0	0	188	**89**	0	**80**	0	**169**	0	96	34	0	130	0	0	0	0	0	487
05:00 PM	16	**168**	0	0	184	86	0	76	0	162	0	**123**	32	0	155	0	0	0	0	0	501
Total Volume	137	640	0	0	777	297	0	290	0	587	2	399	227	0	628	0	0	0	0	0	1992
% App. Total	17.6	82.4	0	0		50.6	0	49.4	0		0.3	63.5	36.1	0		0	0	0	0		
PHF	.672	.952	.000	.000	.952	.834	.000	.906	.000	.868	.250	.811	.692	.000	.863	.000	.000	.000	.000	.000	.975

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71NB Ramps

File Name : zorn-71nb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					NB71 From East					Zorn From South					NB71 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	0	35	3	0	38	0	0	0	0	0	24	32	0	0	56	26	0	24	0	50	144
06:15 AM	0	51	8	0	59	0	0	0	0	0	26	45	0	0	71	42	0	38	0	80	210
06:30 AM	0	49	12	0	61	0	0	0	0	0	34	68	0	0	102	55	0	35	0	90	253
06:45 AM	0	95	12	0	107	0	0	0	0	0	43	86	0	0	129	95	0	51	0	146	382
Total	0	230	35	0	265	0	0	0	0	0	127	231	0	0	358	218	0	148	0	366	989
07:00 AM	0	121	14	0	135	0	0	0	0	0	64	78	0	0	142	98	0	46	0	144	421
07:15 AM	0	167	15	0	182	0	0	0	0	0	75	119	0	0	194	116	0	71	0	187	563
07:30 AM	0	177	17	0	194	0	0	0	0	0	97	117	0	0	214	104	0	74	1	179	587
07:45 AM	0	124	20	0	144	0	0	0	0	0	100	157	0	0	257	101	0	69	0	170	571
Total	0	589	66	0	655	0	0	0	0	0	336	471	0	0	807	419	0	260	1	680	2142
08:00 AM	0	121	20	0	141	0	0	0	0	0	88	112	0	0	200	78	0	67	0	145	486
08:15 AM	0	77	13	0	90	0	0	0	0	0	69	130	0	0	199	79	0	77	0	156	445
08:30 AM	0	99	22	0	121	0	0	0	0	0	73	106	0	0	179	73	0	55	0	128	428
08:45 AM	0	88	20	0	108	0	0	0	0	0	60	109	0	0	169	79	0	64	0	143	420
Total	0	385	75	0	460	0	0	0	0	0	290	457	0	0	747	309	0	263	0	572	1779
*** BREAK ***																					
02:00 PM	0	73	42	0	115	0	0	0	0	0	60	94	0	0	154	61	0	43	0	104	373
02:15 PM	0	83	38	0	121	0	0	0	0	0	65	101	0	0	166	56	0	48	0	104	391
02:30 PM	0	72	38	0	110	0	0	0	0	0	81	117	0	0	198	64	0	55	0	119	427
02:45 PM	0	88	51	0	139	0	0	0	0	0	84	103	0	0	187	62	0	53	0	115	441
Total	0	316	169	0	485	0	0	0	0	0	290	415	0	0	705	243	0	199	0	442	1632
03:00 PM	0	97	53	0	150	0	0	0	0	0	97	122	0	0	219	58	0	39	0	97	466
03:15 PM	0	95	45	0	140	0	0	0	0	0	75	111	0	0	186	58	1	60	0	119	445
03:30 PM	0	114	57	0	171	0	0	0	0	0	115	134	0	0	249	52	0	46	0	98	518
03:45 PM	0	85	55	0	140	0	0	0	0	0	104	119	0	0	223	44	0	56	0	100	463
Total	0	391	210	0	601	0	0	0	0	0	391	486	0	0	877	212	1	201	0	414	1892
04:00 PM	0	96	81	0	177	0	0	0	0	0	137	131	0	0	268	44	1	28	0	73	518
04:15 PM	0	122	106	0	228	0	0	0	0	0	115	127	0	0	242	56	1	46	0	103	573
04:30 PM	0	130	97	0	227	0	0	0	0	0	154	142	0	0	296	47	0	52	0	99	622
04:45 PM	0	143	97	0	240	0	0	0	0	0	139	105	0	0	244	56	0	39	0	95	579
Total	0	491	381	0	872	0	0	0	0	0	545	505	0	0	1050	203	2	165	0	370	2292

Palmer Engineering Company
400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71NB Ramps

File Name : zorn-71nb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 2

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					NB71 From East					Zorn From South					NB71 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
05:00 PM	0	139	112	0	251	0	0	0	0	0	166	88	0	0	254	35	0	54	0	89	594
05:15 PM	0	120	104	0	224	0	0	0	0	0	123	99	0	1	223	51	0	53	0	104	551
05:30 PM	0	160	98	0	258	0	0	0	0	0	93	106	0	0	199	48	0	33	0	81	538
05:45 PM	0	142	67	0	209	0	0	0	0	0	98	107	0	0	205	53	0	37	0	90	504
Total	0	561	381	0	942	0	0	0	0	0	480	400	0	1	881	187	0	177	0	364	2187
06:00 PM	0	147	64	0	211	0	0	0	0	0	114	77	0	0	191	46	0	33	0	79	481
06:15 PM	0	123	51	0	174	0	0	0	0	0	66	113	0	0	179	37	0	36	0	73	426
Grand Total	0	3233	1432	0	4665	0	0	0	0	0	2639	3155	0	1	5795	1874	3	1482	1	3360	13820
Apprch %	0	69.3	30.7	0		0	0	0	0		45.5	54.4	0	0		55.8	0.1	44.1	0		
Total %	0	23.4	10.4	0	33.8	0	0	0	0	0	19.1	22.8	0	0	41.9	13.6	0	10.7	0	24.3	
Unshifted	0	3143	1360	0	4503	0	0	0	0	0	2580	3046	0	1	5627	1830	3	1375	1	3209	13339
% Unshifted	0	97.2	95	0	96.5	0	0	0	0	0	97.8	96.5	0	100	97.1	97.7	100	92.8	100	95.5	96.5
Bank 1	0	77	27	0	104	0	0	0	0	0	43	99	0	0	142	38	0	40	0	78	324
% Bank 1	0	2.4	1.9	0	2.2	0	0	0	0	0	1.6	3.1	0	0	2.5	2	0	2.7	0	2.3	2.3
Bank 2	0	13	45	0	58	0	0	0	0	0	16	10	0	0	26	6	0	67	0	73	157
% Bank 2	0	0.4	3.1	0	1.2	0	0	0	0	0	0.6	0.3	0	0	0.4	0.3	0	4.5	0	2.2	1.1

	Zorn From North					NB71 From East					Zorn From South					NB71 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	167	15	0	182	0	0	0	0	0	75	119	0	0	194	**116**	0	71	0	**187**	563
07:30 AM	0	**177**	17	0	**194**	0	0	0	0	0	97	117	0	0	214	104	0	**74**	**1**	179	**587**
07:45 AM	0	124	**20**	0	144	0	0	0	0	0	**100**	**157**	0	0	**257**	101	0	69	0	170	571
08:00 AM	0	121	20	0	141	0	0	0	0	0	88	112	0	0	200	78	0	67	0	145	486
Total Volume	0	589	72	0	661	0	0	0	0	0	360	505	0	0	865	399	0	281	1	681	2207
% App. Total	0	89.1	10.9	0		0	0	0	0		41.6	58.4	0	0		58.6	0	41.3	0.1		
PHF	.000	.832	.900	.000	.852	.000	.000	.000	.000	.000	.900	.804	.000	.000	.841	.860	.000	.949	.250	.910	.940

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ I-71NB Ramps

File Name : zorn-71nb
Site Code : 00000000
Start Date : 9/10/2015
Page No : 3

	Zorn From North					NB71 From East					Zorn From South					NB71 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	0	122	106	0	228	0	0	0	0	0	115	127	0	0	242	**56**	**1**	46	0	**103**	573
04:30 PM	0	130	97	0	227	0	0	0	0	0	154	**142**	0	0	**296**	47	0	52	0	99	**622**
04:45 PM	0	**143**	97	0	240	0	0	0	0	0	139	105	0	0	244	56	0	39	0	95	579
05:00 PM	0	139	**112**	0	**251**	0	0	0	0	0	**166**	88	0	0	254	35	0	**54**	0	89	594
Total Volume	0	534	412	0	946	0	0	0	0	0	574	462	0	0	1036	194	1	191	0	386	2368
% App. Total	0	56.4	43.6	0		0	0	0	0		55.4	44.6	0	0		50.3	0.3	49.5	0		
PHF	.000	.934	.920	.000	.942	.000	.000	.000	.000	.000	.864	.813	.000	.000	.875	.866	.250	.884	.000	.937	.952

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ Melwood

File Name : Zorn-Melwood
Site Code : 00000000
Start Date : 9/10/2015
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					MELWOOD From East					Zorn From South					MELWOOD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	17	41	0	0	58	1	1	3	0	5	0	39	2	0	41	6	1	19	0	26	130
06:15 AM	22	69	1	0	92	3	0	0	0	3	0	44	3	0	47	2	0	26	0	28	170
06:30 AM	22	75	2	2	101	3	0	0	0	3	1	69	3	0	73	8	0	27	0	35	212
06:45 AM	41	136	4	0	181	6	0	0	0	6	0	79	4	0	83	9	0	39	0	48	318
Total	102	321	7	2	432	13	1	3	0	17	1	231	12	0	244	25	1	111	0	137	830
07:00 AM	36	186	3	0	225	6	0	2	0	8	1	105	6	0	112	10	0	37	0	47	392
07:15 AM	49	227	5	0	281	11	0	3	0	14	0	134	7	0	141	15	0	38	0	53	489
07:30 AM	56	239	0	0	295	22	4	5	0	31	0	145	9	0	154	18	1	48	0	67	547
07:45 AM	62	166	2	0	230	16	4	5	0	25	6	174	13	0	193	12	1	54	0	67	515
Total	203	818	10	0	1031	55	8	15	0	78	7	558	35	0	600	55	2	177	0	234	1943
08:00 AM	67	118	4	0	189	9	3	1	0	13	5	156	9	0	170	23	1	39	0	63	435
08:15 AM	49	106	6	0	161	11	4	1	0	16	6	139	16	0	161	11	3	48	0	62	400
08:30 AM	57	106	4	0	167	10	1	2	0	13	2	118	21	0	141	19	1	47	0	67	388
*** BREAK ***																					
Total	173	330	14	0	517	30	8	4	0	42	13	413	46	0	472	53	5	134	0	192	1223
*** BREAK ***																					
02:00 PM	26	103	5	0	134	8	1	1	0	10	3	109	12	0	124	16	2	38	0	56	324
02:15 PM	31	108	1	0	140	4	0	0	0	4	1	123	6	0	130	11	3	42	0	56	330
02:30 PM	23	99	7	0	129	5	5	1	0	11	5	143	10	0	158	20	1	42	0	63	361
02:45 PM	30	115	7	0	152	6	0	2	0	8	3	131	7	0	141	7	2	46	0	55	356
Total	110	425	20	0	555	23	6	4	0	33	12	506	35	0	553	54	8	168	0	230	1371
03:00 PM	32	113	6	0	151	4	0	3	0	7	1	151	12	0	164	12	2	52	0	66	388
03:15 PM	30	124	7	0	161	3	3	2	0	8	2	137	17	0	156	19	1	51	0	71	396
03:30 PM	30	128	7	0	165	3	0	0	0	3	2	195	17	0	214	15	1	48	0	64	446
03:45 PM	22	98	4	0	124	3	3	3	0	9	7	160	13	0	180	11	3	55	0	69	382
Total	114	463	24	0	601	13	6	8	0	27	12	643	59	0	714	57	7	206	0	270	1612
04:00 PM	26	105	3	0	134	9	0	1	0	10	2	210	17	0	229	13	3	61	0	77	450
04:15 PM	28	138	10	0	176	1	1	2	0	4	3	158	12	0	173	18	3	72	0	93	446
04:30 PM	38	118	7	0	163	6	0	6	0	12	12	221	15	0	248	9	1	73	0	83	506
04:45 PM	34	140	14	0	188	6	3	3	0	12	21	165	13	0	199	13	2	74	0	89	488
Total	126	501	34	0	661	22	4	12	0	38	38	754	57	0	849	53	9	280	0	342	1890

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ Melwood

File Name : Zorn-Melwood
Site Code : 00000000
Start Date : 9/10/2015
Page No : 2

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					MELWOOD From East					Zorn From South					MELWOOD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
05:00 PM	33	123	14	0	170	5	1	4	0	10	9	149	14	0	172	30	4	89	0	123	475
05:15 PM	30	134	6	0	170	2	1	2	0	5	9	145	22	0	176	21	7	87	0	115	466
05:30 PM	55	138	6	0	199	5	0	6	0	11	8	126	28	0	162	12	6	62	0	80	452
05:45 PM	58	121	12	0	191	10	2	10	0	22	10	130	24	0	164	18	4	70	0	92	469
Total	176	516	38	0	730	22	4	22	0	48	36	550	88	0	674	81	21	308	0	410	1862
06:00 PM	44	117	17	0	178	8	1	4	0	13	1	105	29	0	135	18	4	59	0	81	407
06:15 PM	29	119	12	3	163	13	1	5	0	19	6	121	19	0	146	10	3	66	0	79	407
Grand Total	1077	3610	176	5	4868	199	39	77	0	315	126	3881	380	0	4387	406	60	1509	0	1975	11545
Apprch %	22.1	74.2	3.6	0.1		63.2	12.4	24.4	0		2.9	88.5	8.7	0		20.6	3	76.4	0		
Total %	9.3	31.3	1.5	0	42.2	1.7	0.3	0.7	0	2.7	1.1	33.6	3.3	0	38	3.5	0.5	13.1	0	17.1	
Unshifted	1045	3524	174	5	4748	196	39	70	0	305	124	3779	349	0	4252	369	59	1460	0	1888	11193
% Unshifted	97	97.6	98.9	100	97.5	98.5	100	90.9	0	96.8	98.4	97.4	91.8	0	96.9	90.9	98.3	96.8	0	95.6	97
Bank 1	18	80	2	0	100	3	0	6	0	9	1	93	30	0	124	36	1	28	0	65	298
% Bank 1	1.7	2.2	1.1	0	2.1	1.5	0	7.8	0	2.9	0.8	2.4	7.9	0	2.8	8.9	1.7	1.9	0	3.3	2.6
Bank 2	14	6	0	0	20	0	0	1	0	1	1	9	1	0	11	1	0	21	0	22	54
% Bank 2	1.3	0.2	0	0	0.4	0	0	1.3	0	0.3	0.8	0.2	0.3	0	0.3	0.2	0	1.4	0	1.1	0.5

	Zorn From North					MELWOOD From East					Zorn From South					MELWOOD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	49	227	**5**	0	281	11	0	3	0	14	0	134	7	0	141	15	0	38	0	53	489
07:30 AM	56	**239**	0	0	**295**	**22**	**4**	**5**	0	**31**	0	145	9	0	154	18	**1**	48	0	**67**	**547**
07:45 AM	62	166	2	0	230	16	4	5	0	25	**6**	**174**	**13**	0	**193**	12	1	**54**	0	67	515
08:00 AM	**67**	118	4	0	189	9	3	1	0	13	5	156	9	0	170	**23**	1	39	0	63	435
Total Volume	234	750	11	0	995	58	11	14	0	83	11	609	38	0	658	68	3	179	0	250	1986
% App. Total	23.5	75.4	1.1	0		69.9	13.3	16.9	0		1.7	92.6	5.8	0		27.2	1.2	71.6	0		
PHF	.873	.785	.550	.000	.843	.659	.688	.700	.000	.669	.458	.875	.731	.000	.852	.739	.750	.829	.000	.933	.908

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ Melwood

File Name : Zorn-Melwood
Site Code : 00000000
Start Date : 9/10/2015
Page No : 3

	Zorn From North					MELWOOD From East					Zorn From South					MELWOOD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**38**	118	7	0	163	**6**	0	**6**	0	**12**	12	**221**	15	0	**248**	9	1	73	0	83	**506**
04:45 PM	34	**140**	**14**	0	**188**	6	**3**	3	0	12	**21**	165	13	0	199	13	2	74	0	89	488
05:00 PM	33	123	14	0	170	5	1	4	0	10	9	149	14	0	172	**30**	4	**89**	0	**123**	475
05:15 PM	30	134	6	0	170	2	1	2	0	5	9	145	**22**	0	176	21	**7**	87	0	115	466
Total Volume	135	515	41	0	691	19	5	15	0	39	51	680	64	0	795	73	14	323	0	410	1935
% App. Total	19.5	74.5	5.9	0		48.7	12.8	38.5	0		6.4	85.5	8.1	0		17.8	3.4	78.8	0		
PHF	.888	.920	.732	.000	.919	.792	.417	.625	.000	.813	.607	.769	.727	.000	.801	.608	.500	.907	.000	.833	.956

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ VA

File Name : zorn-VA
Site Code : 00000000
Start Date : 9/10/2015
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					VA From East					Zorn From South					VA From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	40	14	0	0	54	2	0	0	0	2	0	35	5	0	40	1	0	2	0	3	99
06:15 AM	44	19	0	0	63	0	0	0	0	0	0	40	10	0	50	1	0	7	0	8	121
06:30 AM	56	24	0	0	80	2	0	0	0	2	2	55	15	0	72	1	0	12	0	13	167
06:45 AM	95	52	0	0	147	3	0	2	0	5	0	68	22	0	90	1	0	9	0	10	252
Total	235	109	0	0	344	7	0	2	0	9	2	198	52	0	252	4	0	30	0	34	639
07:00 AM	126	78	0	1	205	5	0	2	0	7	0	90	24	0	114	4	0	16	0	20	346
07:15 AM	138	93	4	0	235	6	1	3	0	10	1	105	37	0	143	4	0	25	0	29	417
07:30 AM	128	123	5	0	256	1	2	2	0	5	0	127	43	0	170	5	0	20	0	25	456
07:45 AM	104	72	1	0	177	1	0	0	0	1	0	159	19	0	178	6	0	24	0	30	386
Total	496	366	10	1	873	13	3	7	0	23	1	481	123	0	605	19	0	85	0	104	1605
08:00 AM	53	76	3	1	133	8	0	2	0	10	1	107	22	0	130	11	0	42	0	53	326
08:15 AM	49	51	3	1	104	3	1	0	0	4	0	126	12	0	138	11	0	31	0	42	288
08:30 AM	44	67	3	0	114	6	0	0	0	6	0	105	14	0	119	6	0	25	0	31	270
08:45 AM	50	78	6	1	135	5	0	1	0	6	0	107	4	0	111	4	0	26	0	30	282
Total	196	272	15	3	486	22	1	3	0	26	1	445	52	0	498	32	0	124	0	156	1166
*** BREAK ***																					
02:00 PM	31	91	2	0	124	1	0	1	0	2	0	76	7	0	83	15	0	47	0	62	271
02:15 PM	27	89	5	0	121	3	0	1	0	4	2	74	9	0	85	9	0	46	0	55	265
02:30 PM	22	96	2	0	120	4	0	2	0	6	1	89	8	0	98	15	0	69	0	84	308
02:45 PM	25	90	5	0	120	1	0	2	0	3	2	88	9	0	99	11	0	48	0	59	281
Total	105	366	14	0	485	9	0	6	0	15	5	327	33	0	365	50	0	210	0	260	1125
03:00 PM	41	91	4	0	136	0	1	2	0	3	0	99	5	0	104	15	0	67	0	82	325
03:15 PM	28	120	3	0	151	3	1	2	0	6	4	96	10	0	110	16	0	50	0	66	333
03:30 PM	25	109	2	0	136	3	0	2	0	5	2	101	7	0	110	11	0	106	0	117	368
03:45 PM	25	93	7	0	125	1	2	1	0	4	0	110	9	0	119	21	0	68	0	89	337
Total	119	413	16	0	548	7	4	7	0	18	6	406	31	0	443	63	0	291	0	354	1363
04:00 PM	17	102	0	0	119	1	0	1	0	2	1	88	16	0	105	23	5	135	0	163	389
04:15 PM	26	132	6	1	165	1	1	1	0	3	1	97	14	0	112	19	1	71	0	91	371
04:30 PM	24	112	2	0	138	1	0	1	0	2	2	106	21	0	129	31	0	135	0	166	435
04:45 PM	22	133	6	0	161	2	0	2	0	4	0	113	12	0	125	17	1	61	0	79	369
Total	89	479	14	1	583	5	1	5	0	11	4	404	63	0	471	90	7	402	0	499	1564

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ VA

File Name : zorn-VA
Site Code : 00000000
Start Date : 9/10/2015
Page No : 2

Groups Printed- Unshifted - Bank 1 - Bank 2

	Zorn From North					VA From East					Zorn From South					VA From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
05:00 PM	18	132	9	0	159	5	0	0	0	5	2	108	21	0	131	17	0	51	0	68	363
05:15 PM	16	150	5	0	171	3	0	1	0	4	1	138	19	0	158	7	0	33	0	40	373
05:30 PM	8	146	3	0	157	6	0	1	0	7	2	126	9	0	137	15	0	35	0	50	351
05:45 PM	5	148	7	0	160	0	0	1	0	1	2	128	14	0	144	6	0	28	0	34	339
Total	47	576	24	0	647	14	0	3	0	17	7	500	63	0	570	45	0	147	0	192	1426
06:00 PM	11	141	4	0	156	1	0	2	0	3	0	100	5	0	105	8	0	36	0	44	308
06:15 PM	10	127	5	0	142	2	0	0	0	2	1	111	8	0	120	5	0	23	0	28	292
Grand Total	1308	2849	102	5	4264	80	9	35	0	124	27	2972	430	0	3429	316	7	1348	0	1671	9488
Apprch %	30.7	66.8	2.4	0.1		64.5	7.3	28.2	0		0.8	86.7	12.5	0		18.9	0.4	80.7	0		
Total %	13.8	30	1.1	0.1	44.9	0.8	0.1	0.4	0	1.3	0.3	31.3	4.5	0	36.1	3.3	0.1	14.2	0	17.6	
Unshifted	1242	2801	101	4	4148	79	9	34	0	122	27	2909	421	0	3357	301	7	1280	0	1588	9215
% Unshifted	95	98.3	99	80	97.3	98.8	100	97.1	0	98.4	100	97.9	97.9	0	97.9	95.3	100	95	0	95	97.1
Bank 1	61	32	1	0	94	1	0	1	0	2	0	42	8	0	50	10	0	61	0	71	217
% Bank 1	4.7	1.1	1	0	2.2	1.2	0	2.9	0	1.6	0	1.4	1.9	0	1.5	3.2	0	4.5	0	4.2	2.3
Bank 2	5	16	0	1	22	0	0	0	0	0	0	21	1	0	22	5	0	7	0	12	56
% Bank 2	0.4	0.6	0	20	0.5	0	0	0	0	0	0	0.7	0.2	0	0.6	1.6	0	0.5	0	0.7	0.6

	Zorn From North					VA From East					Zorn From South					VA From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	126	78	0	**1**	205	5	0	2	0	7	0	90	24	0	114	4	0	16	0	20	346
07:15 AM	**138**	93	4	0	235	**6**	1	**3**	0	**10**	**1**	105	37	0	143	4	0	**25**	0	29	417
07:30 AM	128	**123**	**5**	0	**256**	1	**2**	2	0	5	0	127	**43**	0	170	5	0	20	0	25	**456**
07:45 AM	104	72	1	0	177	1	0	0	0	1	0	**159**	19	0	**178**	**6**	0	24	0	**30**	386
Total Volume	496	366	10	1	873	13	3	7	0	23	1	481	123	0	605	19	0	85	0	104	1605
% App. Total	56.8	41.9	1.1	0.1		56.5	13	30.4	0		0.2	79.5	20.3	0		18.3	0	81.7	0		
PHF	.899	.744	.500	.250	.853	.542	.375	.583	.000	.575	.250	.756	.715	.000	.850	.792	.000	.850	.000	.867	.880

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by:
Weather: Sunny
Zorn @ VA

File Name : zorn-VA
Site Code : 00000000
Start Date : 9/10/2015
Page No : 3

	Zorn From North					VA From East					Zorn From South					VA From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	17	102	0	0	119	1	0	1	0	2	1	88	16	0	105	23	**5**	**135**	0	163	389
04:15 PM	**26**	132	**6**	**1**	**165**	1	**1**	1	0	3	1	97	14	0	112	19	1	71	0	91	371
04:30 PM	24	112	2	0	138	1	0	1	0	2	**2**	106	**21**	0	**129**	**31**	0	135	0	**166**	**435**
04:45 PM	22	**133**	6	0	161	**2**	0	**2**	0	**4**	0	**113**	12	0	125	17	1	61	0	79	369
Total Volume	89	479	14	1	583	5	1	5	0	11	4	404	63	0	471	90	7	402	0	499	1564
% App. Total	15.3	82.2	2.4	0.2		45.5	9.1	45.5	0		0.8	85.8	13.4	0		18	1.4	80.6	0		
PHF	.856	.900	.583	.250	.883	.625	.250	.625	.000	.688	.500	.894	.750	.000	.913	.726	.350	.744	.000	.752	.899

St Joseph

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by: Jason Ishmael
Weather: Sunny
Other:

File Name : I-265@KY146
Site Code : 00000000
Start Date : 10/6/2015
Page No : 1

Groups Printed- Unshifted - Bank 1 - Bank 2

	I-265 (Gene Snyder) From North					KY 146 (LaGrange Road) From East					I-265 (Gene Snyder) From South					KY 146 (LaGrange Road) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	182	52	0	234	87	0	16	0	103	10	33	0	0	43	380
07:15 AM	0	0	0	0	0	0	0	74	0	74	103	0	20	0	123	7	0	0	0	7	204
07:30 AM	0	0	0	0	0	0	0	79	0	79	108	0	26	0	134	14	0	0	0	14	227
07:45 AM	0	0	0	0	0	0	0	63	0	63	105	0	42	0	147	13	0	0	0	13	223
Total	0	0	0	0	0	0	182	268	0	450	403	0	104	0	507	44	33	0	0	77	1034
08:00 AM	0	0	0	0	0	0	0	72	0	72	114	0	40	0	154	14	0	0	0	14	240
08:15 AM	0	0	0	0	0	0	0	43	0	43	101	0	40	0	141	18	0	0	0	18	202
08:30 AM	0	0	0	0	0	0	0	60	0	60	99	0	35	0	134	18	0	0	0	18	212
08:45 AM	0	0	0	0	0	0	0	45	0	45	101	0	41	0	142	20	0	0	0	20	207
Total	0	0	0	0	0	0	0	220	0	220	415	0	156	0	571	70	0	0	0	70	861
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	32	0	32	117	0	9	0	126	85	0	0	0	85	243
04:15 PM	0	0	0	0	0	0	0	54	0	54	116	0	11	0	127	84	0	0	0	84	265
04:30 PM	0	0	0	0	0	0	0	44	0	44	132	0	13	0	145	161	0	0	0	161	350
04:45 PM	0	0	0	0	0	0	0	56	0	56	151	0	10	0	161	97	0	0	0	97	314
Total	0	0	0	0	0	0	0	186	0	186	516	0	43	0	559	427	0	0	0	427	1172
05:00 PM	0	0	0	0	0	0	0	44	0	44	120	0	15	0	135	133	0	0	0	133	312
05:15 PM	0	0	0	0	0	0	0	46	0	46	145	0	14	0	159	134	0	0	0	134	339
05:30 PM	0	0	0	0	0	0	0	42	0	42	149	0	22	0	171	97	0	0	0	97	310
05:45 PM	0	0	0	0	0	0	0	45	0	45	115	0	6	0	121	67	0	0	0	67	233
Total	0	0	0	0	0	0	0	177	0	177	529	0	57	0	586	431	0	0	0	431	1194
Grand Total	0	0	0	0	0	0	182	851	0	1033	1863	0	360	0	2223	972	33	0	0	1005	4261
Apprch %	0	0	0	0		0	17.6	82.4	0		83.8	0	16.2	0		96.7	3.3	0	0		
Total %	0	0	0	0	0	0	4.3	20	0	24.2	43.7	0	8.4	0	52.2	22.8	0.8	0	0	23.6	
Unshifted	0	0	0	0	0	0	178	828	0	1006	1764	0	353	0	2117	956	31	0	0	987	4110
% Unshifted	0	0	0	0	0	0	97.8	97.3	0	97.4	94.7	0	98.1	0	95.2	98.4	93.9	0	0	98.2	96.5
Bank 1	0	0	0	0	0	0	0	16	0	16	38	0	2	0	40	11	1	0	0	12	68
% Bank 1	0	0	0	0	0	0	0	1.9	0	1.5	2	0	0.6	0	1.8	1.1	3	0	0	1.2	1.6
Bank 2	0	0	0	0	0	0	4	7	0	11	61	0	5	0	66	5	1	0	0	6	83
% Bank 2	0	0	0	0	0	0	2.2	0.8	0	1.1	3.3	0	1.4	0	3	0.5	3	0	0	0.6	1.9

Palmer Engineering Company

400 Shoppers Drive
Winchester, KY 40391
859-744-1218

Counter:
Counted by: Jason Ishmael
Weather: Sunny
Other:

File Name : I-265@KY146
Site Code : 00000000
Start Date : 10/6/2015
Page No : 2

	I-265 (Gene Snyder) From North					KY 146 (LaGrange Road) From East					I-265 (Gene Snyder) From South					KY 146 (LaGrange Road) From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	**182**	52	0	**234**	87	0	16	0	103	10	**33**	0	0	**43**	**380**
07:15 AM	0	0	0	0	0	0	0	74	0	74	103	0	20	0	123	7	0	0	0	7	204
07:30 AM	0	0	0	0	0	0	0	**79**	0	79	**108**	0	26	0	134	**14**	0	0	0	14	227
07:45 AM	0	0	0	0	0	0	0	63	0	63	105	0	**42**	0	**147**	13	0	0	0	13	223
Total Volume	0	0	0	0	0	0	182	268	0	450	403	0	104	0	507	44	33	0	0	77	1034
% App. Total	0	0	0	0		0	40.4	59.6	0		79.5	0	20.5	0		57.1	42.9	0	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.848	.000	.481	.933	.000	.619	.000	.862	.786	.250	.000	.000	.448	.680
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	44	0	44	132	0	13	0	145	**161**	0	0	0	**161**	**350**
04:45 PM	0	0	0	0	0	0	0	**56**	0	**56**	**151**	0	10	0	**161**	97	0	0	0	97	314
05:00 PM	0	0	0	0	0	0	0	44	0	44	120	0	**15**	0	135	133	0	0	0	133	312
05:15 PM	0	0	0	0	0	0	0	46	0	46	145	0	14	0	159	134	0	0	0	134	339
Total Volume	0	0	0	0	0	0	0	190	0	190	548	0	52	0	600	525	0	0	0	525	1315
% App. Total	0	0	0	0		0	0	100	0		91.3	0	8.7	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.848	.000	.848	.907	.000	.867	.000	.932	.815	.000	.000	.000	.815	.939

TRAFFIC STUDY
APPENDIX E

HCS Results

Existing Site

(Zorn Avenue)

HCS 2010 Two-Way Stop Control Summary Report

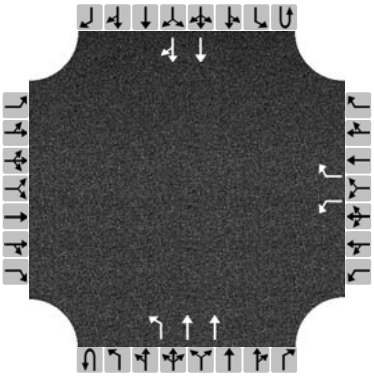
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2015 AM

Site Information

Intersection	Zorn Ave. @ I-71 SB Ramp
Jurisdiction	
East/West Street	I-71 SB Ramp
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

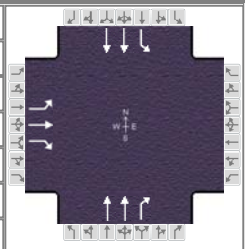
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	2	0	0	0	2	0
Configuration						L		R		L	T				T	TR
Volume (veh/h)						280		420		290	200				210	240
Percent Heavy Vehicles						5		5		5						
Proportion Time Blocked																
Right Turn Channelized	No				Yes				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						304		457		315						
Capacity						322		916		1050						
v/c Ratio						0.94		0.50		0.30						
95% Queue Length						9.6		2.8		1.3						
Control Delay (s/veh)						73.4		12.8		9.9						
Level of Service (LOS)						F		B		A						
Approach Delay (s/veh)					37.0				5.9							
Approach LOS					E				A							

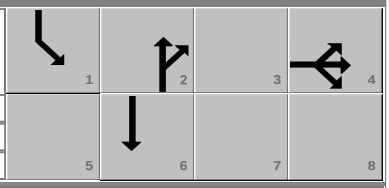
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ I-71 NB Ra…	File Name	2015 AM - Zorn at I-71 NB Ramp.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	280	0	420					200	360	80	210	

Signal Information			
Cycle, s	113.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	35.0	40.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Red	1.9	2.1	4.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		47.6				40.7	25.5	66.2
Change Period, (*Y+R c*), s		7.6				5.7	5.5	5.7
Max Allow Headway (*MAH*), s		5.2				2.2	3.6	2.0
Queue Clearance Time (*g s*), s		17.8				22.2	7.0	5.8
Green Extension Time (*g e*), s		3.2				0.5	0.1	0.2
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.02				0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	304	0	228					217	313	87	228	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1900	1533					1723	1533	1723	1723	
Queue Service Time (*g s*), s	15.8	0.0	12.9					5.3	20.2	5.0	3.8	
Cycle Queue Clearance Time (*g c*), s	15.8	0.0	12.9					5.3	20.2	5.0	3.8	
Green Ratio (*g/C*)	0.35	0.35	0.35					0.31	0.31	0.18	0.53	
Capacity (*c*), veh/h	606	668	539					1060	472	303	1832	
Volume-to-Capacity Ratio (*X*)	0.502	0.000	0.423					0.205	0.664	0.287	0.125	
Available Capacity (*c a*), veh/h	606	668	539					1060	472	303	1832	
Back of Queue (*Q*), veh/ln (95 th percentile)	10.8	0.0	8.4					3.9	12.3	3.8	2.6	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00	0.00					0.00	1.07	0.33	0.00	
Uniform Delay (*d 1*), s/veh	29.1	0.0	28.1					29.1	34.3	40.7	13.4	
Incremental Delay (*d 2*), s/veh	0.9	0.0	0.8					0.0	2.8	0.4	0.0	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	30.0	0.0	28.9					29.2	37.1	41.1	13.4	
Level of Service (LOS)	C		C					C	D	D	B	
Approach Delay, s/veh / LOS	29.5	C		0.0			33.8	C		21.0	C	
Intersection Delay, s/veh / LOS	29.2	C										

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.9	C	1.9	A	2.2	B
Bicycle LOS Score / LOS	1.4	A			0.9	A	0.7	A

HCS 2010 Two-Way Stop Control Summary Report

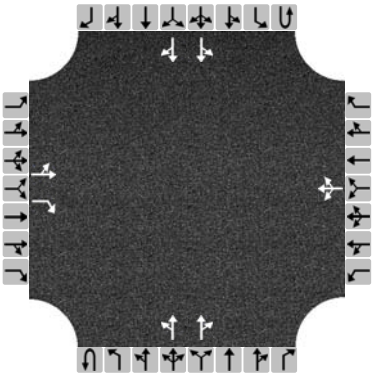
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2015 AM

Site Information

Intersection	Zorn Ave. @ Mellwood Ave.
Jurisdiction	
East/West Street	Mellwood Avenue
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

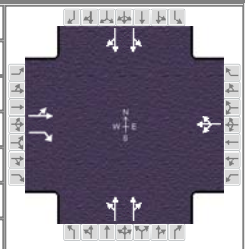
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	0	0	0	2	0	0	0	2	0
Configuration		LT		R			LTR			LT		TR		LT		TR
Volume (veh/h)		180	10	70		20	10	60		40	610	10		10	780	230
Percent Heavy Vehicles		5	5	5		5	5	5		5				5		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	2															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		207		76			98			375				435		
Capacity		216		477			402			626				906		
v/c Ratio		0.96		0.16			0.24			0.60				0.48		
95% Queue Length		8.2		0.6			0.9			0.2				0.0		
Control Delay (s/veh)		97.1		14.0			16.8			11.2				9.0		
Level of Service (LOS)		F		B			C			B				A		
Approach Delay (s/veh)	67.3				16.8				1.2				0.2			
Approach LOS	F				C				A				A			

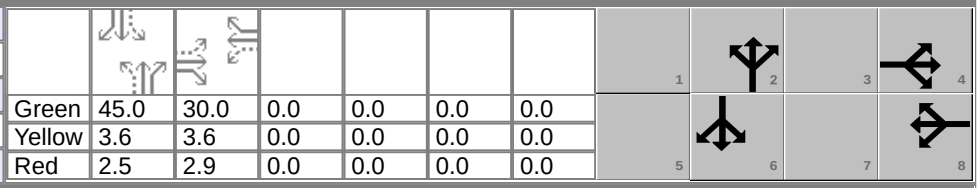
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ VA	File Name	2015 AM - Zorn at VA.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	0	20	10	10	20	120	520	10	10	360	500

Signal Information			
Cycle, s	87.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	30.0	0.0	0.0	0.0	0.0						
Yellow	3.6	3.6	0.0	0.0	0.0	0.0						
Red	2.5	2.9	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		8.0
Phase Duration, s		36.5		36.5		51.1		51.1
Change Period, ($Y+R_c$), s		6.5		6.5		6.1		6.1
Max Allow Headway (*MAH*), s		4.6		4.7		5.1		4.7
Queue Clearance Time (g_s), s		8.3		3.5		47.0		29.2
Green Extension Time (g_e), s		0.6		0.1		0.0		4.7
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.00		1.00		0.19

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		130	22		43		264		442	402		543
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1332	1533		1571		433		1639	1790		1395
Queue Service Time (g_s), s		4.7	0.8		0.0		17.8		15.7	0.0		27.2
Cycle Queue Clearance Time (g_c), s		6.3	0.8		1.5		45.0		15.7	12.2		27.2
Green Ratio (*g/C*)		0.34	0.34		0.34		0.51		0.51	0.51		0.51
Capacity (*c*), veh/h		538	525		589		284		842	962		717
Volume-to-Capacity Ratio (*X*)		0.242	0.041		0.074		0.932		0.525	0.418		0.758
Available Capacity (c_a), veh/h		538	525		589		284		842	962		717
Back of Queue (*Q*), veh/ln (95 th percentile)		3.4	0.5		1.1		13.2		9.3	8.1		13.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.11		0.00		0.00		0.00	0.00		0.00
Uniform Delay (d_1), s/veh		21.0	19.2		19.4		30.7		14.2	13.3		17.0
Incremental Delay (d_2), s/veh		0.3	0.0		0.1		35.9		0.7	0.4		4.8
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0		0.0	0.0		0.0
Control Delay (*d*), s/veh		21.3	19.2		19.5		66.6		14.9	13.7		21.8
Level of Service (LOS)		C	B		B		E		B	B		C
Approach Delay, s/veh / LOS	21.0	C		19.5	B		34.2	C		18.3	B	
Intersection Delay, s/veh / LOS	24.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.7	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	0.7	A	0.6	A	1.1	A	1.3	A

HCS 2010 Two-Way Stop Control Summary Report

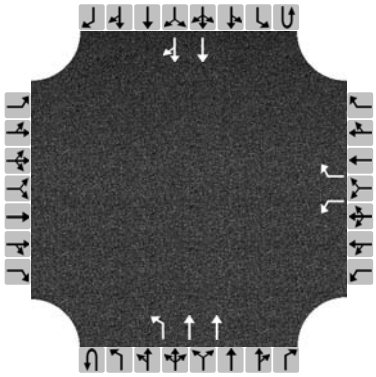
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2015 PM

Site Information

Intersection	Zorn Ave. @ I-71 SB Ramp
Jurisdiction	
East/West Street	I-71 SB Ramp
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

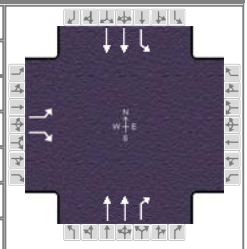
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	2	0	0	0	2	0
Configuration						L		R		L	T				T	TR
Volume (veh/h)						290		300		230	230				230	140
Percent Heavy Vehicles						5		5		5						
Proportion Time Blocked																
Right Turn Channelized	No				Yes				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						315		326		250						
Capacity						360		893		1132						
v/c Ratio						0.88		0.37		0.22						
95% Queue Length						8.4		1.7		0.8						
Control Delay (s/veh)						55.7		11.3		9.1						
Level of Service (LOS)						F		B		A						
Approach Delay (s/veh)					33.1				4.5							
Approach LOS					D				A							

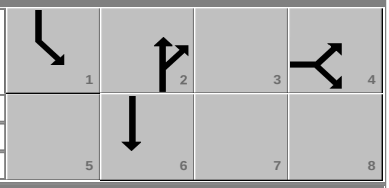
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ I-71 NB Ra…	File Name	2015 PM - Zorn at I-71 NB Ramp.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	290		300					230	570	410	230	

Signal Information			
Cycle, s	113.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	35.0	40.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Red	1.9	2.1	4.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		47.6				40.7	25.5	66.2
Change Period, (*Y+R c*), s		7.6				5.7	5.5	5.7
Max Allow Headway (*MAH*), s		5.2				2.2	3.6	2.0
Queue Clearance Time (*g s*), s		18.5				30.0	22.0	6.2
Green Extension Time (*g e*), s		3.1				0.4	0.0	0.2
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.02				0.09	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	315		212					250	402	446	250	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533					1723	1533	1723	1723	
Queue Service Time (*g s*), s	16.5		11.8					6.2	28.0	20.0	4.2	
Cycle Queue Clearance Time (*g c*), s	16.5		11.8					6.2	28.0	20.0	4.2	
Green Ratio (*g/C*)	0.35		0.35					0.31	0.31	0.18	0.53	
Capacity (*c*), veh/h	606		539					1060	472	303	1832	
Volume-to-Capacity Ratio (*X*)	0.520		0.393					0.236	0.853	1.471	0.136	
Available Capacity (*c a*), veh/h	606		539					1060	472	303	1832	
Back of Queue (*Q*), veh/ln (95 th percentile)	11.2		7.8					4.6	17.7	42.8	2.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	1.53	3.71	0.00	
Uniform Delay (*d 1*), s/veh	29.3		27.8					29.4	37.0	46.9	13.5	
Incremental Delay (*d 2*), s/veh	1.1		0.7					0.0	13.4	229.3	0.0	
Initial Queue Delay (*d 3*), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	30.4		28.4					29.5	50.4	276.2	13.5	
Level of Service (LOS)	C		C					C	D	F	B	
Approach Delay, s/veh / LOS	29.6		C	0.0			42.4		D	181.8		F
Intersection Delay, s/veh / LOS	90.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	1.9	A	1.8	A
Bicycle LOS Score / LOS		F			1.0	A	1.1	A

HCS 2010 Two-Way Stop Control Summary Report

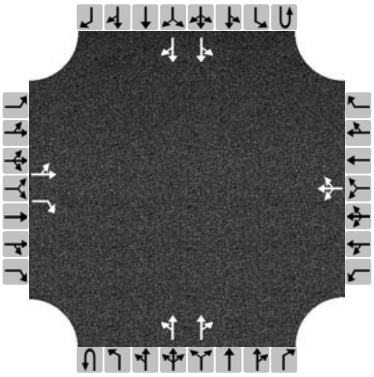
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2015 PM

Site Information

Intersection	Zorn Ave. @ Mellwood Ave.
Jurisdiction	
East/West Street	Mellwood Avenue
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

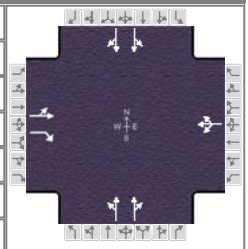
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	0	0	0	2	0	0	0	2	0
Configuration		LT		R			LTR			LT		TR		LT		TR
Volume (veh/h)		320	20	70		10	10	20		70	690	50		40	530	140
Percent Heavy Vehicles		5	5	5		5	5	5		5				5		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	2															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		370		76			44			451				331		
Capacity		242		630			300			865				810		
v/c Ratio		1.53		0.12			0.15			0.52				0.41		
95% Queue Length		22.2		0.4			0.5			0.3				0.2		
Control Delay (s/veh)		294.9		11.5			19.0			9.6				9.7		
Level of Service (LOS)		F		B			C			A				A		
Approach Delay (s/veh)	210.5				19.0				1.4				0.8			
Approach LOS	F				C				A				A			

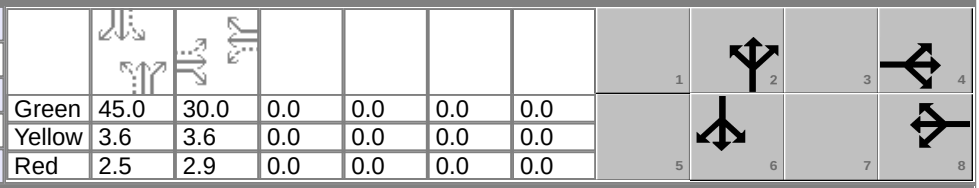
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ VA	File Name	2015 PM - Zorn at VA.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	400	10	90	10	10	10	60	400	10	20	500	90

Signal Information			
Cycle, s	87.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	30.0	0.0	0.0	0.0	0.0						
Yellow	3.6	3.6	0.0	0.0	0.0	0.0						
Red	2.5	2.9	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		8.0
Phase Duration, s		36.5		36.5		51.1		51.1
Change Period, ($Y+R_c$), s		6.5		6.5		6.1		6.1
Max Allow Headway (*MAH*), s		4.6		4.6		4.8		4.6
Queue Clearance Time (g_s), s		30.3		3.1		15.5		12.6
Green Extension Time (g_e), s		0.0		0.1		2.7		3.4
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		0.00		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		446	98		33		239		272	352		311
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1353	1533		1635		1220		1635	1759		1559
Queue Service Time (g_s), s		27.2	3.9		0.0		2.9		8.5	0.0		10.6
Cycle Queue Clearance Time (g_c), s		28.3	3.9		1.1		13.5		8.5	10.3		10.6
Green Ratio (*g/C*)		0.34	0.34		0.34		0.51		0.51	0.51		0.51
Capacity (*c*), veh/h		545	525		615		679		840	947		801
Volume-to-Capacity Ratio (*X*)		0.818	0.186		0.053		0.352		0.324	0.371		0.389
Available Capacity (c_a), veh/h		545	525		615		679		840	947		801
Back of Queue (*Q*), veh/ln (95 th percentile)		15.0	2.5		0.8		4.5		5.2	7.0		6.3
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.52		0.00		0.00		0.00	0.00		0.00
Uniform Delay (d_1), s/veh		28.2	20.2		19.3		12.7		12.4	12.9		12.9
Incremental Delay (d_2), s/veh		9.7	0.2		0.0		0.4		0.3	0.3		0.4
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0		0.0	0.0		0.0
Control Delay (*d*), s/veh		38.0	20.4		19.3		13.1		12.7	13.1		13.3
Level of Service (LOS)		D	C		B		B		B	B		B
Approach Delay, s/veh / LOS	34.8	C		19.3	B		12.9	B		13.2	B	
Intersection Delay, s/veh / LOS	19.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.7	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.4	A	0.5	A	0.9	A	1.0	A

HCS 2010 Two-Way Stop Control Summary Report

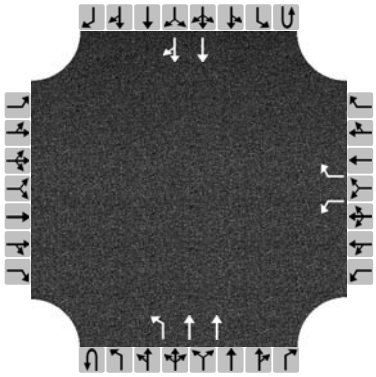
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2025 AM

Site Information

Intersection	Zorn Ave. @ I-71 SB Ramp
Jurisdiction	
East/West Street	I-71 SB Ramp
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

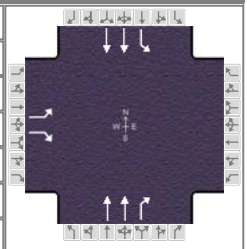
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	2	0	0	0	2	0
Configuration						L		R		L	T				T	TR
Volume (veh/h)						450		430		330	230				240	280
Percent Heavy Vehicles						5		5		5						
Proportion Time Blocked																
Right Turn Channelized	No				Yes				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						489		467		359						
Capacity						278		893		983						
v/c Ratio						1.76		0.52		0.37						
95% Queue Length						32.1		3.1		1.7						
Control Delay (s/veh)						388.6		13.4		10.8						
Level of Service (LOS)						F		B		B						
Approach Delay (s/veh)					205.3				6.3							
Approach LOS					F				A							

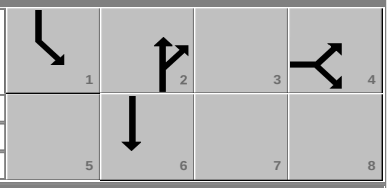
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ I-71 NB Ra…	File Name	2025 AM - Zorn at I-71 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	450		430					230	410	90	240	

Signal Information			
Cycle, s	113.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	35.0	40.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Red	1.9	2.1	4.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		47.6				40.7	25.5	66.2
Change Period, ($Y+R_c$), s		7.6				5.7	5.5	5.7
Max Allow Headway (*MAH*), s		5.2				2.2	3.6	2.0
Queue Clearance Time (g_s), s		31.2				25.9	7.6	6.4
Green Extension Time (g_e), s		3.0				0.5	0.1	0.2
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.54				0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	489		234					250	357	98	261	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533					1723	1533	1723	1723	
Queue Service Time (g_s), s	29.2		13.3					6.2	23.9	5.6	4.4	
Cycle Queue Clearance Time (g_c), s	29.2		13.3					6.2	23.9	5.6	4.4	
Green Ratio (*g/C*)	0.35		0.35					0.31	0.31	0.18	0.53	
Capacity (*c*), veh/h	606		539					1060	472	303	1832	
Volume-to-Capacity Ratio (*X*)	0.807		0.434					0.236	0.756	0.323	0.142	
Available Capacity (c_a), veh/h	606		539					1060	472	303	1832	
Back of Queue (*Q*), veh/ln (95 th percentile)	19.3		8.5					4.6	14.6	4.3	3.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	1.26	0.38	0.00	
Uniform Delay (d_1), s/veh	33.4		28.2					29.4	35.5	41.0	13.5	
Incremental Delay (d_2), s/veh	8.3		0.8					0.0	6.2	0.5	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	41.8		29.0					29.5	41.7	41.4	13.5	
Level of Service (LOS)	D		C					C	D	D	B	
Approach Delay, s/veh / LOS	37.6		D	0.0			36.7		D	21.1		C
Intersection Delay, s/veh / LOS	33.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.9	C	1.9	A	2.0	A
Bicycle LOS Score / LOS		F			1.0	A	0.8	A

HCS 2010 Two-Way Stop Control Summary Report

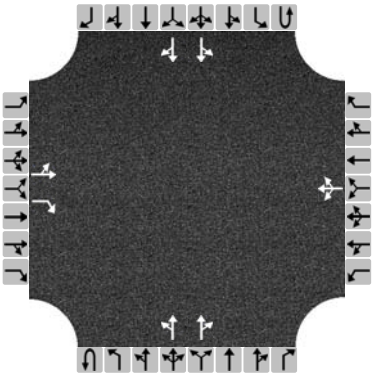
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2025 AM

Site Information

Intersection	Zorn Ave. @ Mellwood Ave.
Jurisdiction	
East/West Street	Mellwood Avenue
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

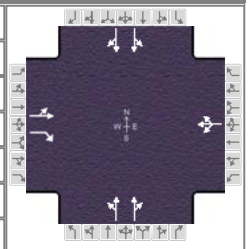
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	0	0	0	2	0	0	0	2	0
Configuration		LT		R			LTR			LT		TR		LT		TR
Volume (veh/h)		200	10	80		20	10	70		50	700	10		10	900	260
Percent Heavy Vehicles		5	5	5		5	5	5		5				5		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	2															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		228		87			109			435				500		
Capacity		170		422			346			542				832		
v/c Ratio		1.34		0.21			0.31			0.80				0.60		
95% Queue Length		13.5		0.8			1.3			0.3				0.0		
Control Delay (s/veh)		239.1		15.7			20.1			12.4				9.4		
Level of Service (LOS)		F		C			C			B				A		
Approach Delay (s/veh)	162.1				20.1				1.7				0.3			
Approach LOS	F				C				A				A			

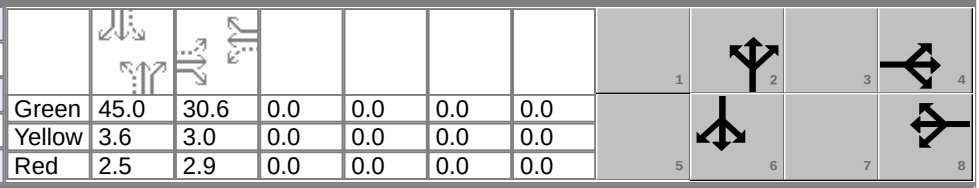
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ VA	File Name	2025 AM - Zorn at VA.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120	0	20	10	10	20	120	620	10	10	490	500

Signal Information			
Cycle, s	87.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	30.6	0.0	0.0	0.0	0.0						
Yellow	3.6	3.0	0.0	0.0	0.0	0.0						
Red	2.5	2.9	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		8.0
Phase Duration, s		36.5		36.5		51.1		51.1
Change Period, ($Y+R_c$), s		6.5		6.5		6.1		6.1
Max Allow Headway (*MAH*), s		4.6		4.7		5.2		4.7
Queue Clearance Time (g_s), s		8.3		3.5		47.0		29.2
Green Extension Time (g_e), s		0.6		0.1		0.0		5.5
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.00		1.00		0.26

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		130	22		43		301		514	543		543
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1332	1533		1571		445		1640	1792		1395
Queue Service Time (g_s), s		4.7	0.8		0.0		17.8		19.4	0.0		27.2
Cycle Queue Clearance Time (g_c), s		6.3	0.8		1.5		45.0		19.4	18.3		27.2
Green Ratio (*g/C*)		0.34	0.34		0.34		0.51		0.51	0.51		0.51
Capacity (*c*), veh/h		538	525		589		287		843	963		717
Volume-to-Capacity Ratio (*X*)		0.242	0.041		0.074		1.048		0.610	0.565		0.758
Available Capacity (c_a), veh/h		538	525		589		287		843	963		717
Back of Queue (*Q*), veh/ln (95 th percentile)		3.4	0.5		1.1		17.5		11.2	11.4		13.6
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.11		0.00		0.00		0.00	0.00		0.00
Uniform Delay (d_1), s/veh		21.0	19.2		19.4		30.2		15.1	14.8		17.0
Incremental Delay (d_2), s/veh		0.3	0.0		0.1		66.2		1.4	0.9		4.8
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0		0.0	0.0		0.0
Control Delay (*d*), s/veh		21.3	19.2		19.5		96.4		16.5	15.7		21.8
Level of Service (LOS)		C	B		B		F		B	B		C
Approach Delay, s/veh / LOS	21.0	C		19.5	B		46.0	D		18.7	B	
Intersection Delay, s/veh / LOS	29.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.7	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	0.7	A	0.6	A	1.2	A	1.4	A

HCS 2010 Two-Way Stop Control Summary Report

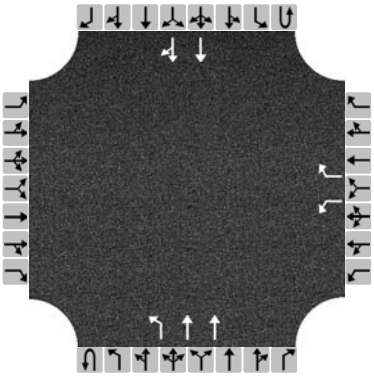
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2025 PM

Site Information

Intersection	Zorn Ave. @ I-71 SB Ramp
Jurisdiction	
East/West Street	I-71 SB Ramp
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

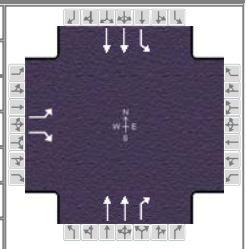
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	2	0	0	0	2	0
Configuration						L		R		L	T				T	TR
Volume (veh/h)						330		340		260	270				270	160
Percent Heavy Vehicles						5		5		5						
Proportion Time Blocked																
Right Turn Channelized	No				Yes				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						359		370		283						
Capacity						314		865		1070						
v/c Ratio						1.14		0.43		0.26						
95% Queue Length						14.8		2.2		1.1						
Control Delay (s/veh)						132.1		12.2		9.6						
Level of Service (LOS)						F		B		A						
Approach Delay (s/veh)					71.3				4.7							
Approach LOS					F				A							

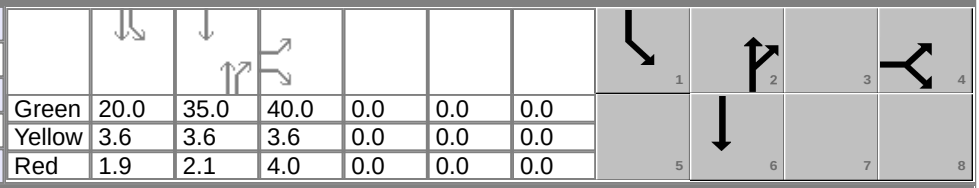
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ I-71 NB Ra…	File Name	2025 PM - Zorn at I-71 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	330		340					270	650	470	270	

Signal Information			
Cycle, s	113.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	35.0	40.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.6	0.0	0.0	0.0
Red	1.9	2.1	4.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		47.6				40.7	25.5	66.2
Change Period, ($Y+R_c$), s		7.6				5.7	5.5	5.7
Max Allow Headway (*MAH*), s		5.2				2.2	3.6	2.0
Queue Clearance Time (g_s), s		21.4				35.6	22.0	7.0
Green Extension Time (g_e), s		3.5				0.0	0.0	0.3
Phase Call Probability		1.00				1.00	1.00	1.00
Max Out Probability		0.06				1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	359		240					293	459	511	293	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533					1723	1533	1723	1723	
Queue Service Time (g_s), s	19.4		13.7					7.3	33.6	20.0	5.0	
Cycle Queue Clearance Time (g_c), s	19.4		13.7					7.3	33.6	20.0	5.0	
Green Ratio (*g/C*)	0.35		0.35					0.31	0.31	0.18	0.53	
Capacity (*c*), veh/h	606		539					1060	472	303	1832	
Volume-to-Capacity Ratio (*X*)	0.592		0.446					0.277	0.973	1.687	0.160	
Available Capacity (c_a), veh/h	606		539					1060	472	303	1832	
Back of Queue (*Q*), veh/ln (95 th percentile)	12.9		8.8					5.4	23.5	55.5	3.4	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	2.03	4.81	0.00	
Uniform Delay (d_1), s/veh	30.2		28.4					29.8	38.9	46.9	13.6	
Incremental Delay (d_2), s/veh	1.9		0.8					0.1	34.1	323.0	0.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	32.1		29.2					29.9	73.1	369.9	13.7	
Level of Service (LOS)	C		C					C	E	F	B	
Approach Delay, s/veh / LOS	30.9		C	0.0			56.2		E	239.9		F
Intersection Delay, s/veh / LOS	117.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	1.9	A	1.8	A
Bicycle LOS Score / LOS		F			1.1	A	1.2	A

HCS 2010 Two-Way Stop Control Summary Report

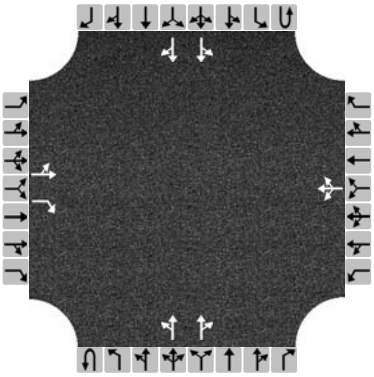
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	North-South
Project Description	VA Traffic Study - 2025 PM

Site Information

Intersection	Zorn Ave. @ Mellwood Ave.
Jurisdiction	
East/West Street	Mellwood Avenue
North/South Street	Zorn Avenue
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

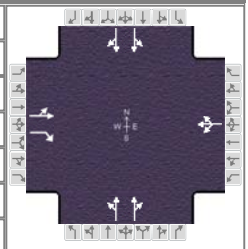
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	1		0	1	0	0	0	2	0	0	0	2	0
Configuration		LT		R			LTR			LT		TR		LT		TR
Volume (veh/h)		370	20	80		10	10	20		80	790	60		50	610	160
Percent Heavy Vehicles		5	5	5		5	5	5		5				5		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	2															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		424		87			44			517				386		
Capacity		183		581			233			787				729		
v/c Ratio		2.31		0.15			0.19			0.66				0.53		
95% Queue Length		34.7		0.5			0.7			0.4				0.2		
Control Delay (s/veh)		648.1		12.3			24.0			10.1				10.3		
Level of Service (LOS)		F		B			C			B				B		
Approach Delay (s/veh)	485.7				24.0				1.7				1.1			
Approach LOS	F				C				A				A			

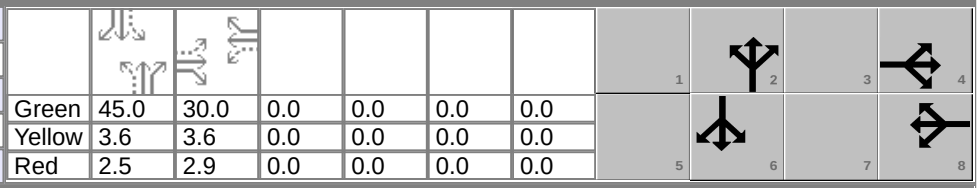
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Zorn Avenue	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Zorn Ave. @ VA	File Name	2025 PM - Zorn at VA.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	400	10	90	10	10	10	60	520	10	20	590	90

Signal Information			
Cycle, s	87.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	30.0	0.0	0.0	0.0	0.0						
Yellow	3.6	3.6	0.0	0.0	0.0	0.0						
Red	2.5	2.9	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		8.0		8.0		8.0
Phase Duration, s		36.5		36.5		51.1		51.1
Change Period, ($Y+R_c$), s		6.5		6.5		6.1		6.1
Max Allow Headway (*MAH*), s		4.6		4.6		4.8		4.6
Queue Clearance Time (g_s), s		30.3		3.1		18.1		14.6
Green Extension Time (g_e), s		0.0		0.1		3.4		4.0
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		1.00		0.00		0.01		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		446	98		33		302		340	402		359
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1353	1533		1635		1258		1637	1756		1570
Queue Service Time (g_s), s		27.2	3.9		0.0		3.4		11.1	0.0		12.6
Cycle Queue Clearance Time (g_c), s		28.3	3.9		1.1		16.1		11.1	12.2		12.6
Green Ratio (*g/C*)		0.34	0.34		0.34		0.51		0.51	0.51		0.51
Capacity (*c*), veh/h		545	525		615		696		841	945		806
Volume-to-Capacity Ratio (*X*)		0.818	0.186		0.053		0.433		0.404	0.425		0.445
Available Capacity (c_a), veh/h		545	525		615		696		841	945		806
Back of Queue (*Q*), veh/ln (95 th percentile)		15.0	2.5		0.8		5.9		6.9	8.1		7.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.52		0.00		0.00		0.00	0.00		0.00
Uniform Delay (d_1), s/veh		28.2	20.2		19.3		13.2		13.1	13.3		13.4
Incremental Delay (d_2), s/veh		9.7	0.2		0.0		0.5		0.4	0.4		0.5
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0		0.0		0.0	0.0		0.0
Control Delay (*d*), s/veh		38.0	20.4		19.3		13.7		13.4	13.7		13.9
Level of Service (LOS)		D	C		B		B		B	B		B
Approach Delay, s/veh / LOS	34.8	C		19.3	B		13.6	B		13.8	B	
Intersection Delay, s/veh / LOS	19.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.7	B	2.7	B	2.1	B	2.3	B
Bicycle LOS Score / LOS	1.4	A	0.5	A	1.0	A	1.1	A

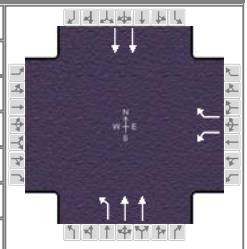
St Joseph Site

(Factory Lane)

Existing

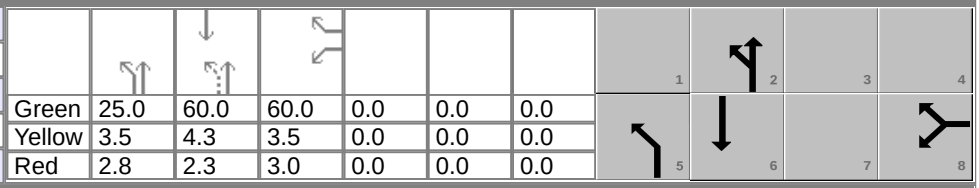
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2015 AM - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				870		186	83	139			966	

Signal Information			
Cycle, s	164.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	25.0	60.0	60.0	0.0	0.0	0.0			
Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Red	2.8	2.3	3.0	0.0	0.0	0.0			

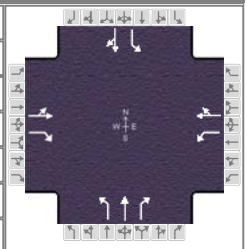
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				66.5	31.3	97.9		66.6
Change Period, ($Y+R_c$), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.2	4.0	3.5		5.9
Queue Clearance Time (g_s), s				62.0	6.3	5.4		47.8
Green Extension Time (g_e), s				0.0	0.2	0.5		6.8
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				1.00	0.00	0.00		0.61

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				946		162	90	151			1050	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533	1723	1723			1723	
Queue Service Time (g_s), s				60.0		12.3	4.3	3.4			45.8	
Cycle Queue Clearance Time (g_c), s				60.0		12.3	4.3	3.4			45.8	
Green Ratio (*g/C*)				0.36		0.36	0.53	0.56			0.36	
Capacity (*c*), veh/h				629		560	351	1913			1257	
Volume-to-Capacity Ratio (*X*)				1.504		0.289	0.257	0.079			0.835	
Back of Queue (*Q*), ft/ln (95 th percentile)				2614.1		217.6	81.6	62.1			716.1	
Back of Queue (*Q*), veh/ln (95 th percentile)				100.5		8.4	3.1	2.4			27.5	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.73	0.20	0.00			0.00	
Uniform Delay (d_1), s/veh				52.2		37.1	27.6	17.0			47.7	
Incremental Delay (d_2), s/veh				234.8		0.6	0.4	0.0			5.5	
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				287.0		37.7	28.0	17.0			53.2	
Level of Service (LOS)				F		D	C	B			D	
Approach Delay, s/veh / LOS	0.0			250.6		F	21.1		C	53.2		D
Intersection Delay, s/veh / LOS	141.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.8	C	1.7	A	1.9	A
Bicycle LOS Score / LOS				F	0.7	A	1.4	A

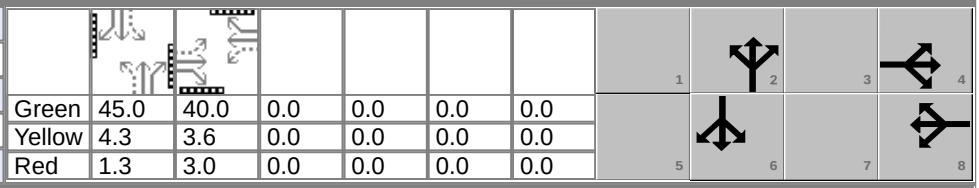
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2015 AM - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1	1	1	664	0	46	1	98	124	88	666	1

Signal Information			
Cycle, s	97.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	40.0	0.0	0.0	0.0	0.0						
Yellow	4.3	3.6	0.0	0.0	0.0	0.0						
Red	1.3	3.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		6.0		5.0		6.0
Phase Duration, s		46.6		46.6		50.6		50.6
Change Period, ($Y+R_c$), s		6.6		6.6		5.6		5.6
Max Allow Headway (*MAH*), s		4.7		4.7		5.1		5.0
Queue Clearance Time (g_s), s		2.1		42.0		37.0		36.9
Green Extension Time (g_e), s		0.0		0.0		0.6		3.2
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		1.00		0.24		0.62

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		2	1	722	50		1	107	108	96	725	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1535	1533	1370	1533		705	1810	1533	1245	1809	
Queue Service Time (g_s), s		0.0	0.0	39.9	1.9		0.1	3.3	3.9	4.6	34.9	
Cycle Queue Clearance Time (g_c), s		0.1	0.0	40.0	1.9		35.0	3.3	3.9	7.9	34.9	
Green Ratio (*g/C*)		0.41	0.41	0.41	0.41		0.46	0.46	0.46	0.46	0.46	
Capacity (*c*), veh/h		687	631	637	631		147	838	710	609	838	
Volume-to-Capacity Ratio (*X*)		0.003	0.002	1.133	0.079		0.007	0.127	0.152	0.157	0.866	
Back of Queue (*Q*), ft/ln (95 th percentile)		1.3	0.7	1075	31.4		1.1	58.8	60.3	58.8	570.6	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.1	0.0	41.3	1.2		0.0	2.3	2.3	2.3	21.9	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	2.39	0.00		0.00	0.00	0.00	0.47	0.00	
Uniform Delay (d_1), s/veh		16.9	16.8	31.0	17.4		39.1	14.9	15.1	17.1	23.4	
Incremental Delay (d_2), s/veh		0.0	0.0	78.3	0.1		0.0	0.1	0.1	0.2	9.7	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		16.9	16.8	109.3	17.5		39.1	15.0	15.2	17.3	33.1	
Level of Service (LOS)		B	B	F	B		D	B	B	B	C	
Approach Delay, s/veh / LOS	16.9	B		103.3	F		15.2	B		31.3	C	
Intersection Delay, s/veh / LOS	60.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.5	A	1.8	A	0.8	A	1.8	A

Phone: Fax:
E-Mail:

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: Palmer Engineering
Agency/Co.: Palmer Engineering
Date Performed: 8/31/2016
Analysis Time Period: 2015 AM Peak Existing
Intersection: Old Henry @ Factory Lane
Jurisdiction: District 5
Units: U. S. Customary
Analysis Year: 2015
Project ID: VA Traffic Study - St Joe Site - 2015 Existing Conditions
East/West Street: Old Henry Road
North/South Street: Old Henry / Factory Lane

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	0	0	0	478	0	42	0	65	83	22	212	0
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LR		TR		LT	
PHF			0.92		0.92		0.92	
Flow Rate			564		160		253	
% Heavy Veh			5		5		5	
No. Lanes			1		1		1	
Opposing-Lanes			0		1		1	
Conflicting-lanes			1		1		1	
Geometry group			1		1		1	

Duration, T 0.25 hrs.

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane			564		160		253	
Left-Turn			519		0		23	
Right-Turn			45		90		0	
Prop. Left-Turns			0.9		0.0		0.1	
Prop. Right-Turns			0.1		0.6		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
Geometry Group			1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj			0.2		0.2		0.2	

hRT-adj			-0.6		-0.6		-0.6	
hHV-adj			1.7		1.7		1.7	
hadj, computed			0.2		-0.3		0.1	

_____Worksheet 4 - Departure Headway and Service Time_____

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate			564		160		253	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial			0.50		0.14		0.22	
hd, final value			5.35		5.79		5.96	
x, final value			0.839		0.257		0.419	
Move-up time, m			2.0		2.0		2.0	
Service Time			3.4		3.8		4.0	

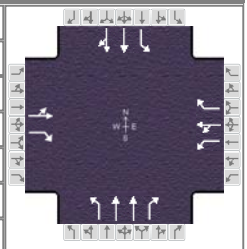
_____Worksheet 5 - Capacity and Level of Service_____

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate			564		160		253	
Service Time			3.4		3.8		4.0	
Utilization, x			0.839		0.257		0.419	
Dep. headway, hd			5.35		5.79		5.96	
Capacity			671		615		602	
95% Queue Length								
Delay			29.8		10.8		13.2	
LOS			D		B		B	
Approach:								
Delay			29.8		10.8		13.2	
LOS			D		B		B	

Intersection Delay 22.4 Intersection LOS C

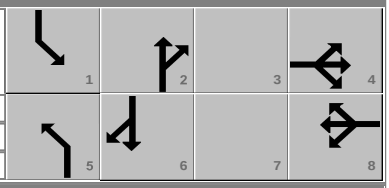
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2015 AM - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	51	27	125	541	86	36	146	411	175	13	1013	31

Signal Information			
Cycle, s	201.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	3.5	3.5	0.0

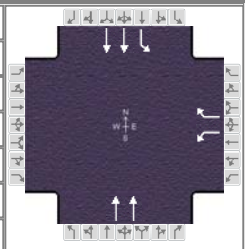
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		47.1		47.1	46.5	80.9	26.5	60.9
Change Period, ($Y+R_c$), s		7.1		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.3		4.6	4.0	3.7	4.0	3.6
Queue Clearance Time (g_s), s		17.7		42.0	18.4	20.9	3.5	57.0
Green Extension Time (g_e), s		0.8		0.0	0.5	2.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	0.00	0.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		85	136	588	93	32	159	447	152	14	570	564
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1752	1533	1723	1810	1533	1723	1723	1533	1723	1810	1790
Queue Service Time (g_s), s		8.2	15.7	40.0	8.8	3.4	16.4	18.9	13.9	1.5	55.0	55.0
Cycle Queue Clearance Time (g_c), s		8.2	15.7	40.0	8.8	3.4	16.4	18.9	13.9	1.5	55.0	55.0
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.37	0.37	0.10	0.27	0.27
Capacity (*c*), veh/h		348	304	342	359	304	342	1282	570	171	494	488
Volume-to-Capacity Ratio (*X*)		0.244	0.447	1.720	0.260	0.104	0.464	0.349	0.267	0.083	1.155	1.156
Back of Queue (*Q*), ft/ln (95 th percentile)		175.8	271.3	1984.7	194.8	63.6	305.5	333.3	238.7	31.7	1356.1	1344.2
Back of Queue (*Q*), veh/ln (95 th percentile)		6.8	10.4	76.3	7.5	2.4	11.7	12.8	9.2	1.2	52.2	51.7
Queue Storage Ratio (*RQ*) (95 th percentile)		1.76	2.71	9.92	0.97	0.32	0.76	0.83	0.80	0.09	0.00	0.00
Uniform Delay (d_1), s/veh		68.1	71.1	80.8	68.3	66.1	71.3	45.7	44.1	82.5	73.3	73.3
Incremental Delay (d_2), s/veh		0.4	1.0	336.0	0.5	0.2	1.0	0.1	0.2	0.2	90.8	91.1
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		68.4	72.1	416.8	68.8	66.3	72.3	45.8	44.3	82.7	164.1	164.4
Level of Service (LOS)		E	E	F	E	E	E	D	D	F	F	F
Approach Delay, s/veh / LOS	70.7	E		355.7	F		51.1	D		163.2	F	
Intersection Delay, s/veh / LOS	174.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	1.7	A	1.1	A	1.4	A

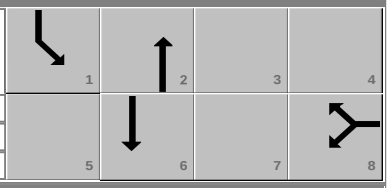
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2015 AM - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2015 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				339		145		211		572	731	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	4.4	5.0	3.7	0.0	0.0	0.0						
Yellow	1.4	1.2	1.8	0.0	0.0	0.0						
Red	50.0	60.0	40.0	0.0	0.0	0.0						

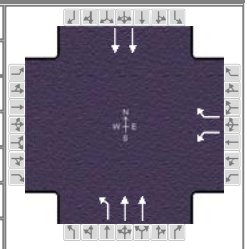
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, ($Y+R_c$), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.2		3.5	6.0	3.5
Queue Clearance Time (g_s), s				36.7		9.7	52.0	17.5
Green Extension Time (g_e), s				0.9		0.7	0.0	2.8
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				368		126		229		622	795	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (g_s), s				34.7		11.4		7.7		50.0	15.5	
Cycle Queue Clearance Time (g_c), s				34.7		11.4		7.7		50.0	15.5	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				0.895		0.344		0.186		1.209	0.334	
Back of Queue (*Q*), ft/ln (95 th percentile)				637.6		208.1		151.6		1375.8	246.7	
Back of Queue (*Q*), veh/ln (95 th percentile)				24.5		8.0		5.8		52.9	9.5	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		1.38	0.00	
Uniform Delay (d_1), s/veh				61.7		52.9		37.0		58.8	10.4	
Incremental Delay (d_2), s/veh				21.9		0.8		0.1		111.0	0.1	
Initial Queue Delay (d_3), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				83.6		53.7		37.0		169.8	10.4	
Level of Service (LOS)				F		D		D		F	B	
Approach Delay, s/veh / LOS	0.0			76.0		E	37.0		D	80.4		F
Intersection Delay, s/veh / LOS	74.7						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.3	B	0.7	A
Bicycle LOS Score / LOS				F	0.7	A	1.7	A

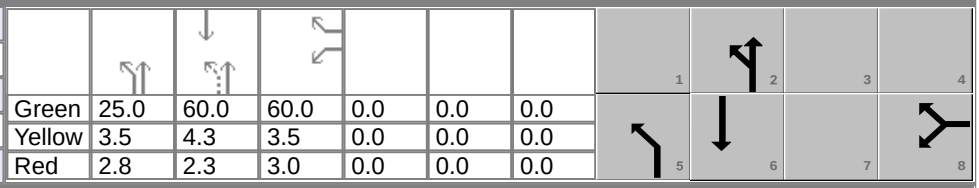
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2015 PM - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				227		480	263	637			438	

Signal Information			
Cycle, s	164.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	25.0	60.0	60.0	0.0	0.0	0.0			
Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Red	2.8	2.3	3.0	0.0	0.0	0.0			

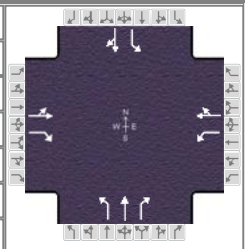
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				66.5	31.3	97.9		66.6
Change Period, ($Y+R_c$), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.3	4.0	3.5		5.9
Queue Clearance Time (g_s), s				41.0	17.4	20.4		18.7
Green Extension Time (g_e), s				5.6	0.6	2.3		4.6
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				0.19	0.12	0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				247		417	286	692			476	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533	1723	1723			1723	
Queue Service Time (g_s), s				17.4		39.0	15.4	18.4			16.7	
Cycle Queue Clearance Time (g_c), s				17.4		39.0	15.4	18.4			16.7	
Green Ratio (*g/C*)				0.36		0.36	0.53	0.56			0.36	
Capacity (*c*), veh/h				629		560	540	1913			1257	
Volume-to-Capacity Ratio (*X*)				0.392		0.746	0.530	0.362			0.379	
Back of Queue (*Q*), ft/ln (95 th percentile)				315.1		581.8	270.6	304.2			297.7	
Back of Queue (*Q*), veh/ln (95 th percentile)				12.1		22.4	10.4	11.7			11.5	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		1.94	0.65	0.00			0.00	
Uniform Delay (d_1), s/veh				38.7		45.5	23.4	20.3			38.5	
Incremental Delay (d_2), s/veh				0.9		6.5	1.0	0.1			0.4	
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				39.5		52.0	24.4	20.4			38.9	
Level of Service (LOS)				D		D	C	C			D	
Approach Delay, s/veh / LOS	0.0			47.4	D		21.6	C		38.9	D	
Intersection Delay, s/veh / LOS	33.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.8	C	1.8	A	1.9	A
Bicycle LOS Score / LOS				F	1.3	A	0.9	A

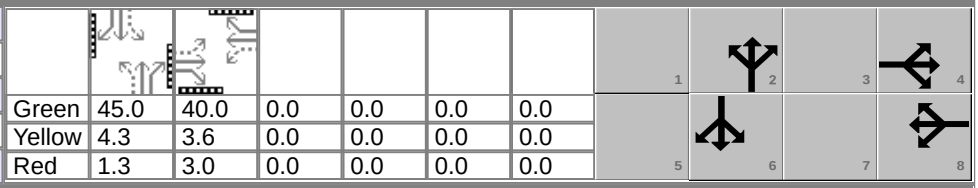
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2015 PM - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	1	1	2	281	0	44	2	599	495	56	282	1

Signal Information			
Cycle, s	97.2	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	45.0	40.0	0.0	0.0	0.0	0.0						
Yellow	4.3	3.6	0.0	0.0	0.0	0.0						
Red	1.3	3.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2		6
Case Number		7.0		6.0		5.0		6.0
Phase Duration, s		46.6		46.6		50.6		50.6
Change Period, ($Y+R_c$), s		6.6		6.6		5.6		5.6
Max Allow Headway (*MAH*), s		4.7		4.7		5.1		5.3
Queue Clearance Time (g_s), s		2.1		18.5		31.3		38.5
Green Extension Time (g_e), s		0.0		1.6		5.7		1.2
Phase Call Probability		1.00		1.00		1.00		1.00
Max Out Probability		0.00		0.00		0.41		0.67

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		2	2	305	48		2	651	430	61	308	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1536	1533	1370	1533		1037	1810	1533	755	1808	
Queue Service Time (g_s), s		0.0	0.1	16.4	1.8		0.1	29.3	20.4	7.1	10.7	
Cycle Queue Clearance Time (g_c), s		0.1	0.1	16.5	1.8		10.8	29.3	20.4	36.5	10.7	
Green Ratio (*g/C*)		0.41	0.41	0.41	0.41		0.46	0.46	0.46	0.46	0.46	
Capacity (*c*), veh/h		688	631	637	631		440	838	710	196	837	
Volume-to-Capacity Ratio (*X*)		0.003	0.003	0.480	0.076		0.005	0.777	0.606	0.311	0.367	
Back of Queue (*Q*), ft/ln (95 th percentile)		1.3	1.3	230.7	30		1.5	467.9	290.6	62.4	193.3	
Back of Queue (*Q*), veh/ln (95 th percentile)		0.1	0.1	8.9	1.2		0.1	18.0	11.2	2.4	7.4	
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.51	0.00		0.01	0.00	0.00	0.50	0.00	
Uniform Delay (d_1), s/veh		16.9	16.9	21.7	17.4		20.4	21.9	19.5	37.2	16.9	
Incremental Delay (d_2), s/veh		0.0	0.0	0.7	0.1		0.0	4.9	1.8	1.3	0.4	
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh		16.9	16.9	22.4	17.4		20.4	26.8	21.2	38.5	17.3	
Level of Service (LOS)		B	B	C	B		C	C	C	D	B	
Approach Delay, s/veh / LOS	16.9	B		21.7	C		24.6	C		20.8	C	
Intersection Delay, s/veh / LOS	23.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.6	B	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.5	A	1.1	A	2.3	B	1.1	A

Phone: Fax:
E-Mail:

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: Palmer Engineering
Agency/Co.: Palmer Engineering
Date Performed: 8/31/2016
Analysis Time Period: 2015 PM Peak Existing
Intersection: Old Henry @ Factory Lane
Jurisdiction: District 5
Units: U. S. Customary
Analysis Year: 2015
Project ID: VA Traffic Study - St Joe Site - 2015 Existing Conditions
East/West Street: Old Henry Road
North/South Street: Old Henry / Factory Lane

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	0	0	0	233	0	31	0	210	403	100	135	0
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration			LR		TR		LT	
PHF			0.92		0.92		0.92	
Flow Rate			286		666		254	
% Heavy Veh			5		5		5	
No. Lanes			1		1		1	
Opposing-Lanes			0		1		1	
Conflicting-lanes			1		1		1	
Geometry group			1		1		1	

Duration, T 0.25 hrs.

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane			286		666		254	
Left-Turn			253		0		108	
Right-Turn			33		438		0	
Prop. Left-Turns			0.9		0.0		0.4	
Prop. Right-Turns			0.1		0.7		0.0	
Prop. Heavy Vehicle			0.0		0.0		0.0	
Geometry Group			1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj			0.2		0.2		0.2	

hRT-adj			-0.6		-0.6		-0.6	
hHV-adj			1.7		1.7		1.7	
hadj, computed			0.2		-0.3		0.2	

_____Worksheet 4 - Departure Headway and Service Time_____

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate			286		666		254	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial			0.25		0.59		0.23	
hd, final value			6.46		5.04		6.07	
x, final value			0.513		0.933		0.428	
Move-up time, m			2.0		2.0		2.0	
Service Time			4.5		3.0		4.1	

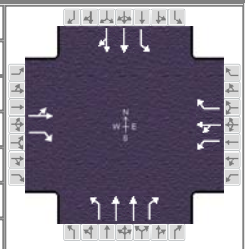
_____Worksheet 5 - Capacity and Level of Service_____

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate			286		666		254	
Service Time			4.5		3.0		4.1	
Utilization, x			0.513		0.933		0.428	
Dep. headway, hd			6.46		5.04		6.07	
Capacity			561		716		591	
95% Queue Length								
Delay			16.1		41.4		13.5	
LOS			C		E		B	
Approach:								
Delay			16.1		41.4		13.5	
LOS			C		E		B	

Intersection Delay 29.5 Intersection LOS D

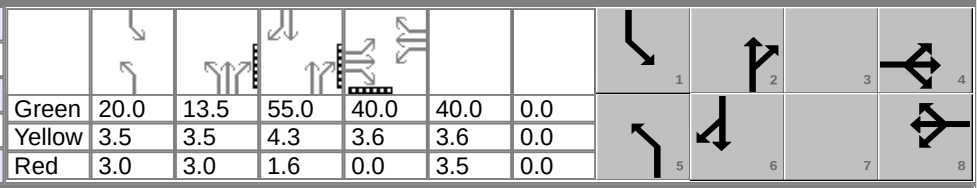
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2015 PM - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	79	44	94	333	100	52	84	1090	518	36	432	33

Signal Information			
Cycle, s	198.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	0.0	3.5	0.0

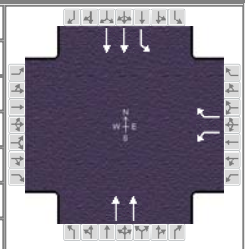
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		43.6		47.1	46.5	80.9	26.5	60.9
Change Period, ($Y+R_c$), s		3.6		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.2		4.6	4.0	3.7	4.0	3.6
Queue Clearance Time (g_s), s		15.1		42.0	10.8	66.5	6.1	25.7
Green Extension Time (g_e), s		0.8		0.0	0.3	0.0	0.1	1.4
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	1.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		134	102	362	109	46	91	1185	450	39	255	250
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1753	1533	1723	1810	1533	1723	1723	1533	1723	1810	1764
Queue Service Time (g_s), s		13.1	11.3	40.0	10.1	4.9	8.8	64.5	51.1	4.1	23.5	23.7
Cycle Queue Clearance Time (g_c), s		13.1	11.3	40.0	10.1	4.9	8.8	64.5	51.1	4.1	23.5	23.7
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.38	0.38	0.10	0.28	0.28
Capacity (*c*), veh/h		354	310	348	365	310	348	1304	581	174	502	490
Volume-to-Capacity Ratio (*X*)		0.378	0.330	1.040	0.297	0.147	0.262	0.908	0.775	0.225	0.508	0.511
Back of Queue (*Q*), ft/ln (95 th percentile)		259.4	208.1	836.3	217.2	90.9	183.8	994.9	727.3	87.4	422.3	416.1
Back of Queue (*Q*), veh/ln (95 th percentile)		10.0	8.0	32.2	8.4	3.5	7.1	38.3	28.0	3.4	16.2	16.0
Queue Storage Ratio (*RQ*) (95 th percentile)		2.59	2.08	4.18	1.09	0.45	0.46	2.49	2.42	0.25	0.00	0.00
Uniform Delay (d_1), s/veh		68.3	67.6	79.1	67.1	65.0	66.6	58.3	54.1	81.9	60.2	60.2
Incremental Delay (d_2), s/veh		0.7	0.6	59.1	0.5	0.3	0.4	9.5	6.4	0.6	0.7	0.8
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		69.0	68.2	138.1	67.7	65.3	67.0	67.8	60.5	82.6	60.9	61.0
Level of Service (LOS)		E	E	F	E	E	E	E	E	F	E	E
Approach Delay, s/veh / LOS	68.6	E		116.8	F		65.8	E		62.5	E	
Intersection Delay, s/veh / LOS	74.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	1.3	A	1.9	A	0.9	A

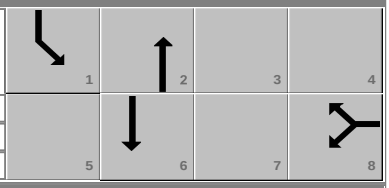
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2015 PM - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2015 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				118		396		1026		448	289	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	50.0	60.0	40.0	0.0	0.0	0.0						
Yellow	4.4	5.0	3.7	0.0	0.0	0.0						
Red	1.4	1.2	1.8	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, ($Y+R_c$), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.3		3.5	6.0	3.5
Queue Clearance Time (g_s), s				39.0		53.5	48.3	7.2
Green Extension Time (g_e), s				0.3		2.4	0.6	1.0
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		0.47	1.00	0.00

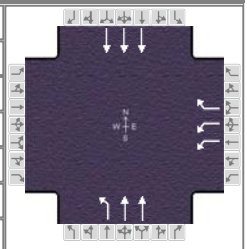
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				128		345		1115		487	314	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (g_s), s				10.3		37.0		51.5		46.3	5.2	
Cycle Queue Clearance Time (g_c), s				10.3		37.0		51.5		46.3	5.2	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				0.312		0.941		0.904		0.947	0.132	
Back of Queue (*Q*), ft/ln (95 th percentile)				209.1		638.1		811.7		822	87.9	
Back of Queue (*Q*), veh/ln (95 th percentile)				8.0		24.5		31.2		31.6	3.4	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		0.82	0.00	
Uniform Delay (d_1), s/veh				52.4		62.6		51.0		57.4	8.8	
Incremental Delay (d_2), s/veh				0.6		32.4		9.4		27.3	0.0	
Initial Queue Delay (d_3), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				53.0		95.0		60.4		84.8	8.8	
Level of Service (LOS)				D		F		E		F	A	
Approach Delay, s/veh / LOS	0.0			83.6		F	60.4		E	55.0		D
Intersection Delay, s/veh / LOS	63.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.4	B	0.7	A
Bicycle LOS Score / LOS				F	1.4	A	1.1	A

No Build

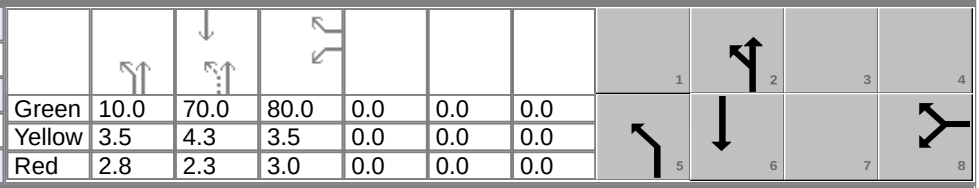
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2025 AM - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				1239		265	118	199			1376	

Signal Information			
Cycle, s	179.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	10.0	70.0	80.0	0.0	0.0	0.0			
Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Red	2.8	2.3	3.0	0.0	0.0	0.0			

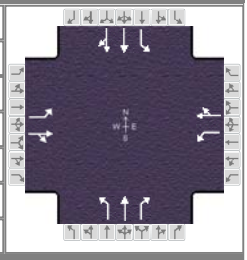
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				86.5	16.3	92.9		76.6
Change Period, (*Y+R c*), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.2	4.0	3.5		5.9
Queue Clearance Time (*g s*), s				68.9	9.8	8.2		49.7
Green Extension Time (*g e*), s				8.8	0.0	0.7		13.2
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				0.86	1.00	0.00		0.55

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				1347		230	128	216			1496	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1673		1533	1723	1723			1643	
Queue Service Time (*g s*), s				66.9		17.6	7.8	6.2			47.7	
Cycle Queue Clearance Time (*g c*), s				66.9		17.6	7.8	6.2			47.7	
Green Ratio (*g/C*)				0.45		0.45	0.46	0.48			0.39	
Capacity (*c*), veh/h				1492		684	179	1657			1923	
Volume-to-Capacity Ratio (*X*)				0.902		0.337	0.718	0.131			0.778	
Back of Queue (*Q*), ft/ln (95 th percentile)				993.4		286.5	182.6	120.8			698.8	
Back of Queue (*Q*), veh/ln (95 th percentile)				38.2		11.0	7.0	4.6			26.9	
Queue Storage Ratio (*RQ*) (95 th percentile)				1.20		0.35	0.19	0.00			0.00	
Uniform Delay (*d 1*), s/veh				46.1		32.4	39.3	25.8			47.9	
Incremental Delay (*d 2*), s/veh				8.4		0.6	13.0	0.0			2.4	
Initial Queue Delay (*d 3*), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				54.5		33.0	52.4	25.8			50.3	
Level of Service (LOS)				D		C	D	C			D	
Approach Delay, s/veh / LOS	0.0			51.3	D		35.7	D		50.3	D	
Intersection Delay, s/veh / LOS	49.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.0	B	1.9	A
Bicycle LOS Score / LOS				F	0.8	A	1.3	A

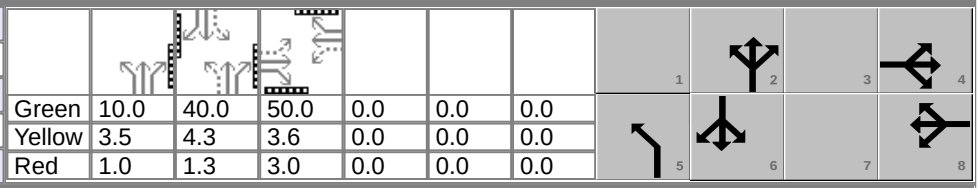
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2025 AM - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	8	36	875	29	61	156	140	177	126	949	46

Signal Information			
Cycle, s	116.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	10.0	40.0	50.0	0.0	0.0	0.0
Yellow	3.5	4.3	3.6	0.0	0.0	0.0
Red	1.0	1.3	3.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	3.0		6.3
Phase Duration, s		56.6		56.6	14.5	60.1		45.6
Change Period, ($Y+R_c$), s		6.6		6.6	4.5	5.6		5.6
Max Allow Headway (*MAH*), s		4.8		4.7	3.0	5.1		5.0
Queue Clearance Time (g_s), s		6.9		52.0	9.1	9.0		35.1
Green Extension Time (g_e), s		0.2		0.0	0.0	1.8		3.0
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	0.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	40		951	98		170	152	154	137	545	536
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1255	1586		1322	1613		1723	1810	1533	1195	1810	1780
Queue Service Time (g_s), s	0.6	1.7		48.3	4.3		7.1	5.7	7.0	9.9	33.1	33.1
Cycle Queue Clearance Time (g_c), s	4.9	1.7		50.0	4.3		7.1	5.7	7.0	9.9	33.1	33.1
Green Ratio (*g/C*)	0.43	0.43		0.43	0.43		0.45	0.47	0.47	0.34	0.34	0.34
Capacity (*c*), veh/h	553	679		609	691		239	845	716	471	620	610
Volume-to-Capacity Ratio (*X*)	0.020	0.059		1.563	0.142		0.709	0.180	0.216	0.291	0.879	0.879
Back of Queue (*Q*), ft/ln (95 th percentile)	8.7	30.2		2503.4	76.2		151.7	108.4	112.3	131.3	594.8	588.1
Back of Queue (*Q*), veh/ln (95 th percentile)	0.3	1.2		96.3	2.9		5.8	4.2	4.3	5.1	22.9	22.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		5.56	0.00		0.61	0.00	0.00	1.05	0.00	0.00
Uniform Delay (d_1), s/veh	21.8	19.6		36.7	20.3		26.8	18.1	18.4	28.5	36.1	36.1
Incremental Delay (d_2), s/veh	0.0	0.0		261.1	0.1		8.0	0.1	0.2	0.5	14.0	14.2
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	21.8	19.6		297.8	20.4		34.8	18.2	18.6	29.0	50.0	50.3
Level of Service (LOS)	C	B		F	C		C	B	B	C	D	D
Approach Delay, s/veh / LOS	20.1	C		271.9	F		24.3	C		47.8	D	
Intersection Delay, s/veh / LOS	127.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.2	B	1.3	A	1.5	A

HCS 2010 Two-Way Stop Control Summary Report

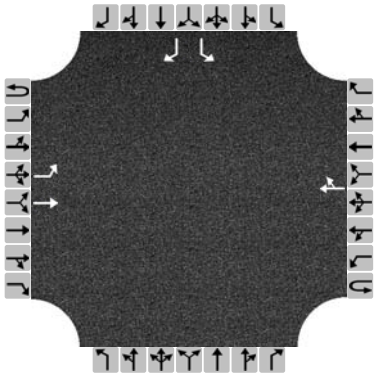
General Information

Analyst	
Agency/Co.	Palmer Engineering
Date Performed	10/12/2015
Analysis Year	2015
Time Analyzed	
Intersection Orientation	East-West
Project Description	VA Traffic Study - 2025 AM

Site Information

Intersection	Factory Lane at Old Henry
Jurisdiction	
East/West Street	Old Henry
North/South Street	Factory Lane
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

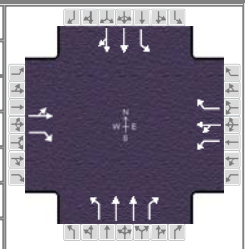
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		92	118				681	60						30		285
Percent Heavy Vehicles		5												5		5
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		100												33		310
Capacity		808												203		395
v/c Ratio		0.12												0.16		0.78
95% Queue Length		0.4												0.6		6.7
Control Delay (s/veh)		10.1												26.1		40.2
Level of Service (LOS)		B												D		E
Approach Delay (s/veh)	4.4												38.9			
Approach LOS													E			

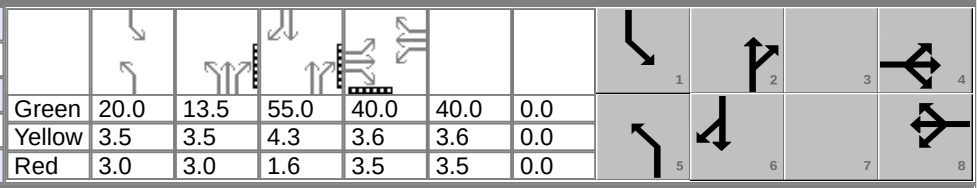
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2025 AM - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	57	30	138	727	116	48	161	454	193	14	1119	34

Signal Information			
Cycle, s	201.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	3.5	3.5	0.0

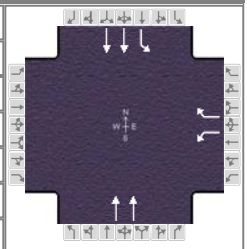
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		47.1		47.1	46.5	80.9	26.5	60.9
Change Period, ($Y+R_c$), s		7.1		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.3		4.6	4.0	3.7	4.0	3.6
Queue Clearance Time (g_s), s		19.5		42.0	20.3	23.2	3.6	57.0
Green Extension Time (g_e), s		0.8		0.0	0.5	2.3	0.0	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	0.00	0.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		95	150	790	126	41	175	493	167	15	630	624
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1752	1533	1723	1810	1533	1723	1723	1533	1723	1810	1790
Queue Service Time (g_s), s		9.2	17.5	40.0	12.1	4.5	18.3	21.2	15.5	1.6	55.0	55.0
Cycle Queue Clearance Time (g_c), s		9.2	17.5	40.0	12.1	4.5	18.3	21.2	15.5	1.6	55.0	55.0
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.37	0.37	0.10	0.27	0.27
Capacity (*c*), veh/h		348	304	342	359	304	342	1282	570	171	494	488
Volume-to-Capacity Ratio (*X*)		0.272	0.493	2.311	0.351	0.136	0.512	0.385	0.293	0.089	1.276	1.277
Back of Queue (*Q*), ft/ln (95 th percentile)		197.1	296.5	3025.1	251.1	83.9	334.4	366.5	259.6	34.2	1649.8	1637.3
Back of Queue (*Q*), veh/ln (95 th percentile)		7.6	11.4	116.4	9.7	3.2	12.9	14.1	10.0	1.3	63.5	63.0
Queue Storage Ratio (*RQ*) (95 th percentile)		1.97	2.97	15.13	1.26	0.42	0.84	0.92	0.87	0.10	0.00	0.00
Uniform Delay (d_1), s/veh		68.5	71.8	80.8	69.6	66.6	72.1	46.4	44.6	82.5	73.3	73.3
Incremental Delay (d_2), s/veh		0.4	1.2	599.1	0.7	0.2	1.3	0.2	0.2	0.2	139.0	139.6
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		68.9	73.0	679.9	70.3	66.8	73.4	46.6	44.9	82.7	212.3	212.9
Level of Service (LOS)		E	E	F	E	E	E	D	D	F	F	F
Approach Delay, s/veh / LOS	71.4	E		573.2	F		51.8	D		211.1	F	
Intersection Delay, s/veh / LOS	265.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	2.1	B	1.2	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2025 AM - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				441		160		233		631	807	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

							1	2	3	4
Green	50.0	60.0	40.0	0.0	0.0	0.0	5	6	7	8
Yellow	4.4	5.0	3.7	0.0	0.0	0.0				
Red	1.4	1.2	1.8	0.0	0.0	0.0				

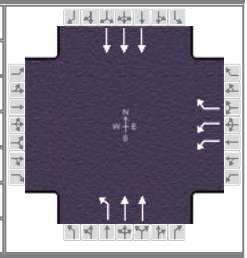
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, ($Y+R_c$), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.2		3.5	6.0	3.5
Queue Clearance Time (g_s), s				42.0		10.5	52.0	19.7
Green Extension Time (g_e), s				0.0		0.8	0.0	3.1
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				479		139		253		686	877	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (g_s), s				40.0		12.7		8.5		50.0	17.7	
Cycle Queue Clearance Time (g_c), s				40.0		12.7		8.5		50.0	17.7	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				1.165		0.380		0.205		1.333	0.368	
Back of Queue (*Q*), ft/ln (95 th percentile)				1060.1		226.7		168.8		1699.3	274.2	
Back of Queue (*Q*), veh/ln (95 th percentile)				40.8		8.7		6.5		65.4	10.5	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		1.70	0.00	
Uniform Delay (d_1), s/veh				63.8		53.4		37.2		58.8	10.7	
Incremental Delay (d_2), s/veh				97.6		0.9		0.1		162.9	0.1	
Initial Queue Delay (d_3), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				161.4		54.3		37.3		221.6	10.8	
Level of Service (LOS)				F		D		D		F	B	
Approach Delay, s/veh / LOS	0.0			137.3		F	37.3		D	103.3		F
Intersection Delay, s/veh / LOS	105.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.3	B	0.7	A
Bicycle LOS Score / LOS				F	0.7	A	1.8	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2025 PM - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				323		684	374	907			624	

Signal Information			
Cycle, s	164.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

							1	2	3	4	
Green	25.0	60.0	60.0	0.0	0.0	0.0	5	6	7	8	
Yellow	3.5	4.3	3.5	0.0	0.0	0.0					
Red	2.8	2.3	3.0	0.0	0.0	0.0					

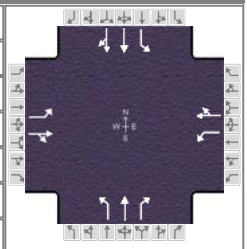
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				66.5	31.3	97.9		66.6
Change Period, ($Y+R_c$), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.3	4.0	3.5		5.9
Queue Clearance Time (g_s), s				35.4	25.9	31.3		18.7
Green Extension Time (g_e), s				6.9	0.0	3.6		7.1
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				0.10	1.00	0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				351		372	407	986			678	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1673		1533	1723	1723			1643	
Queue Service Time (g_s), s				12.2		33.4	23.9	29.3			16.7	
Cycle Queue Clearance Time (g_c), s				12.2		33.4	23.9	29.3			16.7	
Green Ratio (*g/C*)				0.36		0.36	0.53	0.56			0.36	
Capacity (*c*), veh/h				1221		560	500	1913			1799	
Volume-to-Capacity Ratio (*X*)				0.287		0.664	0.813	0.515			0.377	
Back of Queue (*Q*), ft/ln (95 th percentile)				229.7		501.8	424.7	447.6			285.1	
Back of Queue (*Q*), veh/ln (95 th percentile)				8.8		19.3	16.3	17.2			11.0	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.28		0.61	0.45	0.00			0.00	
Uniform Delay (d_1), s/veh				37.0		43.8	26.2	22.8			38.4	
Incremental Delay (d_2), s/veh				0.3		4.0	9.9	0.2			0.3	
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				37.3		47.7	36.1	23.0			38.7	
Level of Service (LOS)				D		D	D	C			D	
Approach Delay, s/veh / LOS	0.0			42.7		D	26.8		C	38.7		D
Intersection Delay, s/veh / LOS	33.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.4	B	1.9	A
Bicycle LOS Score / LOS				F	1.6	A	0.9	A

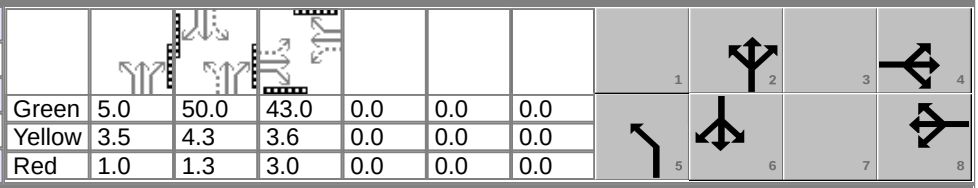
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2025 PM - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	31	136	370	7	58	41	853	704	79	402	79

Signal Information			
Cycle, s	114.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	5.0	50.0	43.0	0.0	0.0	0.0
Yellow	3.5	4.3	3.6	0.0	0.0	0.0
Red	1.0	1.3	3.0	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	3.0		6.3
Phase Duration, s		49.6		49.6	9.5	65.1		55.6
Change Period, ($Y+R_c$), s		6.6		6.6	4.5	5.6		5.6
Max Allow Headway (*MAH*), s		4.8		5.0	3.0	5.0		5.5
Queue Clearance Time (g_s), s		9.6		45.0	3.5	60.0		52.0
Green Extension Time (g_e), s		0.9		0.0	0.0	0.0		0.0
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	1.00		1.00

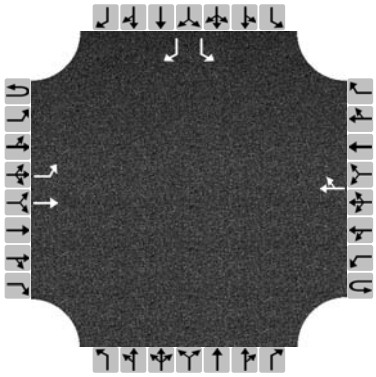
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	43	152		402	71		45	927	612	86	267	255
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1287	1587		1195	1559		1723	1810	1533	584	1810	1706
Queue Service Time (g_s), s	2.6	7.6		35.4	3.4		1.5	58.0	36.7	1.5	11.2	11.4
Cycle Queue Clearance Time (g_c), s	6.0	7.6		43.0	3.4		1.5	58.0	36.7	50.0	11.2	11.4
Green Ratio (*g/C*)	0.37	0.37		0.37	0.37		0.50	0.52	0.52	0.44	0.44	0.44
Capacity (*c*), veh/h	507	595		431	585		424	939	795	70	789	744
Volume-to-Capacity Ratio (*X*)	0.086	0.256		0.932	0.121		0.105	0.988	0.769	1.220	0.339	0.343
Back of Queue (*Q*), ft/ln (95 th percentile)	38	134.6		547.2	59.1		26.9	992.5	494.4	256	211.2	204.4
Back of Queue (*Q*), veh/ln (95 th percentile)	1.5	5.2		21.0	2.3		1.0	38.2	19.0	9.8	8.1	7.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		1.22	0.00		0.11	0.00	0.00	2.05	0.00	0.00
Uniform Delay (d_1), s/veh	25.4	24.8		41.1	23.5		15.7	27.2	22.1	57.3	21.4	21.5
Incremental Delay (d_2), s/veh	0.1	0.3		27.2	0.1		0.0	26.3	4.9	178.1	0.4	0.4
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	25.5	25.1		68.4	23.6		15.8	53.6	27.0	235.4	21.8	21.8
Level of Service (LOS)	C	C		E	C		B	D	C	F	C	C
Approach Delay, s/veh / LOS	25.2	C		61.7	E		42.2	D		51.9	D	
Intersection Delay, s/veh / LOS	46.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.8	A	1.3	A	3.1	C	1.0	A

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst		Intersection	Factory Lane @ Old Henry
Agency/Co.	Palmer Engineering	Jurisdiction	
Date Performed	11/18/2015	East/West Street	Old Henry
Analysis Year	2015	North/South Street	Factory Lane
Time Analyzed		Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	VA Traffic Study - 2025 PM		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

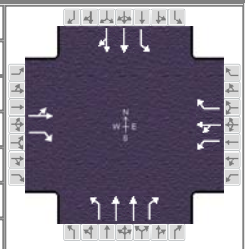
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		1	0	1
Configuration		L	T					TR						L		R
Volume (veh/h)		300	574				332	44						134		182
Percent Heavy Vehicles		5												5		5
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		326												146		198
Capacity		1136												75		657
v/c Ratio		0.29												1.94		0.30
95% Queue Length		1.2												13.1		1.3
Control Delay (s/veh)		9.4												560.6		12.8
Level of Service (LOS)		A												F		B
Approach Delay (s/veh)	3.2												245.3			
Approach LOS													F			

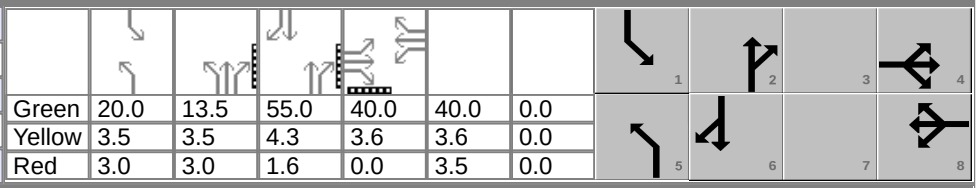
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2025 PM - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	87	48	104	448	134	70	93	1204	573	40	477	36

Signal Information			
Cycle, s	198.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	0.0	3.5	0.0

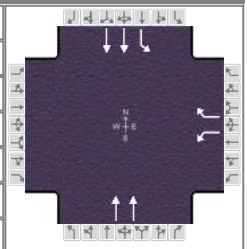
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		43.6		47.1	46.5	80.9	26.5	60.9
Change Period, (*Y+R* $_c$), s		3.6		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.2		4.6	4.0	3.7	4.0	3.6
Queue Clearance Time (g_s), s		16.4		42.0	11.9	77.0	6.6	28.5
Green Extension Time (g_e), s		0.9		0.0	0.3	0.0	0.1	1.6
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	1.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		147	113	487	146	61	101	1309	498	43	282	276
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1753	1533	1723	1810	1533	1723	1723	1533	1723	1810	1764
Queue Service Time (g_s), s		14.4	12.6	40.0	13.8	6.5	9.9	75.0	59.2	4.6	26.4	26.5
Cycle Queue Clearance Time (g_c), s		14.4	12.6	40.0	13.8	6.5	9.9	75.0	59.2	4.6	26.4	26.5
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.38	0.38	0.10	0.28	0.28
Capacity (*c*), veh/h		354	310	348	365	310	348	1304	581	174	502	490
Volume-to-Capacity Ratio (*X*)		0.415	0.365	1.399	0.399	0.197	0.290	1.003	0.857	0.250	0.561	0.563
Back of Queue (*Q*), ft/ln (95 th percentile)		281.5	226.7	1423.9	279.3	122.5	202.9	1219.6	849.3	97.4	467.6	460.1
Back of Queue (*Q*), veh/ln (95 th percentile)		10.8	8.7	54.8	10.7	4.7	7.8	46.9	32.7	3.7	18.0	17.7
Queue Storage Ratio (*RQ*) (95 th percentile)		2.81	2.27	7.12	1.40	0.61	0.51	3.05	2.83	0.28	0.00	0.00
Uniform Delay (d_1), s/veh		68.9	68.1	79.1	68.6	65.7	67.0	61.6	56.6	82.1	61.2	61.3
Incremental Delay (d_2), s/veh		0.8	0.7	196.3	0.8	0.4	0.5	25.7	12.1	0.7	1.3	1.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		69.6	68.8	275.4	69.5	66.1	67.5	87.3	68.7	82.9	62.5	62.6
Level of Service (LOS)		E	E	F	E	E	E	F	E	F	E	E
Approach Delay, s/veh / LOS	69.3	E		213.8	F		81.4	F		64.0	E	
Intersection Delay, s/veh / LOS	104.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	1.6	A	2.1	B	1.0	A

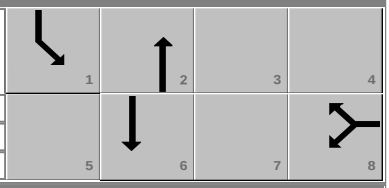
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2025 PM - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				131		437		1133		495	319	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	4.4	5.0	3.7	0.0	0.0	0.0						
Yellow	1.4	1.2	1.8	0.0	0.0	0.0						
Red	50.0	60.0	40.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, (*Y+R c*), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.3		3.5	6.0	3.5
Queue Clearance Time (*g s*), s				42.0		61.8	52.0	7.8
Green Extension Time (*g e*), s				0.0		0.0	0.0	1.1
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		1.00	1.00	0.00

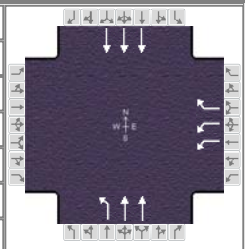
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				142		380		1232		538	347	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (*g s*), s				11.5		40.0		59.8		50.0	5.8	
Cycle Queue Clearance Time (*g c*), s				11.5		40.0		59.8		50.0	5.8	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				0.346		1.039		0.998		1.046	0.146	
Back of Queue (*Q*), ft/ln (95 th percentile)				228.6		770.5		997.9		1006.3	97.9	
Back of Queue (*Q*), veh/ln (95 th percentile)				8.8		29.6		38.4		38.7	3.8	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		1.01	0.00	
Uniform Delay (*d 1*), s/veh				52.9		63.8		53.7		58.8	8.9	
Incremental Delay (*d 2*), s/veh				0.7		57.5		25.1		52.2	0.0	
Initial Queue Delay (*d 3*), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				53.6		121.2		78.8		110.9	8.9	
Level of Service (LOS)				D		F		E		F	A	
Approach Delay, s/veh / LOS	0.0			102.8		F	78.8		E	71.0		E
Intersection Delay, s/veh / LOS	80.9						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.4	B	0.7	A
Bicycle LOS Score / LOS				F	1.5	A	1.2	A

Build

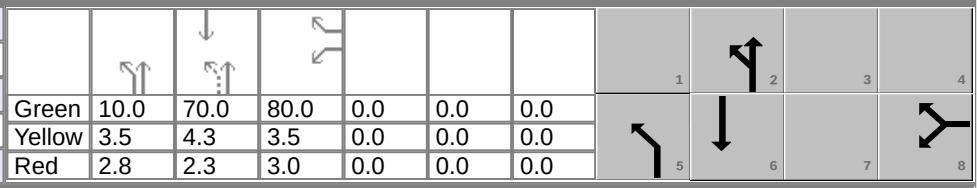
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2025 AM Build - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				1239		560	118	250			1462	

Signal Information			
Cycle, s	179.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	10.0	70.0	80.0	0.0	0.0	0.0			
Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Red	2.8	2.3	3.0	0.0	0.0	0.0			

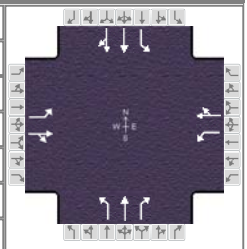
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				86.5	16.3	92.9		76.6
Change Period, ($Y+R_c$), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.2	4.0	3.5		5.9
Queue Clearance Time (g_s), s				68.9	9.8	10.0		54.1
Green Extension Time (g_e), s				9.4	0.0	0.8		11.6
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				0.91	1.00	0.00		0.70

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				1347		487	128	272			1589	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1673		1533	1723	1723			1643	
Queue Service Time (g_s), s				66.9		46.3	7.8	8.0			52.1	
Cycle Queue Clearance Time (g_c), s				66.9		46.3	7.8	8.0			52.1	
Green Ratio (*g/C*)				0.45		0.45	0.46	0.48			0.39	
Capacity (*c*), veh/h				1492		684	167	1657			1923	
Volume-to-Capacity Ratio (*X*)				0.902		0.712	0.767	0.164			0.826	
Back of Queue (*Q*), ft/ln (95 th percentile)				993.4		658.3	193.7	154.4			759.3	
Back of Queue (*Q*), veh/ln (95 th percentile)				38.2		25.3	7.5	5.9			29.2	
Queue Storage Ratio (*RQ*) (95 th percentile)				1.20		0.80	0.20	0.00			0.00	
Uniform Delay (d_1), s/veh				46.1		40.4	40.8	26.2			49.2	
Incremental Delay (d_2), s/veh				8.4		4.3	19.0	0.0			3.5	
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				54.5		44.7	59.9	26.3			52.7	
Level of Service (LOS)				D		D	E	C			D	
Approach Delay, s/veh / LOS	0.0			51.9		D	37.0		D	52.7		D
Intersection Delay, s/veh / LOS	50.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	0.8	A	1.4	A

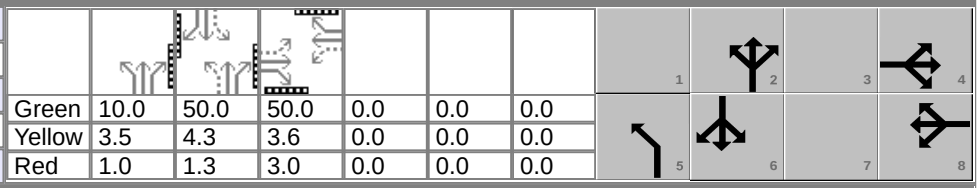
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2025 AM Build - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2025 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	8	36	875	29	74	156	486	177	129	1040	46

Signal Information			
Cycle, s	126.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	10.0	50.0	50.0	0.0	0.0	0.0
Yellow	3.5	4.3	3.6	0.0	0.0	0.0
Red	1.0	1.3	3.0	0.0	0.0	0.0

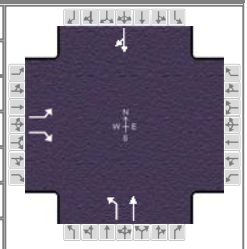
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	3.0		6.3
Phase Duration, s		56.6		56.6	14.5	70.1		55.6
Change Period, ($Y+R_c$), s		6.6		6.6	4.5	5.6		5.6
Max Allow Headway (*MAH*), s		4.8		4.8	3.0	5.0		5.1
Queue Clearance Time (g_s), s		8.5		52.0	9.1	27.6		39.6
Green Extension Time (g_e), s		0.2		0.0	0.0	4.1		5.8
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	0.03		0.68

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	11	40		951	112		170	528	154	140	595	586
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1239	1586		1322	1602		1723	1810	1533	846	1810	1782
Queue Service Time (g_s), s	0.7	2.0		48.0	5.8		7.1	25.6	7.0	17.4	37.5	37.6
Cycle Queue Clearance Time (g_c), s	6.5	2.0		50.0	5.8		7.1	25.6	7.0	28.6	37.5	37.6
Green Ratio (*g/C*)	0.39	0.39		0.39	0.39		0.49	0.51	0.51	0.39	0.39	0.39
Capacity (*c*), veh/h	490	626		558	632		238	921	781	316	714	703
Volume-to-Capacity Ratio (*X*)	0.022	0.064		1.705	0.177		0.713	0.573	0.198	0.443	0.833	0.833
Back of Queue (*Q*), ft/ln (95 th percentile)	10.3	35.6		2792.7	103.9		152.5	411.7	112.1	169.6	631.9	624.9
Back of Queue (*Q*), veh/ln (95 th percentile)	0.4	1.4		107.4	4.0		5.9	15.8	4.3	6.5	24.3	24.0
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		6.21	0.00		0.61	0.00	0.00	1.36	0.00	0.00
Uniform Delay (d_1), s/veh	27.1	23.8		41.8	25.0		27.3	21.6	17.0	36.5	34.6	34.6
Incremental Delay (d_2), s/veh	0.0	0.1		324.8	0.2		8.3	1.1	0.2	1.4	8.6	8.8
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	27.1	23.9		366.6	25.1		35.7	22.6	17.2	37.9	43.2	43.4
Level of Service (LOS)	C	C		F	C		D	C	B	D	D	D
Approach Delay, s/veh / LOS	24.6	C		330.6	F		24.2	C		42.7	D	
Intersection Delay, s/veh / LOS	130.8						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.2	B	1.9	A	1.6	A

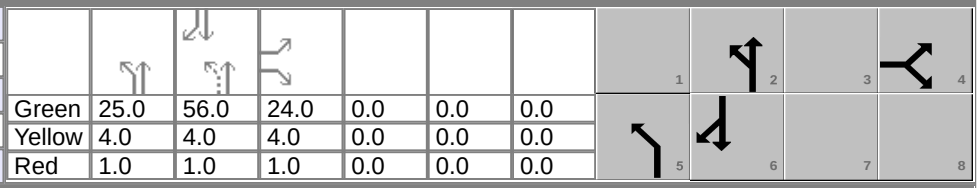
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Factor…	File Name	2025 AM Build - Factory Lane at Old Henry.xus		
Project Description	VA Traffic Study - 2025 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	33		379				451	118			681	73

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	25.0	56.0	24.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	1.0	1.0	1.0	0.0	0.0	0.0						

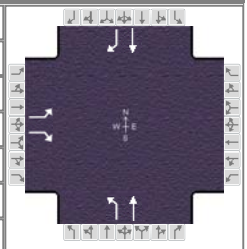
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		8.3
Phase Duration, s		29.0			30.0	91.0		61.0
Change Period, ($Y+R_c$), s		5.0			5.0	5.0		5.0
Max Allow Headway (*MAH*), s		3.8			3.5	3.4		3.6
Queue Clearance Time (g_s), s		20.4			27.0	4.6		54.4
Green Extension Time (g_e), s		0.3			0.0	0.3		0.6
Phase Call Probability		1.00			1.00	1.00		1.00
Max Out Probability		1.00			1.00	0.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	36		247				490	128			803	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533				1723	1810			1784	
Queue Service Time (g_s), s	2.0		18.4				25.0	2.6			52.4	
Cycle Queue Clearance Time (g_c), s	2.0		18.4				25.0	2.6			52.4	
Green Ratio (*g/C*)	0.20		0.20				0.69	0.72			0.47	
Capacity (*c*), veh/h	345		307				439	1297			833	
Volume-to-Capacity Ratio (*X*)	0.104		0.804				1.118	0.099			0.965	
Back of Queue (*Q*), ft/ln (95 th percentile)	40.8		332.4				824.8	38.6			914.4	
Back of Queue (*Q*), veh/ln (95 th percentile)	1.6		12.8				31.7	1.5			35.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		2.66				3.67	0.00			0.00	
Uniform Delay (d_1), s/veh	39.2		45.8				38.4	5.2			31.0	
Incremental Delay (d_2), s/veh	0.1		14.0				79.0	0.0			22.8	
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	
Control Delay (*d*), s/veh	39.3		59.8				117.4	5.2			53.8	
Level of Service (LOS)	D		E				F	A			D	
Approach Delay, s/veh / LOS	57.2		E	0.0			94.2		F	53.8		D
Intersection Delay, s/veh / LOS	69.0						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.2	B	0.7	A	2.5	B
Bicycle LOS Score / LOS		F			1.4	A	1.8	A

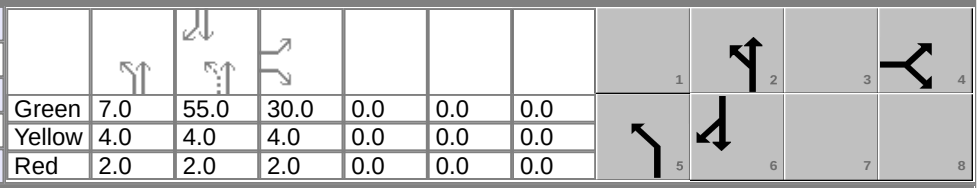
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Factory Lane	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	VA @ Factory Lane	File Name	2025 AM Build - VA at Factory Lane (signalized).xus		
Project Description	VA Traffic Study - 2025 AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	64		97				372	152			315	270

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	7.0	55.0	30.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0

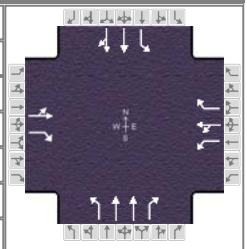
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		36.0			13.0	74.0		61.0
Change Period, ($Y+R_c$), s		6.0			6.0	6.0		6.0
Max Allow Headway (*MAH*), s		4.3			4.1	4.0		4.2
Queue Clearance Time (g_s), s		6.7			9.0	6.2		14.8
Green Extension Time (g_e), s		0.5			0.0	0.6		2.3
Phase Call Probability		1.00			1.00	1.00		1.00
Max Out Probability		0.00			1.00	0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	70		85				404	165			342	235
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533				1723	1810			1810	1533
Queue Service Time (g_s), s	3.4		4.7				7.0	4.2			12.8	9.9
Cycle Queue Clearance Time (g_c), s	3.4		4.7				7.0	4.2			12.8	9.9
Green Ratio (*g/C*)	0.27		0.27				0.58	0.62			0.50	0.50
Capacity (*c*), veh/h	470		418				560	1119			905	767
Volume-to-Capacity Ratio (*X*)	0.148		0.203				0.722	0.148			0.378	0.306
Back of Queue (*Q*), ft/ln (95 th percentile)	65.6		81.5				252	73.5			232.5	160
Back of Queue (*Q*), veh/ln (95 th percentile)	2.5		3.1				9.7	2.8			8.9	6.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				1.01	0.00			0.00	0.80
Uniform Delay (d_1), s/veh	30.3		30.8				20.4	8.8			17.0	16.2
Incremental Delay (d_2), s/veh	0.1		0.2				4.5	0.1			0.3	0.2
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	30.5		31.0				24.9	8.9			17.2	16.5
Level of Service (LOS)	C		C				C	A			B	B
Approach Delay, s/veh / LOS	30.8	C		0.0			20.3	C		16.9	B	
Intersection Delay, s/veh / LOS	20.0	C										

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	0.7	A	2.3	B
Bicycle LOS Score / LOS		F			1.4	A	1.4	A

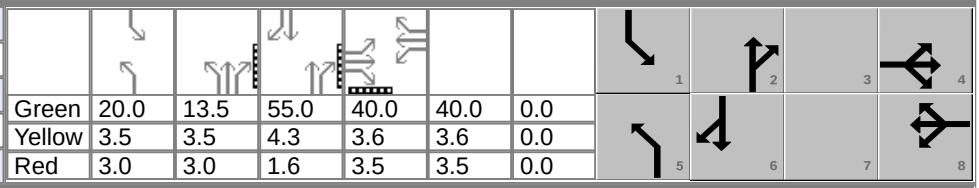
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2025 AM Build - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2025 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	57	43	138	782	119	54	161	454	411	53	1119	34

Signal Information			
Cycle, s	201.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	3.5	3.5	0.0

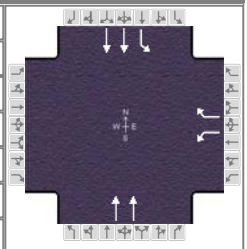
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		47.1		47.1	46.5	80.9	26.5	60.9
Change Period, ($Y+R_c$), s		7.1		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.2		4.6	4.0	3.8	4.0	3.6
Queue Clearance Time (g_s), s		19.5		42.0	20.3	40.5	8.3	57.0
Green Extension Time (g_e), s		0.9		0.0	0.5	2.7	0.1	0.0
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	0.04	0.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		109	150	850	129	47	175	493	358	58	630	624
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1759	1533	1723	1810	1533	1723	1723	1533	1723	1810	1790
Queue Service Time (g_s), s		10.6	17.5	40.0	12.4	5.1	18.3	21.2	38.5	6.3	55.0	55.0
Cycle Queue Clearance Time (g_c), s		10.6	17.5	40.0	12.4	5.1	18.3	21.2	38.5	6.3	55.0	55.0
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.37	0.37	0.10	0.27	0.27
Capacity (*c*), veh/h		349	304	342	359	304	342	1282	570	171	494	488
Volume-to-Capacity Ratio (*X*)		0.311	0.493	2.486	0.360	0.154	0.512	0.385	0.627	0.337	1.276	1.277
Back of Queue (*Q*), ft/ln (95 th percentile)		221.4	296.5	3325.4	256.6	95.3	334.4	366.5	557.5	133.3	1649.8	1637.3
Back of Queue (*Q*), veh/ln (95 th percentile)		8.5	11.4	127.9	9.9	3.7	12.9	14.1	21.4	5.1	63.5	63.0
Queue Storage Ratio (*RQ*) (95 th percentile)		2.21	2.97	16.63	1.28	0.48	0.84	0.92	1.86	0.38	0.00	0.00
Uniform Delay (d_1), s/veh		69.0	71.8	80.8	69.8	66.8	72.1	46.4	51.8	84.6	73.3	73.3
Incremental Delay (d_2), s/veh		0.5	1.2	677.3	0.7	0.3	1.3	0.2	2.1	1.2	139.0	139.6
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		69.5	73.0	758.1	70.5	67.1	73.4	46.6	53.9	85.8	212.3	212.9
Level of Service (LOS)		E	E	F	E	E	E	D	D	F	F	F
Approach Delay, s/veh / LOS	71.6	E		640.0	F		53.7	D		207.1	F	
Intersection Delay, s/veh / LOS	276.6						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	2.2	B	1.3	A	1.6	A

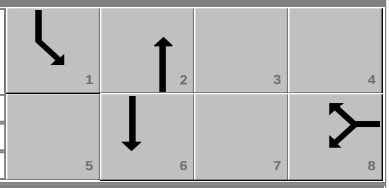
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2025 AM Build - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2025 AM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				441		352		246		634	811	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	50.0	60.0	40.0	0.0	0.0	0.0						
Yellow	4.4	5.0	3.7	0.0	0.0	0.0						
Red	1.4	1.2	1.8	0.0	0.0	0.0						

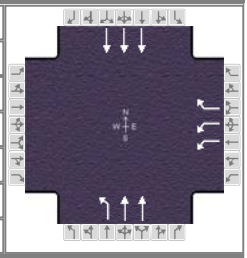
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, (*Y+R c*), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.2		3.5	6.0	3.5
Queue Clearance Time (*g s*), s				42.0		11.0	52.0	19.8
Green Extension Time (*g e*), s				0.0		0.8	0.0	3.2
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				479		348		267		689	882	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (*g s*), s				40.0		37.4		9.0		50.0	17.8	
Cycle Queue Clearance Time (*g c*), s				40.0		37.4		9.0		50.0	17.8	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				1.165		0.950		0.217		1.340	0.370	
Back of Queue (*Q*), ft/ln (95 th percentile)				1060.1		649.7		178.7		1716.3	275.7	
Back of Queue (*Q*), veh/ln (95 th percentile)				40.8		25.0		6.9		66.0	10.6	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		1.72	0.00	
Uniform Delay (*d 1*), s/veh				63.8		62.8		37.4		58.8	10.7	
Incremental Delay (*d 2*), s/veh				97.6		34.3		0.1		165.6	0.1	
Initial Queue Delay (*d 3*), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				161.4		97.1		37.5		224.3	10.8	
Level of Service (LOS)				F		F		D		F	B	
Approach Delay, s/veh / LOS	0.0			134.3		F	37.5		D	104.5		F
Intersection Delay, s/veh / LOS	107.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.3	B	0.7	A
Bicycle LOS Score / LOS				F	0.7	A	1.8	A

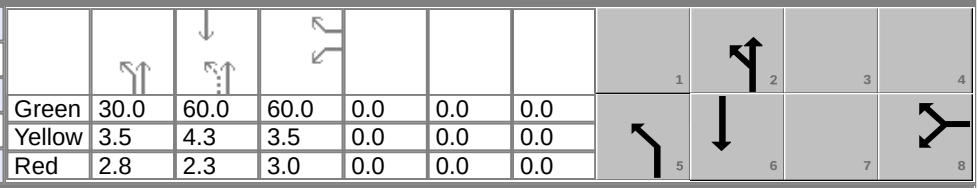
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ I-265…	File Name	2025 PM Build - Old Henry at I-265 NB Ramp.xus		
Project Description	VA Traffic Study - 2025 PM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				323		748	374	918			911	

Signal Information			
Cycle, s	169.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	30.0	60.0	60.0	0.0	0.0	0.0			
Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Red	2.8	2.3	3.0	0.0	0.0	0.0			

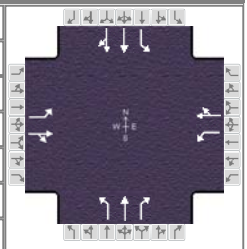
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	1.0	4.0		8.3
Phase Duration, s				66.5	36.3	102.9		66.6
Change Period, ($Y+R_c$), s				6.5	6.3	6.6		6.6
Max Allow Headway (*MAH*), s				6.3	4.0	3.5		5.9
Queue Clearance Time (g_s), s				41.5	26.0	31.8		29.5
Green Extension Time (g_e), s				6.5	0.6	3.6		10.4
Phase Call Probability				1.00	1.00	1.00		1.00
Max Out Probability				0.24	1.00	0.00		0.10

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	
Adjusted Flow Rate (*v*), veh/h				351		407	407	998			990	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1673		1533	1723	1723			1643	
Queue Service Time (g_s), s				12.8		39.5	24.0	29.8			27.5	
Cycle Queue Clearance Time (g_c), s				12.8		39.5	24.0	29.8			27.5	
Green Ratio (*g/C*)				0.35		0.35	0.54	0.57			0.35	
Capacity (*c*), veh/h				1185		543	453	1959			1746	
Volume-to-Capacity Ratio (*X*)				0.296		0.748	0.897	0.509			0.567	
Back of Queue (*Q*), ft/ln (95 th percentile)				239.4		590	465	454.2			433.6	
Back of Queue (*Q*), veh/ln (95 th percentile)				9.2		22.7	17.9	17.5			16.7	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.80		0.72	0.49	0.00			0.00	
Uniform Delay (d_1), s/veh				39.5		48.1	30.5	22.2			44.2	
Incremental Delay (d_2), s/veh				0.3		6.8	20.2	0.2			0.7	
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	
Control Delay (*d*), s/veh				39.8		54.9	50.7	22.4			44.9	
Level of Service (LOS)				D		D	D	C			D	
Approach Delay, s/veh / LOS	0.0			47.9		D	30.6		C	44.9		D
Intersection Delay, s/veh / LOS	39.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.4	B	1.9	A
Bicycle LOS Score / LOS				F	1.6	A	1.0	A

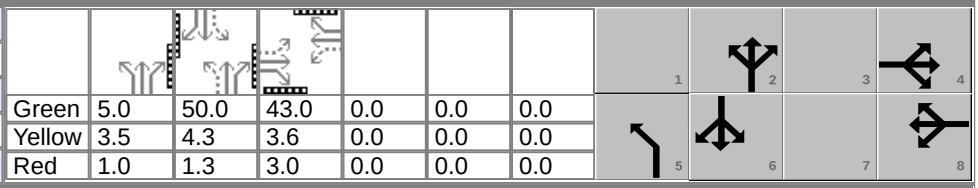
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Bush…	File Name	2025 PM Build - Old Henry at Bush Farm.xus		
Project Description	VA Traffic Study - 2025 PM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	31	136	370	7	61	41	928	704	92	708	11

Signal Information			
Cycle, s	114.7	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	5.0	50.0	43.0	0.0	0.0	0.0
Yellow	3.5	4.3	3.6	0.0	0.0	0.0
Red	1.0	1.3	3.0	0.0	0.0	0.0

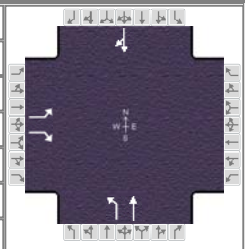
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		6.0		6.0	1.0	3.0		6.3
Phase Duration, s		49.6		49.6	9.5	65.1		55.6
Change Period, ($Y+R_c$), s		6.6		6.6	4.5	5.6		5.6
Max Allow Headway (*MAH*), s		4.8		5.0	3.0	5.0		5.4
Queue Clearance Time (g_s), s		9.6		45.0	3.5	61.5		52.0
Green Extension Time (g_e), s		0.9		0.0	0.0	0.0		0.0
Phase Call Probability		1.00		1.00	1.00	1.00		1.00
Max Out Probability		0.00		1.00	1.00	1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	43	152		402	74		45	1009	612	100	392	390
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1283	1587		1195	1558		1723	1810	1533	541	1810	1800
Queue Service Time (g_s), s	2.6	7.6		35.4	3.6		1.5	59.5	36.7	0.0	17.9	17.9
Cycle Queue Clearance Time (g_c), s	6.2	7.6		43.0	3.6		1.5	59.5	36.7	50.0	17.9	17.9
Green Ratio (*g/C*)	0.37	0.37		0.37	0.37		0.50	0.52	0.52	0.44	0.44	0.44
Capacity (*c*), veh/h	504	595		431	584		325	939	795	63	789	784
Volume-to-Capacity Ratio (*X*)	0.086	0.256		0.932	0.127		0.137	1.075	0.769	1.593	0.497	0.497
Back of Queue (*Q*), ft/ln (95 th percentile)	38.1	134.6		547.2	62		26.9	1277.1	494.4	351.7	306.9	306
Back of Queue (*Q*), veh/ln (95 th percentile)	1.5	5.2		21.0	2.4		1.0	49.1	19.0	13.5	11.8	11.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00		1.22	0.00		0.11	0.00	0.00	2.81	0.00	0.00
Uniform Delay (d_1), s/veh	25.6	24.8		41.1	23.5		16.7	27.6	22.1	57.3	23.3	23.3
Incremental Delay (d_2), s/veh	0.1	0.3		27.2	0.1		0.1	51.6	4.9	329.2	0.7	0.7
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	25.7	25.1		68.4	23.6		16.8	79.2	27.0	386.5	24.0	24.0
Level of Service (LOS)	C	C		E	C		B	F	C	F	C	C
Approach Delay, s/veh / LOS	25.2	C		61.4	E		58.3	E		65.1	E	
Intersection Delay, s/veh / LOS	58.6						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.4	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.8	A	1.3	A	3.2	C	1.2	A

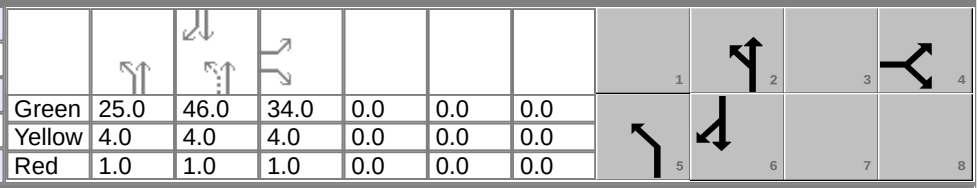
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Old Henry Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	Old Henry Rd. @ Factor…	File Name	2025 PM Build - Factory Lane at Old Henry.xus		
Project Description	VA Traffic Study - 2025 PM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	159		501				378	574			332	52

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	25.0	46.0	34.0	0.0	0.0	0.0						
Yellow	4.0	4.0	4.0	0.0	0.0	0.0						
Red	1.0	1.0	1.0	0.0	0.0	0.0						

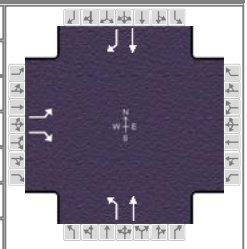
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		8.3
Phase Duration, s		39.0			30.0	81.0		51.0
Change Period, ($Y+R_c$), s		5.0			5.0	5.0		5.0
Max Allow Headway (*MAH*), s		3.8			3.5	3.4		3.6
Queue Clearance Time (g_s), s		25.3			16.7	25.2		24.0
Green Extension Time (g_e), s		1.1			0.8	1.7		1.1
Phase Call Probability		1.00			1.00	1.00		1.00
Max Out Probability		0.11			0.07	0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	173		327				411	624			407	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533				1723	1810			1774	
Queue Service Time (g_s), s	9.6		23.3				14.7	23.2			22.0	
Cycle Queue Clearance Time (g_c), s	9.6		23.3				14.7	23.2			22.0	
Green Ratio (*g/C*)	0.28		0.28				0.61	0.63			0.38	
Capacity (*c*), veh/h	488		434				608	1146			680	
Volume-to-Capacity Ratio (*X*)	0.354		0.753				0.675	0.544			0.598	
Back of Queue (*Q*), ft/ln (95 th percentile)	188.8		377.5				245.3	342.2			376.2	
Back of Queue (*Q*), veh/ln (95 th percentile)	7.3		14.5				9.4	13.2			14.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		3.02				1.09	0.00			0.00	
Uniform Delay (d_1), s/veh	34.3		39.2				16.3	12.3			29.6	
Incremental Delay (d_2), s/veh	0.3		7.0				2.7	0.4			1.3	
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	
Control Delay (*d*), s/veh	34.6		46.1				19.1	12.8			30.9	
Level of Service (LOS)	C		D				B	B			C	
Approach Delay, s/veh / LOS	42.1		D	0.0			15.3		B	30.9		C
Intersection Delay, s/veh / LOS	25.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.2	B	0.7	A	2.6	B
Bicycle LOS Score / LOS		F			2.1	B	1.2	A

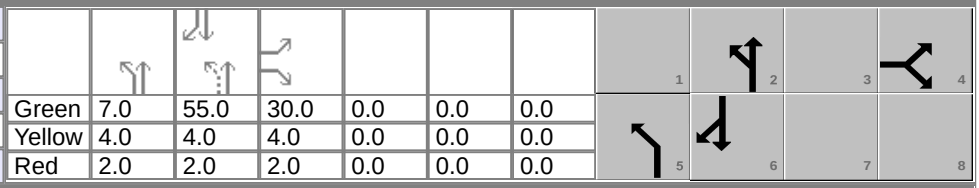
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	Factory Lane	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	VA @ Factory Lane	File Name	2025 PM Build - VA at Factory Lane (signalized).xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	281		344				86	344			316	70

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	7.0	55.0	30.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0

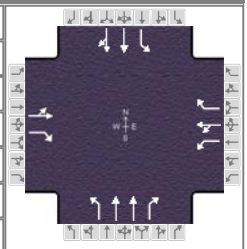
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		9.0			1.0	4.0		7.3
Phase Duration, s		36.0			13.0	74.0		61.0
Change Period, ($Y+R_c$), s		6.0			6.0	6.0		6.0
Max Allow Headway (*MAH*), s		4.2			4.1	4.0		4.1
Queue Clearance Time (g_s), s		21.4			4.6	12.9		14.9
Green Extension Time (g_e), s		1.7			0.0	1.4		1.6
Phase Call Probability		1.00			1.00	1.00		1.00
Max Out Probability		0.25			1.00	0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14				5	2			6	16
Adjusted Flow Rate (*v*), veh/h	305		299				93	374			343	76
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723		1533				1723	1810			1810	1533
Queue Service Time (g_s), s	17.2		19.4				2.6	10.9			12.9	2.9
Cycle Queue Clearance Time (g_c), s	17.2		19.4				2.6	10.9			12.9	2.9
Green Ratio (*g/C*)	0.27		0.27				0.58	0.62			0.50	0.50
Capacity (*c*), veh/h	470		418				559	1119			905	767
Volume-to-Capacity Ratio (*X*)	0.650		0.715				0.167	0.334			0.380	0.099
Back of Queue (*Q*), ft/ln (95 th percentile)	311.9		320.3				45.4	191.1			233.1	46.1
Back of Queue (*Q*), veh/ln (95 th percentile)	12.0		12.3				1.7	7.4			9.0	1.8
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00				0.18	0.00			0.00	0.23
Uniform Delay (d_1), s/veh	35.4		36.1				11.3	10.1			17.0	14.5
Incremental Delay (d_2), s/veh	3.1		5.7				0.1	0.2			0.3	0.1
Initial Queue Delay (d_3), s/veh	0.0		0.0				0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	38.5		41.8				11.4	10.3			17.2	14.5
Level of Service (LOS)	D		D				B	B			B	B
Approach Delay, s/veh / LOS	40.2	D		0.0			10.5	B		16.7	B	
Intersection Delay, s/veh / LOS	24.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.3	B	0.7	A	2.4	B
Bicycle LOS Score / LOS		F			1.3	A	1.2	A

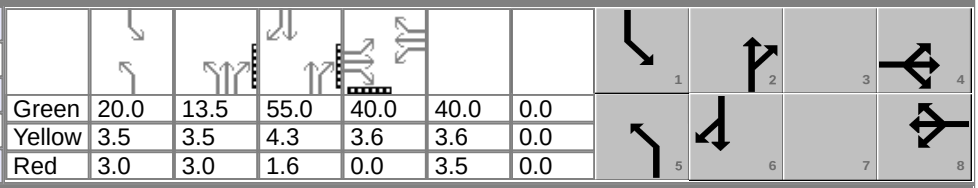
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ Facto…	File Name	2025 PM Build - La Grange at Factory Lane.xus		
Project Description	VA Traffic Study - 2025 PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	87	51	104	679	153	101	93	1204	634	46	477	36

Signal Information			
Cycle, s	198.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.0	13.5	55.0	40.0	40.0	0.0
Yellow	3.5	3.5	4.3	3.6	3.6	0.0
Red	3.0	3.0	1.6	0.0	3.5	0.0

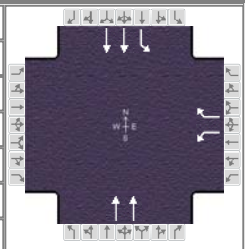
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		11.0		9.0	2.0	3.0	2.0	4.0
Phase Duration, s		43.6		47.1	46.5	80.9	26.5	60.9
Change Period, (*Y+R c*), s		3.6		7.1	6.5	5.9	6.5	5.9
Max Allow Headway (*MAH*), s		4.2		4.6	4.0	3.7	4.0	3.6
Queue Clearance Time (*g s*), s		16.8		42.0	11.9	77.0	7.3	28.5
Green Extension Time (*g e*), s		0.9		0.0	0.3	0.0	0.1	1.6
Phase Call Probability		1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability		0.00		1.00	0.00	1.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		150	113	738	166	88	101	1309	551	50	282	276
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1754	1533	1723	1810	1533	1723	1723	1533	1723	1810	1764
Queue Service Time (*g s*), s		14.8	12.6	40.0	16.0	9.6	9.9	75.0	69.1	5.3	26.4	26.5
Cycle Queue Clearance Time (*g c*), s		14.8	12.6	40.0	16.0	9.6	9.9	75.0	69.1	5.3	26.4	26.5
Green Ratio (*g/C*)		0.20	0.20	0.20	0.20	0.20	0.20	0.38	0.38	0.10	0.28	0.28
Capacity (*c*), veh/h		354	310	348	365	310	348	1304	581	174	502	490
Volume-to-Capacity Ratio (*X*)		0.423	0.365	2.121	0.455	0.284	0.290	1.003	0.949	0.287	0.561	0.563
Back of Queue (*Q*), ft/ln (95 th percentile)		287	226.7	2729.3	314.4	180.7	202.9	1219.6	1026.9	112.7	467.6	460.1
Back of Queue (*Q*), veh/ln (95 th percentile)		11.0	8.7	105.0	12.1	7.0	7.8	46.9	39.5	4.3	18.0	17.7
Queue Storage Ratio (*RQ*) (95 th percentile)		2.87	2.27	13.65	1.57	0.90	0.51	3.05	3.42	0.32	0.00	0.00
Uniform Delay (*d 1*), s/veh		69.0	68.1	79.1	69.5	66.9	67.0	61.6	59.7	82.5	61.2	61.3
Incremental Delay (*d 2*), s/veh		0.8	0.7	514.0	1.1	0.6	0.5	25.7	25.3	0.9	1.3	1.4
Initial Queue Delay (*d 3*), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		69.8	68.8	593.1	70.5	67.5	67.5	87.3	85.0	83.4	62.5	62.6
Level of Service (LOS)		E	E	F	E	E	E	F	F	F	E	E
Approach Delay, s/veh / LOS	69.4	E		458.9	F		85.6	F		64.3	E	
Intersection Delay, s/veh / LOS	178.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.5	B	2.3	B
Bicycle LOS Score / LOS	0.9	A	2.1	B	2.1	B	1.0	A

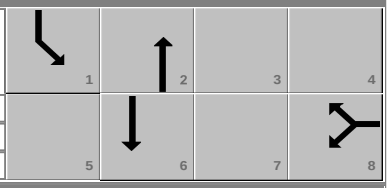
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Palmer Engineering			Duration, h	0.25
Analyst		Analysis Date	Oct 12, 2015	Area Type	Other
Jurisdiction		Time Period		PHF	0.92
Urban Street	La Grange Road	Analysis Year	2015	Analysis Period	1> 7:00
Intersection	La Grange Rd. @ I-265…	File Name	2025 PM Build - La Grange at I-265 SB Ramp.xus		
Project Description	VA Traffic Study - 2025 PM Build				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				131		492		1136		507	338	

Signal Information			
Cycle, s	167.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	50.0	60.0	40.0	0.0	0.0	0.0						
Yellow	4.4	5.0	3.7	0.0	0.0	0.0						
Red	1.4	1.2	1.8	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8		2	1	6
Case Number				9.0		8.3	2.0	4.0
Phase Duration, s				45.5		66.2	55.8	122.0
Change Period, ($Y+R_c$), s				5.5		6.2	5.8	6.2
Max Allow Headway (*MAH*), s				5.3		3.5	6.0	3.5
Queue Clearance Time (g_s), s				42.0		62.0	52.0	8.2
Green Extension Time (g_e), s				0.0		0.0	0.0	1.2
Phase Call Probability				1.00		1.00	1.00	1.00
Max Out Probability				1.00		1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18		2		1	6	
Adjusted Flow Rate (*v*), veh/h				142		440		1235		551	367	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1723		1533		1723		1723	1723	
Queue Service Time (g_s), s				11.5		40.0		60.0		50.0	6.2	
Cycle Queue Clearance Time (g_c), s				11.5		40.0		60.0		50.0	6.2	
Green Ratio (*g/C*)				0.24		0.24		0.36		0.30	0.69	
Capacity (*c*), veh/h				412		366		1234		514	2382	
Volume-to-Capacity Ratio (*X*)				0.346		1.202		1.001		1.071	0.154	
Back of Queue (*Q*), ft/ln (95 th percentile)				228.6		1027		1004.3		1057.3	104.2	
Back of Queue (*Q*), veh/ln (95 th percentile)				8.8		39.5		38.6		40.7	4.0	
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00		0.00		1.06	0.00	
Uniform Delay (d_1), s/veh				52.9		63.8		53.8		58.8	8.9	
Incremental Delay (d_2), s/veh				0.7		114.2		25.7		60.1	0.0	
Initial Queue Delay (d_3), s/veh				0.0		0.0		0.0		0.0	0.0	
Control Delay (*d*), s/veh				53.6		178.0		79.5		118.9	9.0	
Level of Service (LOS)				D		F		F		F	A	
Approach Delay, s/veh / LOS	0.0			147.6		F	79.5		E	74.9		E
Intersection Delay, s/veh / LOS	92.4						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.4	B	0.7	A
Bicycle LOS Score / LOS				F	1.5	A	1.2	A

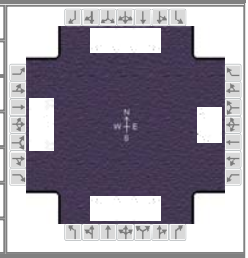
Midlands Site

(KY 22)

Existing

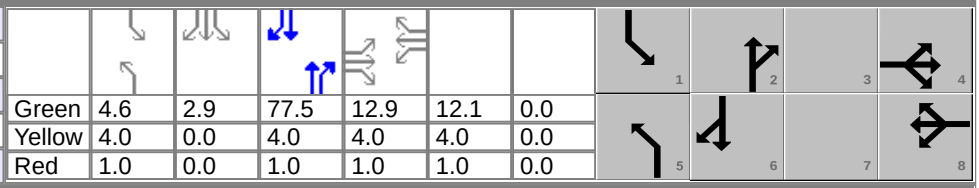
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	RUDY LANE	File Name	2015 AM_EXIST_RUDY.xus		
Project Description	EXIST - AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	131	6	43	18	42	118	43	609	8	72	1112	162

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.6	2.9	77.5	12.9	12.1	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

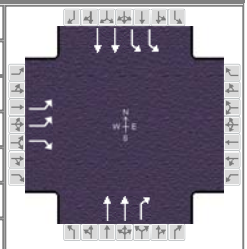
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		17.9		17.1	9.6	82.5	12.5	85.4
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		12.6		11.8	5.5		7.8	
Green Extension Time (g_e), s		0.3		0.3	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.82		0.94	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	146	7	42		67	120	48	677	3	80	1236	169
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1817	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	10.6	0.4	3.3		4.5	9.8	3.5	12.5	0.1	5.8	26.9	6.0
Cycle Queue Clearance Time (g_c), s	10.6	0.4	3.3		4.5	9.8	3.5	12.5	0.1	5.8	26.9	6.0
Green Ratio (*g/C*)	0.10	0.10	0.10		0.09	0.09	0.04	0.60	0.60	0.06	0.62	0.62
Capacity (*c*), veh/h	174	183	155		169	146	62	2094	932	102	2173	967
Volume-to-Capacity Ratio (*X*)	0.837	0.037	0.273		0.394	0.824	0.772	0.323	0.004	0.787	0.569	0.175
Available Capacity (c_a), veh/h	432	454	385		547	471	608	2094	932	581	2173	967
Back of Queue (*Q*), veh/ln (95 th percentile)	8.4	0.4	2.3		3.7	7.1	3.0	8.3	0.1	4.8	15.2	3.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.65	0.00	0.45		0.00	0.00	0.45	0.00	0.02	0.78	0.00	1.87
Uniform Delay (d_1), s/veh	57.5	53.0	54.2		55.5	57.9	62.2	13.1	10.6	60.5	14.6	10.6
Incremental Delay (d_2), s/veh	4.0	0.0	0.3		0.6	4.4	7.4	0.4	0.0	5.0	1.1	0.4
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	61.6	53.0	54.6		56.0	62.3	69.6	13.5	10.6	65.4	15.7	11.0
Level of Service (LOS)	E	D	D		E	E	E	B	B	E	B	B
Approach Delay, s/veh / LOS	59.8	E		60.1	E		17.2	B		17.8	B	
Intersection Delay, s/veh / LOS	23.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.8	A	0.8	A	1.1	A	1.7	A

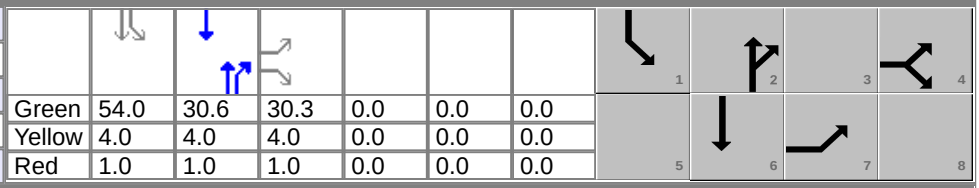
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 SOUTH RAMP	File Name	2015 AM_EXIST_ I-264 SOUTH RAMP.xus		
Project Description	2015 AM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	200		302					447	411	1132	1046	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	54.0	30.6	30.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

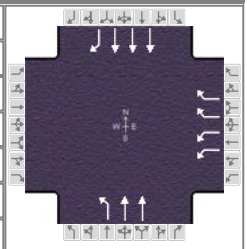
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		35.3				35.6	59.0	94.7
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2				0.0	6.0	0.0
Queue Clearance Time (g_s), s		29.2					46.4	
Green Extension Time (g_e), s		1.1				0.0	7.7	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		0.00					0.76	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	222		336					497	234	1258	1162	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	6.9		27.2					16.4	17.5	44.4	19.9	
Cycle Queue Clearance Time (g_c), s	6.9		27.2					16.4	17.5	44.4	19.9	
Green Ratio (*g/C*)	0.23		0.23					0.24	0.24	0.42	0.69	
Capacity (*c*), veh/h	796		365					828	368	1418	2422	
Volume-to-Capacity Ratio (*X*)	0.279		0.920					0.600	0.636	0.887	0.480	
Available Capacity (c_a), veh/h	1128		517					828	368	1513	2422	
Back of Queue (*Q*), veh/ln (95 th percentile)	5.2		17.4					11.8	11.9	26.0	11.2	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	40.9		48.6					44.2	44.7	35.2	9.4	
Incremental Delay (d_2), s/veh	0.1		14.3					3.2	8.1	7.2	0.7	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	40.9		63.0					47.4	52.8	42.3	10.0	
Level of Service (LOS)	D		E					D	D	D	B	
Approach Delay, s/veh / LOS	54.2		D	0.0			49.2		D	26.8		C
Intersection Delay, s/veh / LOS	35.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.5	B	1.9	A
Bicycle LOS Score / LOS		F			1.1	A	2.5	B

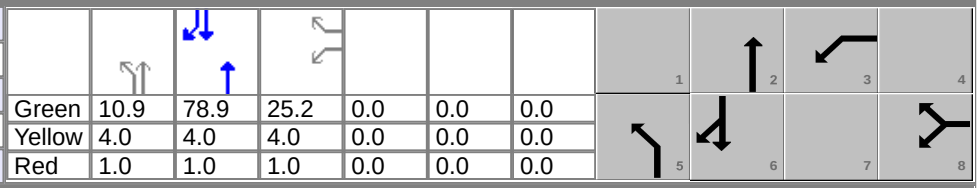
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 NORTH RAMP	File Name	2015 AM_EXIST_I-264 NORTH RAMP.xus		
Project Description	2015 AM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				392		415	109	531			1793	616

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	10.9	78.9	25.2	0.0	0.0	0.0			
Yellow	4.0	4.0	4.0	0.0	0.0	0.0			
Red	1.0	1.0	1.0	0.0	0.0	0.0			

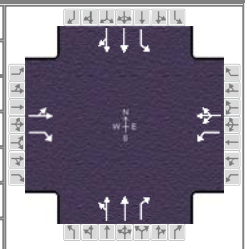
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				30.2	15.9	99.8		83.9
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.1	3.0	0.0		0.0
Queue Clearance Time (g_s), s				23.0	10.8			
Green Extension Time (g_e), s				2.3	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				0.00	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				436		461	121	590			1992	684
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				15.3		21.0	8.8	7.1			33.6	39.8
Cycle Queue Clearance Time (g_c), s				15.3		21.0	8.8	7.1			33.6	39.8
Green Ratio (*g/C*)				0.19		0.19	0.08	0.73			0.61	0.61
Capacity (*c*), veh/h				662		537	147	2560			3049	949
Volume-to-Capacity Ratio (*X*)				0.658		0.859	0.824	0.230			0.653	0.721
Available Capacity (c_a), veh/h				1260		1022	700	2560			3049	949
Back of Queue (*Q*), veh/ln (95 th percentile)				10.6		11.6	7.2	4.1			17.7	20.4
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				48.4		50.7	58.6	5.7			16.6	17.9
Incremental Delay (d_2), s/veh				0.4		1.6	4.4	0.2			1.1	4.7
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				48.8		52.3	63.0	5.9			17.8	22.6
Level of Service (LOS)				D		D	E	A			B	C
Approach Delay, s/veh / LOS	0.0			50.6		D	15.7		B	19.0		B
Intersection Delay, s/veh / LOS	25.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	1.1	A	2.0	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	NORTHFIELD DRIVE	File Name	2015 AM_EXIST_NORTHFIELD.xus		
Project Description	2015 AM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	5	14	135	550	7	4	23	587	337	14	1721	4

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.0	53.0	4.6	47.3	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

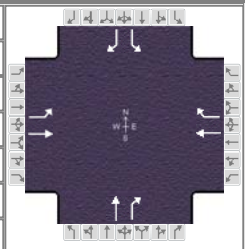
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		9.6		52.3		58.0	10.0	68.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		5.2		46.1			3.1	
Green Extension Time (g_e), s		0.0		1.2		0.0	0.0	0.0
Phase Call Probability		0.89		1.00			1.00	
Max Out Probability		0.00		0.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		21	39	611	12		44	634	208	16	958	958
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1821	1563	1757	1731		52	1679	1563	1757	1845	1843
Queue Service Time (g_s), s		1.5	3.2	44.1	0.6		0.0	46.7	11.8	1.1	63.0	63.0
Cycle Queue Clearance Time (g_c), s		1.5	3.2	44.1	0.6		53.0	46.7	11.8	1.1	63.0	63.0
Green Ratio (*g/C*)		0.04	0.04	0.36	0.36		0.41	0.41	0.41	0.04	0.48	0.48
Capacity (*c*), veh/h		65	56	640	630		65	685	638	68	894	894
Volume-to-Capacity Ratio (*X*)		0.325	0.697	0.956	0.019		0.668	0.926	0.326	0.230	1.072	1.072
Available Capacity (c_a), veh/h		210	180	1086	1070		65	685	638	636	894	894
Back of Queue (*Q*), veh/ln (95 th percentile)		1.2	2.4	26.9	0.4		4.0	29.7	8.0	0.9	51.8	51.9
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		61.1	62.0	40.3	26.5		39.4	36.6	26.3	60.6	33.5	33.5
Incremental Delay (d_2), s/veh		1.1	5.7	8.3	0.0		43.0	20.4	1.4	0.6	51.2	51.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		62.2	67.7	48.7	26.5		82.4	57.0	27.6	61.3	84.6	84.9
Level of Service (LOS)		E	E	D	C		F	E	C	E	F	F
Approach Delay, s/veh / LOS	65.8	E		48.2	D		51.4	D		84.6	F	
Intersection Delay, s/veh / LOS	69.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	1.5	A	1.2	A	2.1	B

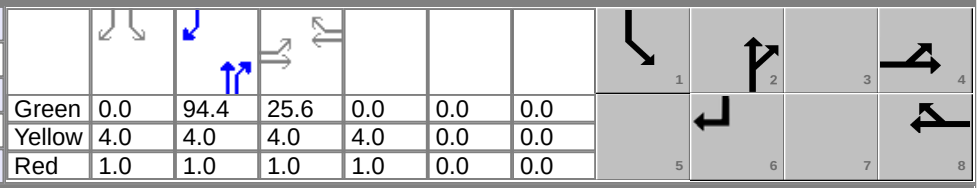
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2015 AM_EXIST_BROWNSBORO.xus		
Project Description	2015 AM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	286	0			0	0		330	0	0		659

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.0	94.4	25.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

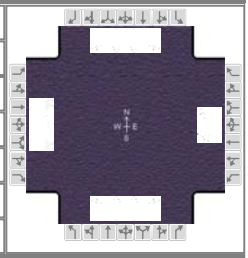
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	2.0	3.0
Phase Duration, s		30.6		0.0		99.4	0.0	99.4
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		0.0		0.0	0.0	0.0
Queue Clearance Time (g_s), s		25.1						
Green Extension Time (g_e), s		0.6		0.0		0.0	0.0	0.0
Phase Call Probability		1.00						
Max Out Probability		0.00						

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	318	0			0	0		367	0	0		732
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	23.1	0.0			0.0	0.0		8.8	0.0	0.0		31.4
Cycle Queue Clearance Time (g_c), s	23.1	0.0			0.0	0.0		8.8	0.0	0.0		31.4
Green Ratio (*g/C*)	0.20	0.20				0.00		0.73	0.73			0.73
Capacity (*c*), veh/h	346	363			1	1		1339	1135	1		1135
Volume-to-Capacity Ratio (*X*)	0.918	0.000			0.000	0.000		0.274	0.000	0.000		0.645
Available Capacity (c_a), veh/h	919	965			772	654		1339	1135	1127		1135
Back of Queue (*Q*), veh/ln (95 th percentile)	15.5	0.0			0.0	0.0		5.5	0.0	0.0		14.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh	51.2	0.0			0.0	0.0		6.1	0.0	0.0		9.2
Incremental Delay (d_2), s/veh	4.2	0.0			0.0	0.0		0.5	0.0	0.0		2.8
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	55.4	0.0			0.0	0.0		6.6	0.0	0.0		12.0
Level of Service (LOS)	E							A				B
Approach Delay, s/veh / LOS	55.4	E		0.0			6.6	A		12.0	B	
Intersection Delay, s/veh / LOS	20.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.3	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	1.0	A	0.5	A	1.1	A		F

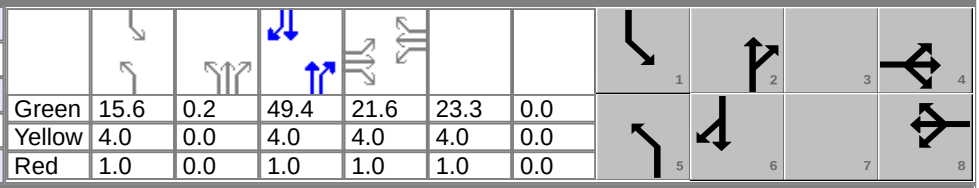
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	RUDY LANE	File Name	2015 PM_EXIST_RUDY.xus		
Project Description	2015 PM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	235	22	66	51	75	233	55	681	59	166	674	265

Signal Information			
Cycle, s	130.0	Reference Phase	6
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	15.6	0.2		49.4	21.6	23.3	0.0					
Yellow	4.0	0.0		4.0	4.0	4.0	0.0					
Red	1.0	0.0		1.0	1.0	1.0	0.0					

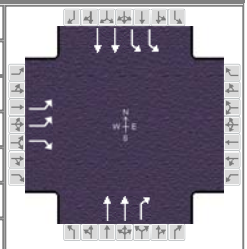
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		26.6		28.3	20.8	54.6	20.6	54.4
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		20.9		23.3	6.1		15.4	
Green Extension Time (g_e), s		0.6		0.4	0.0	0.0	0.2	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.00		0.25	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	261	24	73		140	259	61	757	54	184	749	267
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1808	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	18.9	1.5	5.3		9.0	21.3	4.1	22.0	2.9	13.4	22.0	16.7
Cycle Queue Clearance Time (g_c), s	18.9	1.5	5.3		9.0	21.3	4.1	22.0	2.9	13.4	22.0	16.7
Green Ratio (*g/C*)	0.17	0.17	0.17		0.18	0.18	0.12	0.38	0.38	0.12	0.38	0.38
Capacity (*c*), veh/h	291	306	259		317	274	229	1351	601	211	1315	585
Volume-to-Capacity Ratio (*X*)	0.897	0.080	0.283		0.441	0.943	0.267	0.560	0.091	0.873	0.569	0.455
Available Capacity (c_a), veh/h	595	624	529		396	342	229	1351	601	361	1315	585
Back of Queue (*Q*), veh/ln (95 th percentile)	13.2	1.2	3.7		7.2	15.6	3.5	14.3	2.0	10.2	14.4	10.7
Queue Storage Ratio (*RQ*) (95 th percentile)	2.61	0.00	0.73		0.00	0.00	0.53	0.00	0.68	1.63	0.00	5.49
Uniform Delay (d_1), s/veh	53.1	45.8	47.5		47.9	52.9	50.9	31.4	25.5	56.2	32.3	30.7
Incremental Delay (d_2), s/veh	4.0	0.0	0.2		0.4	28.5	2.8	1.7	0.3	5.4	1.8	2.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	57.1	45.9	47.7		48.2	81.4	53.8	33.1	25.8	61.6	34.1	33.2
Level of Service (LOS)	E	D	D		D	F	D	C	C	E	C	C
Approach Delay, s/veh / LOS	54.4	D		69.8	E		34.1	C		38.1	D	
Intersection Delay, s/veh / LOS	43.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.1	A	1.1	A	1.2	A	1.5	A

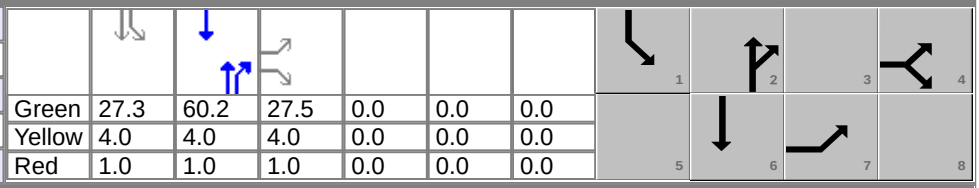
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	PALMER			Duration, h	0.25
Analyst	SDS	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	PM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	I-264 SOUTH RAMP	File Name	2015 PM_EXIST_ I-264 SOUTH RAMP.xus		
Project Description	2015 PM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	579		214					870	302	579	826	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	27.3	60.2	27.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

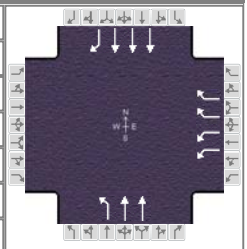
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		32.5				65.2	32.3	97.5
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1				0.0	3.0	0.0
Queue Clearance Time (g_s), s		25.8					25.9	
Green Extension Time (g_e), s		1.6				0.0	1.5	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		0.07					0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	643		238					967	336	643	918	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	23.8		18.4					26.5	19.1	23.9	13.3	
Cycle Queue Clearance Time (g_c), s	23.8		18.4					26.5	19.1	23.9	13.3	
Green Ratio (*g/C*)	0.21		0.21					0.46	0.46	0.21	0.71	
Capacity (*c*), veh/h	721		330					1626	724	718	2500	
Volume-to-Capacity Ratio (*X*)	0.893		0.720					0.594	0.464	0.897	0.367	
Available Capacity (c_a), veh/h	919		421					1626	724	1248	2500	
Back of Queue (*Q*), veh/ln (95 th percentile)	16.0		11.7					16.4	11.6	15.3	7.8	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	49.8		47.7					25.9	23.9	50.0	7.3	
Incremental Delay (d_2), s/veh	8.0		2.7					1.6	2.1	2.3	0.4	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	57.8		50.4					27.5	26.0	52.2	7.7	
Level of Service (LOS)	E		D					C	C	D	A	
Approach Delay, s/veh / LOS	55.8		E	0.0			27.1		C	26.1		C
Intersection Delay, s/veh / LOS	33.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	3.0	C	2.4	B	1.9	A
Bicycle LOS Score / LOS		F			1.6	A	1.8	A

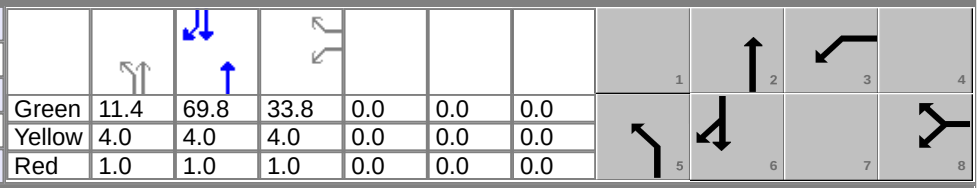
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	I-264 NORTH RAMP	File Name	2015 PM_EXIST_I-264 NORTH RAMP.xus		
Project Description	2015 PM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				284		582	115	1334			1208	203

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.4	69.8	33.8	0.0	0.0	0.0		
Yellow	4.0	4.0	4.0	0.0	0.0	0.0		
Red	1.0	1.0	1.0	0.0	0.0	0.0		

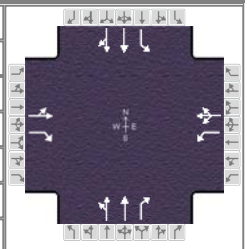
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				38.8	16.4	91.2		74.8
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.2	3.0	0.0		0.0
Queue Clearance Time (g_s), s				31.3	11.3			
Green Extension Time (g_e), s				2.4	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				0.01	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				316		647	128	1482			1342	226
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				9.8		29.3	9.3	32.0			21.9	10.1
Cycle Queue Clearance Time (g_c), s				9.8		29.3	9.3	32.0			21.9	10.1
Green Ratio (*g/C*)				0.26		0.26	0.09	0.66			0.54	0.54
Capacity (*c*), veh/h				886		719	154	2330			2699	840
Volume-to-Capacity Ratio (*X*)				0.356		0.900	0.830	0.636			0.497	0.269
Available Capacity (c_a), veh/h				1260		1022	530	2330			2699	840
Back of Queue (*Q*), veh/ln (95 th percentile)				7.3		15.7	7.6	17.0			12.9	6.6
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				39.2		46.5	58.4	12.8			19.0	16.3
Incremental Delay (d_2), s/veh				0.1		6.4	4.3	1.3			0.7	0.8
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				39.3		52.9	62.7	14.1			19.7	17.1
Level of Service (LOS)				D		D	E	B			B	B
Approach Delay, s/veh / LOS	0.0			48.4		D	18.0		B	19.3		B
Intersection Delay, s/veh / LOS	25.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	1.8	A	1.3	A

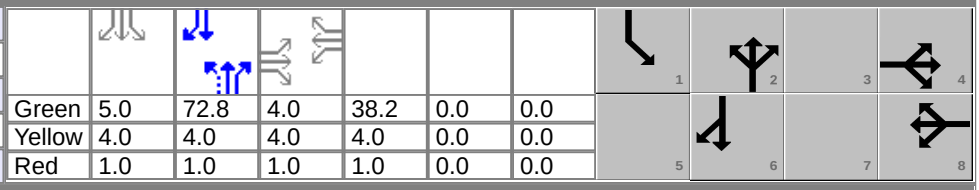
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	NORTHFIELD DRIVE	File Name	2015 PM_EXIST_NORTHFIELD.xus		
Project Description	2015 PM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	16	18	14	409	11	7	10	1513	385	13	988	15

Signal Information			
Cycle, s	140.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	72.8	4.0	38.2	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

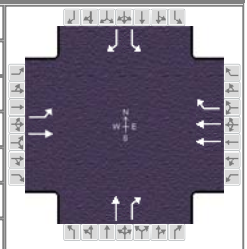
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		9.0		43.2		77.8	10.0	87.8
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		4.9		37.5			3.1	
Green Extension Time (g_e), s		0.0		0.7		0.0	0.0	0.0
Phase Call Probability		0.81		1.00			1.00	
Max Out Probability		1.00		0.02			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		38	4	454	20		886	807	206	14	559	556
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1802	1563	1757	1724		1820	1679	1563	1757	1845	1835
Queue Service Time (g_s), s		2.9	0.4	35.5	1.2		20.5	62.2	10.2	1.1	24.9	24.9
Cycle Queue Clearance Time (g_c), s		2.9	0.4	35.5	1.2		63.4	62.2	10.2	1.1	24.9	24.9
Green Ratio (*g/C*)		0.03	0.03	0.27	0.27		0.52	0.52	0.52	0.04	0.59	0.59
Capacity (*c*), veh/h		52	45	479	471		972	872	812	63	1090	1085
Volume-to-Capacity Ratio (*X*)		0.728	0.099	0.948	0.043		0.911	0.925	0.253	0.230	0.512	0.512
Back of Queue (*Q*), ft/ln (95 th percentile)		73.6	7.2	636.8	23.1		988.4	927.1	172.8	23.3	402.4	400.7
Back of Queue (*Q*), veh/ln (95 th percentile)		2.9	0.3	24.9	0.9		38.6	36.2	6.7	0.9	15.7	15.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		67.4	66.2	49.9	37.4		31.2	31.1	18.6	65.6	16.8	16.8
Incremental Delay (d_2), s/veh		19.2	0.4	20.9	0.0		14.1	16.9	0.7	0.7	1.7	1.7
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		86.7	66.6	70.8	37.5		45.2	48.0	19.3	66.3	18.5	18.5
Level of Service (LOS)		F	E	E	D		D	D	B	E	B	B
Approach Delay, s/veh / LOS	84.6	F		69.4	E		43.6	D		19.1	B	
Intersection Delay, s/veh / LOS	39.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	1.3	A	2.1	B	1.4	A

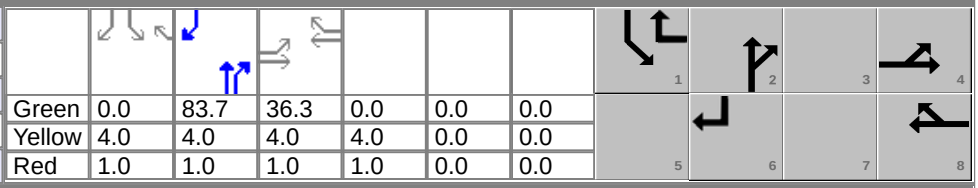
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	BROWNSBORO ROAD	File Name	2015 PM_EXIST_BROWNSBORO.xus		
Project Description	2015 PM EXISTING				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	419	0			0	0		388	0	0		370

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.0	83.7	36.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	2.0	3.0
Phase Duration, s		41.3		0.0		88.7	0.0	88.7
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		0.0		0.0	0.0	0.0
Queue Clearance Time (g_s), s		35.8						
Green Extension Time (g_e), s		0.6		0.0		0.0	0.0	0.0
Phase Call Probability		1.00						
Max Out Probability		0.13						

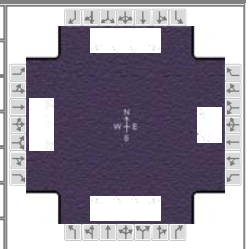
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	466	0			0	0		431	0	0		411
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1756	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	33.8	0.0			0.0	0.0		14.1	0.0	0.0		16.5
Cycle Queue Clearance Time (g_c), s	33.8	0.0			0.0	0.0		14.1	0.0	0.0		16.5
Green Ratio (*g/C*)	0.28	0.28				0.00		0.64	0.64			0.64
Capacity (*c*), veh/h	491	515			3	-59		1187	1006	1		1006
Volume-to-Capacity Ratio (*X*)	0.948	0.000			0.000	0.000		0.363	0.000	0.000		0.409
Available Capacity (c_a), veh/h	568	596			396	116		1187	1006	806		1006
Back of Queue (*Q*), veh/ln (95 th percentile)	24.2	0.0			0.0	0.0		9.4	0.0	0.0		9.4
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh	45.9	0.0			0.0	0.0		10.8	0.0	0.0		11.2
Incremental Delay (d_2), s/veh	22.8	0.0			0.0	0.0		0.9	0.0	0.0		1.2
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	68.7	0.0			0.0	0.0		11.6	0.0	0.0		12.4
Level of Service (LOS)	E							B				B
Approach Delay, s/veh / LOS	68.7	E		0.0			11.6	B		12.4	B	
Intersection Delay, s/veh / LOS	32.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.3	B	2.4	B	2.7	B
Bicycle LOS Score / LOS	1.3	A	0.5	A	1.2	A		F

No Build With VA

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	RUDY LANE	File Name	2025 AM_SPUI_RUDY.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	157	10	50	30	60	137	50	766	15	82	1444	182

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.3	3.1	72.6	15.0	13.9	0.0	1	2	3	4	5	6	7	8
Yellow	4.0	0.0	4.0	4.0	4.0	0.0								
Red	1.0	0.0	1.0	1.0	1.0	0.0								

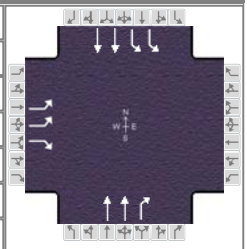
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		20.0		18.9	10.3	77.6	13.5	80.7
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		14.7		13.5	6.1		8.6	
Green Extension Time (g_e), s		0.4		0.4	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.87		0.96	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	174	11	50		100	141	56	851	11	91	1604	191
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1814	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	12.7	0.7	3.8		6.8	11.5	4.1	18.4	0.4	6.6	45.7	7.6
Cycle Queue Clearance Time (g_c), s	12.7	0.7	3.8		6.8	11.5	4.1	18.4	0.4	6.6	45.7	7.6
Green Ratio (*g/C*)	0.12	0.12	0.12		0.11	0.11	0.04	0.56	0.56	0.07	0.58	0.58
Capacity (*c*), veh/h	203	213	181		194	168	72	1961	873	114	2045	910
Volume-to-Capacity Ratio (*X*)	0.859	0.052	0.277		0.514	0.842	0.773	0.434	0.013	0.797	0.784	0.210
Back of Queue (*Q*), ft/ln (95 th percentile)	246.8	14.7	68.2		141.9	209.5	88	295.4	6.7	140.7	635.4	121.6
Back of Queue (*Q*), veh/ln (95 th percentile)	9.6	0.6	2.7		5.5	8.2	3.4	11.5	0.3	5.5	24.8	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.90	0.00	0.52		0.00	0.00	0.52	0.00	0.09	0.67	0.00	0.76
Uniform Delay (d_1), s/veh	56.4	51.1	52.5		54.8	57.0	61.7	16.7	12.8	59.9	20.9	12.9
Incremental Delay (d_2), s/veh	4.1	0.0	0.3		0.8	4.3	6.4	0.7	0.0	4.7	3.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	60.5	51.2	52.8		55.6	61.3	68.2	17.4	12.8	64.7	24.0	13.4
Level of Service (LOS)	E	D	D		E	E	E	B	B	E	C	B
Approach Delay, s/veh / LOS	58.4	E		58.9	E		20.5	C		24.9	C	
Intersection Delay, s/veh / LOS	28.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.9	A	0.9	A	1.2	A	2.0	B

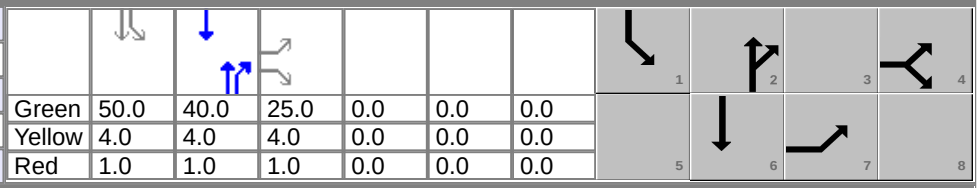
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 SOUTH RAMP	File Name	2025 AM_NO SPUI_ I-264 SOUTH RAMP.xus		
Project Description	2025 AM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	368		340					570	480	1298	1378	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	50.0	40.0	25.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

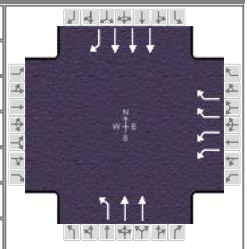
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		30.0				45.0	55.0	100.0
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1				0.0	6.0	0.0
Queue Clearance Time (g_s), s		27.0					52.0	
Green Extension Time (g_e), s		0.0				0.0	0.0	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		1.00					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	409		378					633	333	1442	1531	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	14.3		25.0					19.8	24.4	50.0	27.0	
Cycle Queue Clearance Time (g_c), s	14.3		25.0					19.8	24.4	50.0	27.0	
Green Ratio (*g/C*)	0.19		0.19					0.31	0.31	0.38	0.73	
Capacity (*c*), veh/h	656		301					1081	481	1312	2567	
Volume-to-Capacity Ratio (*X*)	0.623		1.257					0.586	0.693	1.099	0.597	
Back of Queue (*Q*), ft/ln (95 th percentile)	258.7		821					343.9	393.6	1072.2	346.7	
Back of Queue (*Q*), veh/ln (95 th percentile)	10.1		32.1					13.4	15.4	41.9	13.5	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	48.2		52.5					38.0	39.6	40.0	8.4	
Incremental Delay (d_2), s/veh	1.4		139.7					2.3	8.0	56.6	1.0	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	49.6		192.2					40.3	47.6	96.6	9.4	
Level of Service (LOS)	D		F					D	D	F	A	
Approach Delay, s/veh / LOS	118.1		F	0.0			42.8		D	51.7		D
Intersection Delay, s/veh / LOS	60.9						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.4	B	1.9	A
Bicycle LOS Score / LOS		F			1.3	A	2.9	C

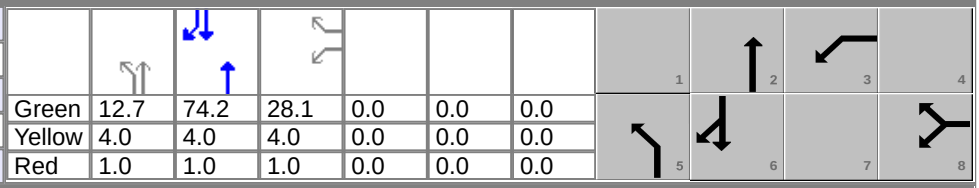
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 NORTH RAMP	File Name	2025 AM_NO SPUI_I-264 NORTH RAMP.xus		
Project Description	NO BUILD - AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				440		500	130	788			2256	732

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.7	74.2	28.1	0.0	0.0	0.0			
Yellow	4.0	4.0	4.0	0.0	0.0	0.0			
Red	1.0	1.0	1.0	0.0	0.0	0.0			

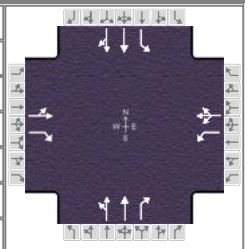
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				33.1	17.7	96.9		79.2
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.1	3.0	0.0		0.0
Queue Clearance Time (g_s), s				27.6	12.5			
Green Extension Time (g_e), s				0.6	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				1.00	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				489		556	144	876			2507	813
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				17.0		25.6	10.5	12.7			55.5	60.5
Cycle Queue Clearance Time (g_c), s				17.0		25.6	10.5	12.7			55.5	60.5
Green Ratio (*g/C*)				0.22		0.22	0.10	0.71			0.57	0.57
Capacity (*c*), veh/h				739		599	171	2482			2868	892
Volume-to-Capacity Ratio (*X*)				0.662		0.927	0.845	0.353			0.874	0.911
Back of Queue (*Q*), ft/ln (95 th percentile)				297.9		396	213.9	194.8			729.1	818.7
Back of Queue (*Q*), veh/ln (95 th percentile)				11.6		15.5	8.4	7.6			28.5	32.0
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				46.6		49.9	57.7	7.5			23.9	25.0
Incremental Delay (d_2), s/veh				1.6		19.6	4.3	0.4			4.1	15.1
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				48.2		69.5	62.0	7.8			28.0	40.0
Level of Service (LOS)				D		E	E	A			C	D
Approach Delay, s/veh / LOS	0.0			59.5		E	15.5		B	30.9		C
Intersection Delay, s/veh / LOS	33.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	1.3	A	2.3	B

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	NORTHFIELD DRIVE	File Name	2025 AM_NO SPUI_NORTHFIELD.xus		
Project Description	NO BUILD - AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	26	150	688	11	23	25	670	598	25	2120	10

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.0	60.0	5.0	40.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

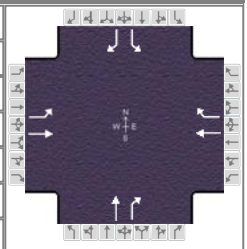
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		45.0		65.0	10.0	75.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		6.6		42.0			4.0	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.97		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		40	56	764	38		40	732	303	28	1183	1183
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1819	1563	1757	1644		29	1679	1563	1757	1845	1842
Queue Service Time (g_s), s		2.8	4.6	40.0	2.1		0.0	54.1	16.9	2.0	70.0	70.0
Cycle Queue Clearance Time (g_c), s		2.8	4.6	40.0	2.1		60.0	54.1	16.9	2.0	70.0	70.0
Green Ratio (*g/C*)		0.04	0.04	0.31	0.31		0.46	0.46	0.46	0.04	0.54	0.54
Capacity (*c*), veh/h		70	60	541	506		60	775	722	68	993	992
Volume-to-Capacity Ratio (*X*)		0.572	0.924	1.414	0.075		0.670	0.945	0.420	0.411	1.191	1.193
Back of Queue (*Q*), ft/ln (95 th percentile)		65	150.2	1778.1	38.4		96	855.8	267.5	41.8	1956.5	1964.2
Back of Queue (*Q*), veh/ln (95 th percentile)		2.5	5.9	69.5	1.5		3.7	33.4	10.5	1.6	76.4	76.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		61.4	62.3	45.0	31.9		45.4	33.4	23.4	61.1	30.0	30.0
Incremental Delay (d_2), s/veh		7.0	87.8	197.1	0.0		46.3	21.4	1.8	1.5	96.2	97.0
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		68.5	150.1	242.1	31.9		91.7	54.8	25.2	62.5	126.2	127.0
Level of Service (LOS)		E	F	F	C		F	D	C	E	F	F
Approach Delay, s/veh / LOS	115.9	F		232.2	F		47.8	D		125.9	F	
Intersection Delay, s/veh / LOS	126.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	1.8	A	1.4	A	2.5	B

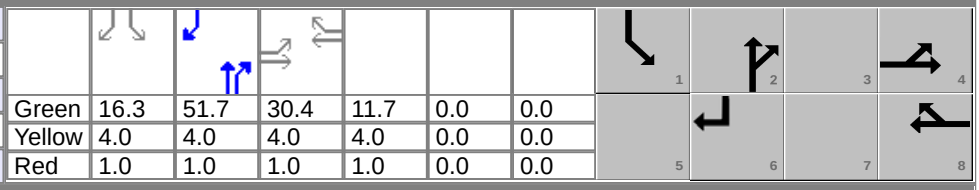
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 AM_NO SPUI_BROWNSBORO.xus		
Project Description	2025 AM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	340	244			122	39		380	225	173		700

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	16.3	51.7	30.4	11.7	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

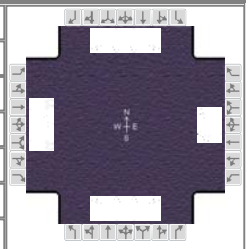
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	2.0	3.0
Phase Duration, s		35.4		16.7		56.7	21.3	77.9
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		29.3		11.4			16.0	
Green Extension Time (g_e), s		1.1		0.3		0.0	0.3	0.0
Phase Call Probability		1.00		1.00			1.00	
Max Out Probability		0.00		0.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	378	271			136	43		422	250	192		778
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	27.3	17.2			9.4	3.4		23.3	14.9	14.0		56.5
Cycle Queue Clearance Time (g_c), s	27.3	17.2			9.4	3.4		23.3	14.9	14.0		56.5
Green Ratio (*g/C*)	0.23	0.23			0.09	0.09		0.40	0.40	0.13		0.56
Capacity (*c*), veh/h	411	432			165	140		733	621	220		877
Volume-to-Capacity Ratio (*X*)	0.919	0.628			0.819	0.309		0.576	0.402	0.874		0.887
Back of Queue (*Q*), ft/ln (95 th percentile)	452.7	314.2			202.8	61		409.2	247.9	267.1		764.4
Back of Queue (*Q*), veh/ln (95 th percentile)	17.7	12.3			7.9	2.4		16.0	9.7	10.4		29.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh	48.6	44.7			58.1	55.4		30.6	28.1	55.8		24.9
Incremental Delay (d_2), s/veh	3.6	0.6			3.8	0.5		3.3	1.9	4.2		12.8
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	52.2	45.3			61.9	55.9		33.9	30.0	60.1		37.8
Level of Service (LOS)	D	D			E	E		C	C	E		D
Approach Delay, s/veh / LOS	49.3	D		60.5	E		32.5	C		42.2	D	
Intersection Delay, s/veh / LOS	42.7						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	0.8	A	1.6	A		F

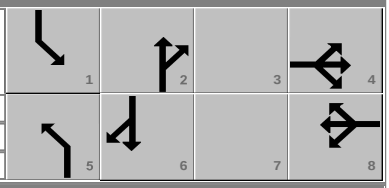
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	RUDY LANE	File Name	2025 PM_SPUI_RUDY.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	251	25	75	55	80	252	75	770	75	181	862	281

Signal Information			
Cycle, s	130.0	Reference Phase	6
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	16.9	3.8	42.0	22.7	24.6	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

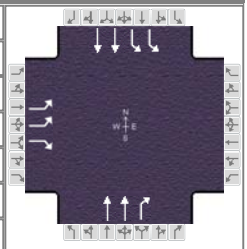
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		27.7		29.6	25.7	50.8	21.9	47.0
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		22.2		23.9	7.4		16.6	
Green Extension Time (g_e), s		0.5		0.7	0.1	0.0	0.3	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.03		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	279	28	78		150	269	83	856	78	201	958	301
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1808	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	20.2	1.6	5.6		9.5	21.9	5.4	27.1	4.4	14.6	33.0	21.0
Cycle Queue Clearance Time (g_c), s	20.2	1.6	5.6		9.5	21.9	5.4	27.1	4.4	14.6	33.0	21.0
Green Ratio (*g/C*)	0.17	0.17	0.17		0.19	0.19	0.16	0.35	0.35	0.13	0.32	0.32
Capacity (*c*), veh/h	307	322	273		342	296	279	1237	550	228	1135	505
Volume-to-Capacity Ratio (*X*)	0.908	0.086	0.285		0.438	0.909	0.298	0.692	0.141	0.881	0.844	0.596
Back of Queue (*Q*), ft/ln (95 th percentile)	394.7	34.2	99.6		194.8	368.1	117.9	445.6	78.6	276.9	544.9	340.2
Back of Queue (*Q*), veh/ln (95 th percentile)	15.4	1.3	3.9		7.6	14.4	4.6	17.4	3.1	10.8	21.3	13.3
Queue Storage Ratio (*RQ*) (95 th percentile)	3.04	0.00	0.77		0.00	0.00	0.69	0.00	1.05	1.32	0.00	2.13
Uniform Delay (d_1), s/veh	52.6	44.9	46.6		46.6	51.6	48.3	36.1	28.7	55.6	40.9	36.9
Incremental Delay (d_2), s/veh	17.4	0.0	0.2		0.3	12.3	2.7	3.2	0.5	4.3	7.7	5.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	70.0	45.0	46.8		46.9	63.9	51.0	39.3	29.2	59.9	48.7	42.0
Level of Service (LOS)	E	D	D		D	E	D	D	C	E	D	D
Approach Delay, s/veh / LOS	63.5	E		57.8	E		39.5	D		48.8	D	
Intersection Delay, s/veh / LOS	48.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.5	B
Bicycle LOS Score / LOS	1.1	A	1.2	A	1.3	A	1.7	A

HCS 2010 Signalized Intersection Results Summary

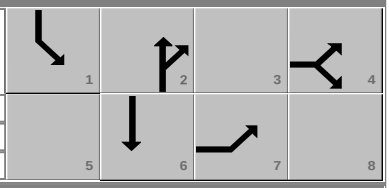
General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 SOUTH RAMP	File Name	2025 PM_NO SPUI_ I-264 SOUTH RAMP.xus		
Project Description	2025 PM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	711		240					933	320	1020	1054	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	42.5	40.0	32.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



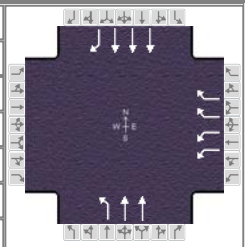
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		37.5				45.0	47.5	92.5
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1				0.0	3.0	0.0
Queue Clearance Time (g_s), s		31.4					44.5	
Green Extension Time (g_e), s		1.2				0.0	0.0	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		0.82					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	790		267					1037	222	1133	1171	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	29.4		20.0					37.7	14.9	42.5	21.3	
Cycle Queue Clearance Time (g_c), s	29.4		20.0					37.7	14.9	42.5	21.3	
Green Ratio (*g/C*)	0.25		0.25					0.31	0.31	0.33	0.67	
Capacity (*c*), veh/h	854		391					1081	481	1114	2363	
Volume-to-Capacity Ratio (*X*)	0.925		0.682					0.959	0.462	1.017	0.496	
Back of Queue (*Q*), ft/ln (95 th percentile)	506.5		320.1					658.5	255.3	769	307.5	
Back of Queue (*Q*), veh/ln (95 th percentile)	19.8		12.5					25.7	10.0	30.0	12.0	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	47.5		44.1					44.2	36.3	43.8	10.4	
Incremental Delay (d_2), s/veh	13.8		3.1					19.2	3.2	31.3	0.7	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	61.3		47.2					63.4	39.5	75.0	11.2	
Level of Service (LOS)	E		D					E	D	F	B	
Approach Delay, s/veh / LOS	57.7		E	0.0			59.2		E	42.6		D
Intersection Delay, s/veh / LOS	50.6						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.4	B	1.9	A
Bicycle LOS Score / LOS		F			1.5	A	2.4	B

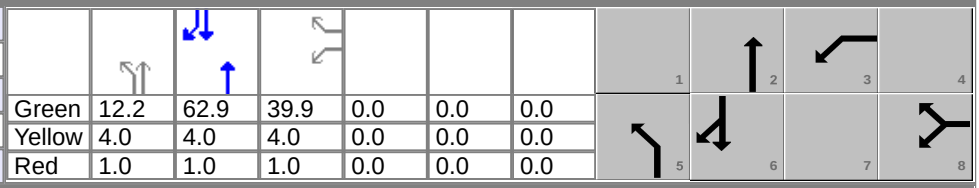
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 NORTH RAMP	File Name	2025 PM_NO SPUI_I-264 NORTH RAMP.xus		
Project Description	2025 PM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				350		700	125	1519			1719	362

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.2	62.9	39.9	0.0	0.0	0.0			
Yellow	4.0	4.0	4.0	0.0	0.0	0.0			
Red	1.0	1.0	1.0	0.0	0.0	0.0			

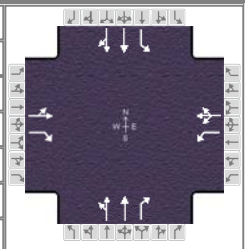
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				44.9	17.2	85.1		67.9
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.2	3.0	0.0		0.0
Queue Clearance Time (g_s), s				37.2	12.1			
Green Extension Time (g_e), s				2.7	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				0.10	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				389		778	139	1688			1910	402
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				11.6		35.2	10.1	46.2			41.2	23.3
Cycle Queue Clearance Time (g_c), s				11.6		35.2	10.1	46.2			41.2	23.3
Green Ratio (*g/C*)				0.31		0.31	0.09	0.62			0.48	0.48
Capacity (*c*), veh/h				1047		849	165	2164			2431	756
Volume-to-Capacity Ratio (*X*)				0.371		0.916	0.840	0.780			0.786	0.532
Back of Queue (*Q*), ft/ln (95 th percentile)				212.1		478.4	207.7	625.9			580.8	347.8
Back of Queue (*Q*), veh/ln (95 th percentile)				8.3		18.7	8.1	24.4			22.7	13.6
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				35.2		43.4	57.9	18.4			27.9	23.3
Incremental Delay (d_2), s/veh				0.1		10.2	4.3	2.9			2.6	2.7
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				35.3		53.7	62.3	21.3			30.6	26.0
Level of Service (LOS)				D		D	E	C			C	C
Approach Delay, s/veh / LOS	0.0			47.6		D	24.4		C	29.8		C
Intersection Delay, s/veh / LOS	31.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	2.0	A	1.8	A

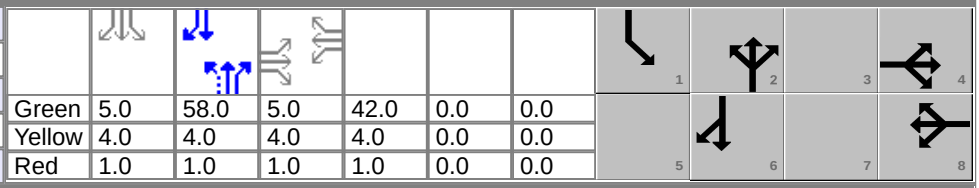
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	NORTHFIELD DRIVE	File Name	2025 PM_NO SPUI_NORTHFIELD.xus		
Project Description	NO BUILD - PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	26	25	886	21	45	10	1720	474	15	1170	20

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	58.0	5.0	42.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

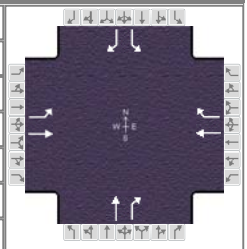
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		47.0		63.0	10.0	73.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		5.6		44.0			3.2	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.89		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		51	11	984	73		1007	916	249	17	663	659
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1805	1563	1757	1643		1817	1679	1563	1757	1845	1834
Queue Service Time (g_s), s		3.6	0.9	42.0	4.1		23.3	58.0	13.6	1.2	34.8	34.8
Cycle Queue Clearance Time (g_c), s		3.6	0.9	42.0	4.1		58.0	58.0	13.6	1.2	34.8	34.8
Green Ratio (*g/C*)		0.04	0.04	0.32	0.32		0.45	0.45	0.45	0.04	0.52	0.52
Capacity (*c*), veh/h		69	60	568	531		839	749	697	68	965	959
Volume-to-Capacity Ratio (*X*)		0.736	0.185	1.734	0.138		1.200	1.223	0.357	0.247	0.687	0.687
Back of Queue (*Q*), ft/ln (95 th percentile)		101.9	16.5	2813.1	74.1		1769.3	1665.8	227.1	24.7	551.9	550.8
Back of Queue (*Q*), veh/ln (95 th percentile)		4.0	0.6	109.9	2.9		69.1	65.1	8.9	1.0	21.6	21.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		61.8	60.5	44.0	31.2		36.7	36.0	23.7	60.7	23.1	23.1
Incremental Delay (d_2), s/veh		29.7	0.5	337.8	0.0		101.5	112.0	1.4	0.7	4.0	4.0
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		91.6	61.1	381.8	31.2		138.2	148.0	25.1	61.4	27.1	27.1
Level of Service (LOS)		F	E	F	C		F	F	C	E	C	C
Approach Delay, s/veh / LOS	86.1	F		357.5	F		129.4	F		27.5	C	
Intersection Delay, s/veh / LOS	151.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.2	B	2.3	B	1.6	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 PM_NO SPUI_BROWNSBORO.xus		
Project Description	2025 PM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	430	65			497	128		460	55	36		475

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	3.8	51.2	25.0	30.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	1.0	3.0
Phase Duration, s		30.0		35.0		56.2	8.8	65.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		27.0		32.0			3.7	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		1.00		1.00			0.76	
Max Out Probability		1.00		1.00			0.00	

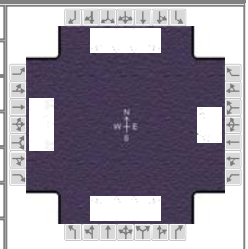
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	478	72			552	142		511	61	40		250
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	25.0	4.3			30.0	9.6		30.2	3.2	1.7		13.3
Cycle Queue Clearance Time (g_c), s	25.0	4.3			30.0	9.6		30.2	3.2	1.7		13.3
Green Ratio (*g/C*)	0.19	0.19			0.23	0.26		0.39	0.39	0.44		0.46
Capacity (*c*), veh/h	338	355			426	407		726	615	248		722
Volume-to-Capacity Ratio (*X*)	1.414	0.204			1.297	0.350		0.704	0.099	0.161		0.346
Back of Queue (*Q*), ft/ln (95 th percentile)	1159.4	89			1180.8	167.9		519.1	56.3	31.8		221.4
Back of Queue (*Q*), veh/ln (95 th percentile)	45.3	3.5			46.1	6.6		20.3	2.2	1.2		8.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.11		0.00
Uniform Delay (d_1), s/veh	52.5	44.1			50.0	39.1		33.1	24.9	25.2		22.4
Incremental Delay (d_2), s/veh	203.1	0.1			150.2	0.2		5.7	0.3	0.1		1.3
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	255.6	44.2			200.2	39.3		38.7	25.2	25.3		23.8
Level of Service (LOS)	F	D			F	D		D	C	C		C
Approach Delay, s/veh / LOS	227.8	F		167.2	F		37.3	D		24.0	C	
Intersection Delay, s/veh / LOS	128.0						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.4	A	1.6	A	1.4	A		F

No Build
With Mixed Use

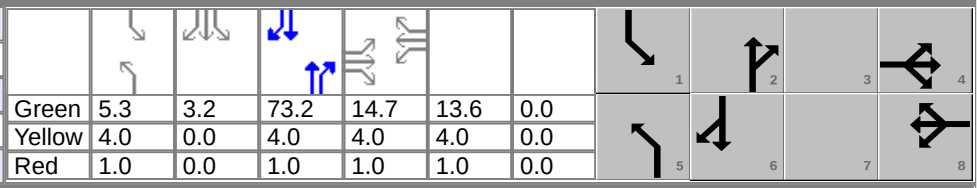
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	RUDY LANE	File Name	2025 AM_SPUI_RUDY.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	153	10	50	30	60	133	50	715	15	83	1456	183

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.3	3.2	73.2	14.7	13.6	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

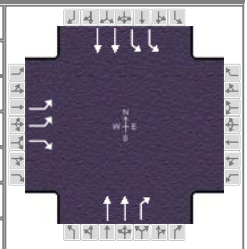
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		19.7		18.6	10.3	78.2	13.5	81.4
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		14.4		13.2	6.1		8.7	
Green Extension Time (g_e), s		0.4		0.4	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.87		0.96	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	170	11	50		100	137	56	794	11	92	1618	192
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1814	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	12.4	0.7	3.8		6.8	11.2	4.1	16.6	0.4	6.7	45.8	7.5
Cycle Queue Clearance Time (g_c), s	12.4	0.7	3.8		6.8	11.2	4.1	16.6	0.4	6.7	45.8	7.5
Green Ratio (*g/C*)	0.11	0.11	0.11		0.10	0.10	0.04	0.56	0.56	0.07	0.59	0.59
Capacity (*c*), veh/h	199	209	177		189	163	72	1977	880	116	2064	919
Volume-to-Capacity Ratio (*X*)	0.855	0.053	0.283		0.528	0.838	0.773	0.402	0.013	0.798	0.784	0.209
Back of Queue (*Q*), ft/ln (95 th percentile)	241.8	14.8	68.4		142.5	204.5	88	271.2	6.6	142.2	634.8	120.5
Back of Queue (*Q*), veh/ln (95 th percentile)	9.4	0.6	2.7		5.6	8.0	3.4	10.6	0.3	5.6	24.8	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.86	0.00	0.53		0.00	0.00	0.52	0.00	0.09	0.68	0.00	0.75
Uniform Delay (d_1), s/veh	56.6	51.4	52.8		55.2	57.1	61.7	16.0	12.5	59.9	20.5	12.6
Incremental Delay (d_2), s/veh	4.0	0.0	0.3		0.9	4.3	6.4	0.6	0.0	4.7	3.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	60.7	51.5	53.1		56.0	61.5	68.2	16.7	12.5	64.6	23.5	13.1
Level of Service (LOS)	E	D	D		E	E	E	B	B	E	C	B
Approach Delay, s/veh / LOS	58.6	E		59.2	E		19.9	B		24.5	C	
Intersection Delay, s/veh / LOS	28.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.9	A	0.9	A	1.2	A	2.1	B

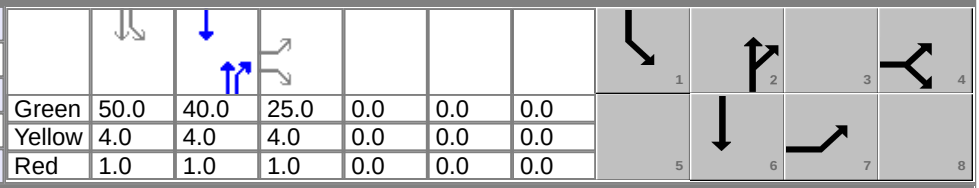
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 SOUTH RAMP	File Name	2025 AM_NO SPUI_ I-264 SOUTH RAMP.xus		
Project Description	2025 AM NO SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	301		340					511	480	1324	1392	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	50.0	40.0	25.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

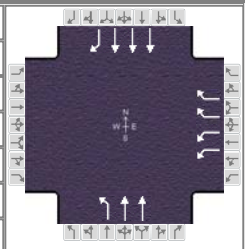
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		30.0				45.0	55.0	100.0
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.2				0.0	6.0	0.0
Queue Clearance Time (g_s), s		27.0					52.0	
Green Extension Time (g_e), s		0.0				0.0	0.0	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		1.00					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	334		378					568	333	1471	1547	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	11.4		25.0					17.4	24.4	50.0	27.5	
Cycle Queue Clearance Time (g_c), s	11.4		25.0					17.4	24.4	50.0	27.5	
Green Ratio (*g/C*)	0.19		0.19					0.31	0.31	0.38	0.73	
Capacity (*c*), veh/h	656		301					1081	481	1312	2567	
Volume-to-Capacity Ratio (*X*)	0.510		1.257					0.525	0.693	1.121	0.603	
Back of Queue (*Q*), ft/ln (95 th percentile)	213.7		821					308	393.6	1135.6	351.9	
Back of Queue (*Q*), veh/ln (95 th percentile)	8.3		32.1					12.0	15.4	44.4	13.7	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	47.0		52.5					37.2	39.6	40.0	8.4	
Incremental Delay (d_2), s/veh	0.3		139.7					1.8	8.0	65.1	1.1	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	47.3		192.2					39.0	47.6	105.1	9.5	
Level of Service (LOS)	D		F					D	D	F	A	
Approach Delay, s/veh / LOS	124.2		F	0.0			42.2		D	56.1		E
Intersection Delay, s/veh / LOS	63.9						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.4	B	1.9	A
Bicycle LOS Score / LOS		F			1.2	A	3.0	C

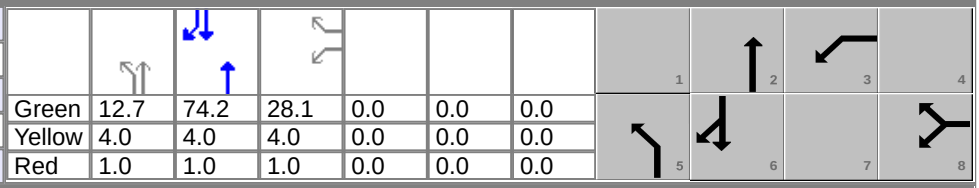
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 NORTH RAMP	File Name	2025 AM_NO SPUI_I-264 NORTH RAMP.xus		
Project Description	2025 AM NO SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				440		500	130	662			2296	750

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.7	74.2	28.1	0.0	0.0	0.0			
Yellow	4.0	4.0	4.0	0.0	0.0	0.0			
Red	1.0	1.0	1.0	0.0	0.0	0.0			

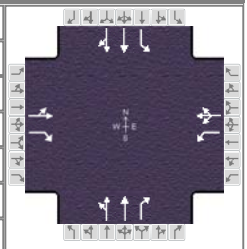
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				33.1	17.7	96.9		79.2
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.1	3.0	0.0		0.0
Queue Clearance Time (g_s), s				27.6	12.5			
Green Extension Time (g_e), s				0.6	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				1.00	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				489		556	144	736			2551	833
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				17.0		25.6	10.5	10.1			57.5	63.7
Cycle Queue Clearance Time (g_c), s				17.0		25.6	10.5	10.1			57.5	63.7
Green Ratio (*g/C*)				0.22		0.22	0.10	0.71			0.57	0.57
Capacity (*c*), veh/h				739		599	171	2482			2868	892
Volume-to-Capacity Ratio (*X*)				0.662		0.927	0.845	0.296			0.889	0.934
Back of Queue (*Q*), ft/ln (95 th percentile)				297.9		396	213.9	156			754.8	871.2
Back of Queue (*Q*), veh/ln (95 th percentile)				11.6		15.5	8.4	6.1			29.5	34.0
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				46.6		49.9	57.7	7.1			24.3	25.6
Incremental Delay (d_2), s/veh				1.6		19.6	4.3	0.3			4.6	17.8
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				48.2		69.5	62.0	7.4			28.9	43.5
Level of Service (LOS)				D		E	E	A			C	D
Approach Delay, s/veh / LOS	0.0			59.5		E	16.4		B	32.5		C
Intersection Delay, s/veh / LOS	35.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	1.2	A	2.3	B

HCS 2010 Signalized Intersection Results Summary

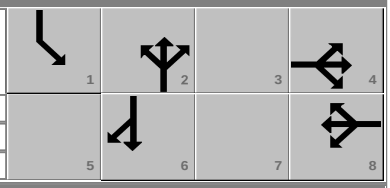
General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	NORTHFIELD DRIVE	File Name	2025 AM_NO SPUI_NORTHFIELD_WDEV.xus		
Project Description	NO BUILD - AM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	23	150	746	12	30	25	670	472	25	2120	10

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	60.0	5.0	40.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0



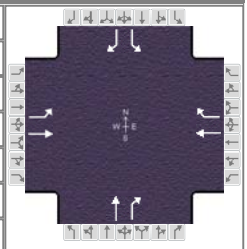
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		45.0		65.0	10.0	75.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		6.6		42.0			4.0	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.96		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		37	56	829	47		41	731	247	28	1183	1183
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1817	1563	1757	1635		31	1679	1563	1757	1845	1842
Queue Service Time (g_s), s		2.6	4.6	40.0	2.6		0.0	54.0	13.1	2.0	70.0	70.0
Cycle Queue Clearance Time (g_c), s		2.6	4.6	40.0	2.6		60.0	54.0	13.1	2.0	70.0	70.0
Green Ratio (*g/C*)		0.04	0.04	0.31	0.31		0.46	0.46	0.46	0.04	0.54	0.54
Capacity (*c*), veh/h		70	60	541	503		60	775	722	68	993	992
Volume-to-Capacity Ratio (*X*)		0.525	0.924	1.533	0.093		0.687	0.943	0.342	0.411	1.191	1.193
Back of Queue (*Q*), ft/ln (95 th percentile)		56.8	150.2	2112.2	47.6		99.7	851.9	218.5	41.8	1956.5	1964.2
Back of Queue (*Q*), veh/ln (95 th percentile)		2.2	5.9	82.5	1.9		3.9	33.3	8.5	1.6	76.4	76.7
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		61.3	62.3	45.0	32.1		44.7	33.4	22.4	61.1	30.0	30.0
Incremental Delay (d_2), s/veh		3.5	87.8	249.2	0.0		48.6	21.1	1.3	1.5	96.2	97.0
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		64.8	150.1	294.2	32.1		93.3	54.5	23.7	62.5	126.2	127.0
Level of Service (LOS)		E	F	F	C		F	D	C	E	F	F
Approach Delay, s/veh / LOS	116.2	F		280.3	F		48.6	D		125.9	F	
Intersection Delay, s/veh / LOS	138.6						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	1.9	A	1.3	A	2.5	B

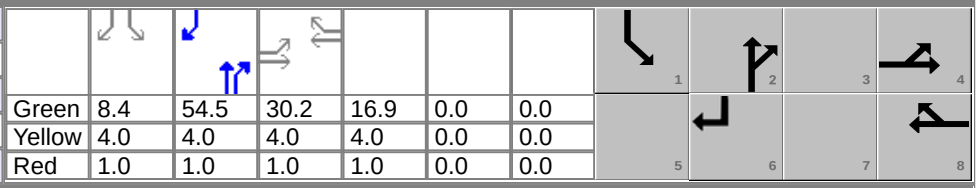
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 AM_NO SPUI_BROWNSBORO.xus		
Project Description	2025 AM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	340	115			188	59		380	106	81		700

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.4	54.5	30.2	16.9	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

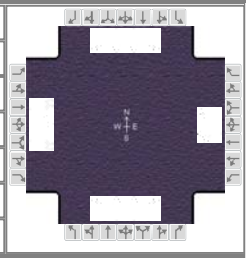
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	2.0	3.0
Phase Duration, s		35.2		21.9		59.5	13.4	72.9
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		29.3		16.4			8.6	
Green Extension Time (g_e), s		0.9		0.5		0.0	0.1	0.0
Phase Call Probability		1.00		1.00			0.96	
Max Out Probability		0.00		0.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	378	128			209	66		422	118	90		778
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	27.3	7.4			14.4	5.0		22.4	6.2	6.6		61.5
Cycle Queue Clearance Time (g_c), s	27.3	7.4			14.4	5.0		22.4	6.2	6.6		61.5
Green Ratio (*g/C*)	0.23	0.23			0.13	0.13		0.42	0.42	0.06		0.52
Capacity (*c*), veh/h	408	429			240	203		774	656	113		816
Volume-to-Capacity Ratio (*X*)	0.925	0.298			0.871	0.323		0.546	0.180	0.795		0.953
Back of Queue (*Q*), ft/ln (95 th percentile)	454.6	153.5			284.1	88.7		392.9	107.3	138.9		885.1
Back of Queue (*Q*), veh/ln (95 th percentile)	17.8	6.0			11.1	3.5		15.3	4.2	5.4		34.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh	48.8	41.1			55.5	51.4		28.4	23.7	60.0		29.5
Incremental Delay (d_2), s/veh	3.9	0.1			3.8	0.3		2.8	0.6	4.7		21.9
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	52.7	41.3			59.3	51.7		31.2	24.3	64.7		51.4
Level of Service (LOS)	D	D			E	D		C	C	E		D
Approach Delay, s/veh / LOS	49.8	D		57.5	E		29.7	C		52.8	D	
Intersection Delay, s/veh / LOS	47.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.3	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	0.9	A	1.4	A		F

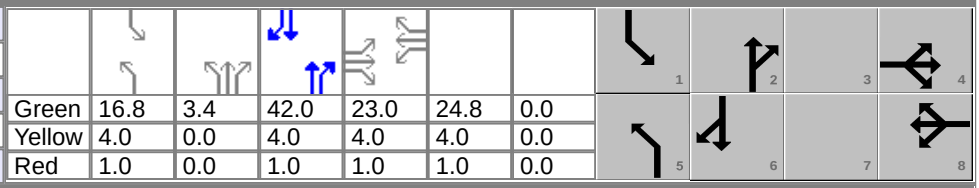
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	RUDY LANE	File Name	2025 PM_SPUI_RUDY.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	254	25	75	55	80	254	75	806	75	180	840	280

Signal Information			
Cycle, s	130.0	Reference Phase	6
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	16.8	3.4		42.0	23.0	24.8	0.0					
Yellow	4.0	0.0		4.0	4.0	4.0	0.0					
Red	1.0	0.0		1.0	1.0	1.0	0.0					

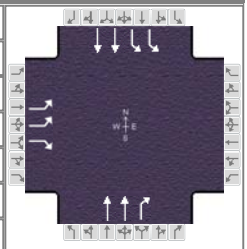
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		28.0		29.8	25.3	50.4	21.8	47.0
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		22.5		24.1	7.5		16.5	
Green Extension Time (g_e), s		0.5		0.7	0.1	0.0	0.3	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.04		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	282	28	78		150	271	83	896	78	200	933	300
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1808	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	20.5	1.6	5.6		9.5	22.1	5.5	28.9	4.4	14.5	31.8	20.9
Cycle Queue Clearance Time (g_c), s	20.5	1.6	5.6		9.5	22.1	5.5	28.9	4.4	14.5	31.8	20.9
Green Ratio (*g/C*)	0.18	0.18	0.18		0.19	0.19	0.16	0.35	0.35	0.13	0.32	0.32
Capacity (*c*), veh/h	310	326	276		345	298	274	1228	546	227	1135	505
Volume-to-Capacity Ratio (*X*)	0.910	0.085	0.282		0.435	0.910	0.305	0.729	0.142	0.880	0.822	0.594
Back of Queue (*Q*), ft/ln (95 th percentile)	399.6	34.2	99.4		194.7	372.1	118.6	472.6	78.9	275.3	525.7	338.7
Back of Queue (*Q*), veh/ln (95 th percentile)	15.6	1.3	3.9		7.6	14.5	4.6	18.5	3.1	10.8	20.5	13.2
Queue Storage Ratio (*RQ*) (95 th percentile)	3.07	0.00	0.76		0.00	0.00	0.70	0.00	1.05	1.31	0.00	2.12
Uniform Delay (d_1), s/veh	52.5	44.7	46.4		46.4	51.5	48.6	36.9	28.9	55.6	40.6	36.9
Incremental Delay (d_2), s/veh	17.9	0.0	0.2		0.3	12.9	2.9	3.8	0.5	4.3	6.8	5.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	70.4	44.8	46.6		46.8	64.4	51.5	40.7	29.5	59.9	47.3	41.9
Level of Service (LOS)	E	D	D		D	E	D	D	C	E	D	D
Approach Delay, s/veh / LOS	63.8	E		58.1	E		40.8	D		48.0	D	
Intersection Delay, s/veh / LOS	48.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.5	B
Bicycle LOS Score / LOS	1.1	A	1.2	A	1.4	A	1.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency				Duration, h	0.25
Analyst		Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period		PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 SOUTH RAMP	File Name	2025 PM_NO SPUI_ I-264 SOUTH RAMP.xus		
Project Description	2025 PM NO SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	782		240					974	320	955	1030	

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	40.3	40.0	34.7	0.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	0.0	0.0	0.0				
Red	1.0	1.0	1.0	0.0	0.0	0.0				

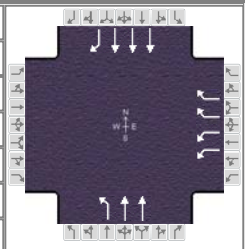
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4				2	1	6
Case Number		9.0				7.3	2.0	4.0
Phase Duration, s		39.7				45.0	45.3	90.3
Change Period, ($Y+R_c$), s		5.0				5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1				0.0	3.0	0.0
Queue Clearance Time (g_s), s		34.5					42.3	
Green Extension Time (g_e), s		0.2				0.0	0.0	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		1.00					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	869		267					1082	222	1061	1144	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1563					1756	1563	1706	1756	
Queue Service Time (g_s), s	32.5		19.6					40.0	14.9	40.3	21.6	
Cycle Queue Clearance Time (g_c), s	32.5		19.6					40.0	14.9	40.3	21.6	
Green Ratio (*g/C*)	0.27		0.27					0.31	0.31	0.31	0.66	
Capacity (*c*), veh/h	912		418					1081	481	1056	2303	
Volume-to-Capacity Ratio (*X*)	0.953		0.638					1.001	0.462	1.004	0.497	
Back of Queue (*Q*), ft/ln (95 th percentile)	569.8		311.6					727.1	255.3	719.5	315.8	
Back of Queue (*Q*), veh/ln (95 th percentile)	22.3		12.2					28.4	10.0	28.1	12.3	
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00		0.00					0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	46.8		42.1					45.0	36.3	44.9	11.4	
Incremental Delay (d_2), s/veh	19.0		2.4					27.7	3.2	28.8	0.8	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	65.8		44.5					72.7	39.5	73.7	12.2	
Level of Service (LOS)	E		D					F	D	F	B	
Approach Delay, s/veh / LOS	60.8		E	0.0			67.1		E	41.8		D
Intersection Delay, s/veh / LOS	53.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.4	B	1.9	A
Bicycle LOS Score / LOS		F			1.6	A	2.3	B

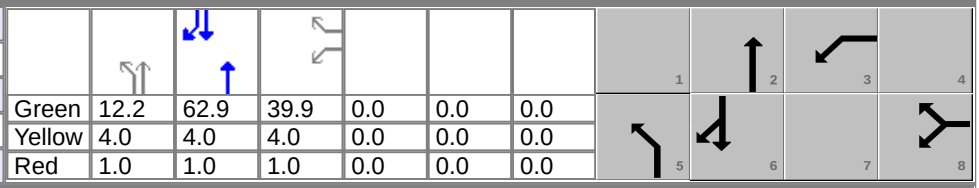
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	I-264 NORTH RAMP	File Name	2025 PM_NO SPUI_I-264 NORTH RAMP.xus		
Project Description	2025 PM NO SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				350		700	125	1631			1630	333

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.2	62.9	39.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

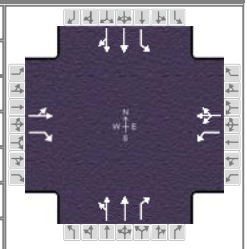
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				8	5	2		6
Case Number				9.0	2.0	4.0		7.3
Phase Duration, s				44.9	17.2	85.1		67.9
Change Period, ($Y+R_c$), s				5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s				3.2	3.0	0.0		0.0
Queue Clearance Time (g_s), s				37.2	12.1			
Green Extension Time (g_e), s				2.7	0.2	0.0		0.0
Phase Call Probability				1.00	0.99			
Max Out Probability				0.10	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				3		18	5	2			6	16
Adjusted Flow Rate (*v*), veh/h				389		778	139	1812			1811	370
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1706		1383	1757	1756			1675	1563
Queue Service Time (g_s), s				11.6		35.2	10.1	53.2			37.8	20.8
Cycle Queue Clearance Time (g_c), s				11.6		35.2	10.1	53.2			37.8	20.8
Green Ratio (*g/C*)				0.31		0.31	0.09	0.62			0.48	0.48
Capacity (*c*), veh/h				1047		849	165	2164			2431	756
Volume-to-Capacity Ratio (*X*)				0.371		0.916	0.840	0.837			0.745	0.489
Back of Queue (*Q*), ft/ln (95 th percentile)				212.1		478.4	207.7	714.9			538.3	316.7
Back of Queue (*Q*), veh/ln (95 th percentile)				8.3		18.7	8.1	27.9			21.0	12.4
Queue Storage Ratio (*RQ*) (95 th percentile)				0.00		0.00	0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh				35.2		43.4	57.9	19.8			27.1	22.7
Incremental Delay (d_2), s/veh				0.1		10.2	4.3	4.1			2.1	2.3
Initial Queue Delay (d_3), s/veh				0.0		0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh				35.3		53.7	62.3	23.8			29.2	25.0
Level of Service (LOS)				D		D	E	C			C	C
Approach Delay, s/veh / LOS	0.0			47.6		D	26.6		C	28.5		C
Intersection Delay, s/veh / LOS	32.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.1	B	1.9	A
Bicycle LOS Score / LOS				F	2.1	B	1.7	A

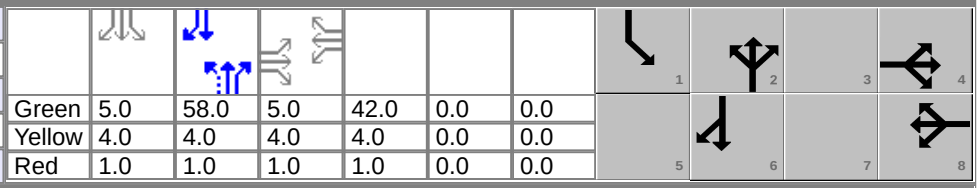
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	NORTHFIELD DRIVE	File Name	2025 PM_NO SPUI_NORTHFIELD_WDEV.xus		
Project Description	NO BUILD - PM				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	29	25	768	20	35	10	1720	586	15	1170	20

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	58.0	5.0	42.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

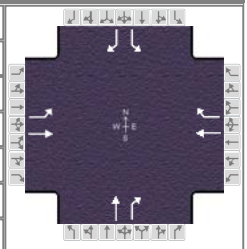
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		47.0		63.0	10.0	73.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		5.9		44.0			3.2	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.91		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		54	11	853	61		1007	916	301	17	663	659
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1808	1563	1757	1655		1817	1679	1563	1757	1845	1834
Queue Service Time (g_s), s		3.9	0.9	42.0	3.4		23.3	58.0	17.2	1.2	34.8	34.8
Cycle Queue Clearance Time (g_c), s		3.9	0.9	42.0	3.4		58.0	58.0	17.2	1.2	34.8	34.8
Green Ratio (*g/C*)		0.04	0.04	0.32	0.32		0.45	0.45	0.45	0.04	0.52	0.52
Capacity (*c*), veh/h		70	60	568	535		839	749	697	68	965	959
Volume-to-Capacity Ratio (*X*)		0.783	0.185	1.503	0.114		1.200	1.223	0.432	0.247	0.687	0.687
Back of Queue (*Q*), ft/ln (95 th percentile)		116	16.5	2122.2	61.2		1769.3	1665.8	274	24.7	551.9	550.8
Back of Queue (*Q*), veh/ln (95 th percentile)		4.5	0.6	82.9	2.4		69.1	65.1	10.7	1.0	21.6	21.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh		62.0	60.5	44.0	30.9		36.7	36.0	24.7	60.7	23.1	23.1
Incremental Delay (d_2), s/veh		39.9	0.5	235.7	0.0		101.5	112.0	1.9	0.7	4.0	4.0
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		101.8	61.1	279.7	31.0		138.2	148.0	26.6	61.4	27.1	27.1
Level of Service (LOS)		F	E	F	C		F	F	C	E	C	C
Approach Delay, s/veh / LOS	94.9	F		263.0	F		127.1	F		27.5	C	
Intersection Delay, s/veh / LOS	124.7						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	2.9	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.0	A	2.3	B	1.6	A

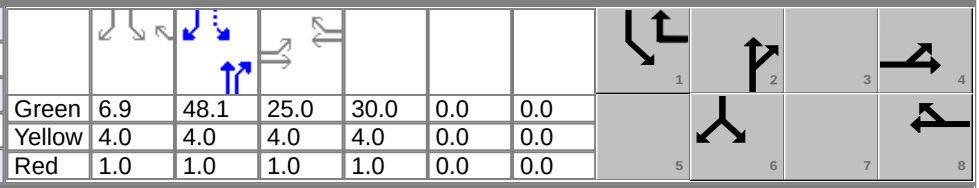
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 PM_NO SPUI_BROWNSBORO.xus		
Project Description	2025 PM NO BUILD				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	430	180			368	95		460	150	99		475

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.9	48.1	25.0	30.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		10.0		11.0		7.3	1.0	3.0
Phase Duration, s		30.0		35.0		53.1	11.9	65.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		27.0		30.5			6.9	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.2	0.0
Phase Call Probability		1.00		1.00			0.98	
Max Out Probability		1.00		1.00			0.00	

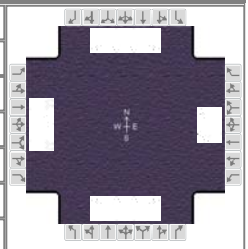
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	478	200			409	106		511	167	110		250
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	25.0	12.8			28.5	6.7		31.4	9.8	4.9		13.3
Cycle Queue Clearance Time (g_c), s	25.0	12.8			28.5	6.7		31.4	9.8	4.9		13.3
Green Ratio (*g/C*)	0.19	0.19			0.23	0.28		0.37	0.37	0.44		0.46
Capacity (*c*), veh/h	338	355			426	444		682	578	261		722
Volume-to-Capacity Ratio (*X*)	1.414	0.564			0.961	0.238		0.749	0.288	0.421		0.346
Back of Queue (*Q*), ft/ln (95 th percentile)	1159.4	251.8			597.2	116.8		546.2	174.4	91.6		221.4
Back of Queue (*Q*), veh/ln (95 th percentile)	45.3	9.8			23.3	4.6		21.3	6.8	3.6		8.6
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.31		0.00
Uniform Delay (d_1), s/veh	52.5	47.6			49.4	35.7		35.7	28.9	26.8		22.4
Incremental Delay (d_2), s/veh	203.1	1.3			33.2	0.1		7.4	1.3	0.4		1.3
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	255.6	48.8			82.7	35.8		43.1	30.1	27.2		23.8
Level of Service (LOS)	F	D			F	D		D	C	C		C
Approach Delay, s/veh / LOS	194.6	F		73.0	E		39.9	D		24.8	C	
Intersection Delay, s/veh / LOS	92.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.6	A	1.3	A	1.6	A		F

Build with VA

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	RUDY LANE	File Name	2025 AM_SPUI_RUDY.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	157	10	50	30	60	137	50	766	15	82	1444	182

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.3	3.1	72.6	15.0	13.9	0.0	1	2	3	4	5	6	7	8
Yellow	4.0	0.0	4.0	4.0	4.0	0.0								
Red	1.0	0.0	1.0	1.0	1.0	0.0								

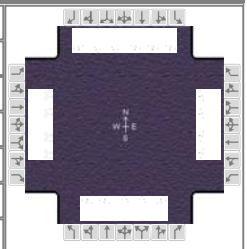
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		20.0		18.9	10.3	77.6	13.5	80.7
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		14.7		13.5	6.1		8.6	
Green Extension Time (g_e), s		0.4		0.4	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.87		0.96	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	174	11	50		100	141	56	851	11	91	1604	191
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1814	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	12.7	0.7	3.8		6.8	11.5	4.1	18.4	0.4	6.6	45.7	7.6
Cycle Queue Clearance Time (g_c), s	12.7	0.7	3.8		6.8	11.5	4.1	18.4	0.4	6.6	45.7	7.6
Green Ratio (*g/C*)	0.12	0.12	0.12		0.11	0.11	0.04	0.56	0.56	0.07	0.58	0.58
Capacity (*c*), veh/h	203	213	181		194	168	72	1961	873	114	2045	910
Volume-to-Capacity Ratio (*X*)	0.859	0.052	0.277		0.514	0.842	0.773	0.434	0.013	0.797	0.784	0.210
Back of Queue (*Q*), ft/ln (95 th percentile)	246.8	14.7	68.2		141.9	209.5	88	295.4	6.7	140.7	635.4	121.6
Back of Queue (*Q*), veh/ln (95 th percentile)	9.6	0.6	2.7		5.5	8.2	3.4	11.5	0.3	5.5	24.8	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.90	0.00	0.52		0.00	0.00	0.52	0.00	0.09	0.67	0.00	0.76
Uniform Delay (d_1), s/veh	56.4	51.1	52.5		54.8	57.0	61.7	16.7	12.8	59.9	20.9	12.9
Incremental Delay (d_2), s/veh	4.1	0.0	0.3		0.8	4.3	6.4	0.7	0.0	4.7	3.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	60.5	51.2	52.8		55.6	61.3	68.2	17.4	12.8	64.7	24.0	13.4
Level of Service (LOS)	E	D	D		E	E	E	B	B	E	C	B
Approach Delay, s/veh / LOS	58.4	E		58.9	E		20.5	C		24.9	C	
Intersection Delay, s/veh / LOS	28.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.9	A	0.9	A	1.2	A	2.0	B

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	PALMER			Duration, h	0.25
Analyst	SDS	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	I-264	File Name	2025 AM_SPUI.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	368		340	440		500	130	440	480	1298	958	732

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.5	33.3	50.9	8.0	1.0	23.3
Yellow	4.0	4.0	4.0	4.0	0.0	4.0
Red	1.0	1.0	1.0	1.0	0.0	1.0

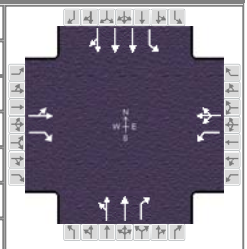
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	13.0	28.3	14.0	29.3	13.5	55.9	51.8	94.1
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.3	3.0	3.3	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s	10.0	20.7	11.0	21.8	8.3		42.5	
Green Extension Time (g_e), s	0.0	2.5	0.0	2.5	0.3	0.0	4.3	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	0.00	1.00	0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	409		378	489		556	144	489	89	1442	1064	247
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1383	1706		1383	1706	1756	1563	1706	1756	1563
Queue Service Time (g_s), s	8.0		18.7	9.0		19.8	6.3	16.0	5.4	40.5	26.5	9.9
Cycle Queue Clearance Time (g_c), s	8.0		18.7	9.0		19.8	6.3	16.0	5.4	40.5	26.5	9.9
Green Ratio (*g/C*)	0.21		0.21	0.22		0.47	0.06	0.34	0.40	0.31	0.59	0.65
Capacity (*c*), veh/h	694		588	736		1312	194	1191	624	1597	2087	1012
Volume-to-Capacity Ratio (*X*)	0.589		0.642	0.665		0.423	0.743	0.410	0.142	0.903	0.510	0.244
Back of Queue (*Q*), ft/ln (95 th percentile)	151.4		271.2	200.3		269.6	126.7	289.7	97	605.9	403.1	157.6
Back of Queue (*Q*), veh/ln (95 th percentile)	5.9		10.6	7.8		10.5	4.9	11.3	3.8	23.7	15.7	6.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.43		0.68	0.57		0.67	0.58	0.00	0.49	1.35	0.00	0.00
Uniform Delay (d_1), s/veh	54.2		53.9	54.5		25.9	69.6	38.1	28.7	49.4	17.7	11.1
Incremental Delay (d_2), s/veh	0.9		0.4	1.8		0.1	2.1	1.0	0.5	0.8	0.9	0.6
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	55.1		54.3	56.3		26.0	71.8	39.1	29.2	50.3	18.6	11.6
Level of Service (LOS)	E		D	E		C	E	D	C	D	B	B
Approach Delay, s/veh / LOS	54.7		D	40.2		D	44.4		D	34.6		C
Intersection Delay, s/veh / LOS	40.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.7	D	3.9	D	3.3	C	2.9	C
Bicycle LOS Score / LOS		F		F	1.1	A	2.8	C

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	NORTHFIELD DRIVE	File Name	2025 AM_SPUI_NORTHFIELD.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	26	150	688	11	23	25	670	598	25	2120	10

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.0	53.0	5.0	47.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

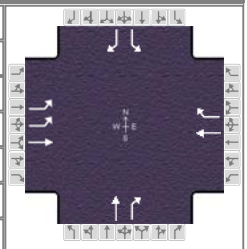
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		52.0		58.0	10.0	68.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		6.6		49.0			4.0	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.97		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		40	56	764	38		215	557	303	28	1579	788
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1819	1563	1757	1644		637	1679	1563	1757	1845	1840
Queue Service Time (g_s), s		2.8	4.6	47.0	2.0		11.0	38.3	18.5	2.0	50.1	50.2
Cycle Queue Clearance Time (g_c), s		2.8	4.6	47.0	2.0		51.2	38.3	18.5	2.0	50.1	50.2
Green Ratio (*g/C*)		0.04	0.04	0.36	0.36		0.41	0.41	0.41	0.04	0.48	0.48
Capacity (*c*), veh/h		70	60	635	595		291	684	637	68	1788	892
Volume-to-Capacity Ratio (*X*)		0.572	0.924	1.204	0.064		0.739	0.814	0.476	0.411	0.883	0.884
Back of Queue (*Q*), ft/ln (95 th percentile)		65	150.2	1391.6	34.8		242.3	602.5	295.2	41.8	773.2	814.9
Back of Queue (*Q*), veh/ln (95 th percentile)		2.5	5.9	54.4	1.4		9.5	23.5	11.5	1.6	30.2	31.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	1.41	0.13	0.00	0.00
Uniform Delay (d_1), s/veh		61.4	62.3	41.5	27.1		29.8	34.1	28.3	61.1	30.2	30.2
Incremental Delay (d_2), s/veh		7.0	87.8	106.1	0.0		15.5	10.3	2.5	1.5	6.7	12.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		68.5	150.1	147.6	27.1		45.3	44.4	30.8	62.5	36.9	42.6
Level of Service (LOS)		E	F	F	C		D	D	C	E	D	D
Approach Delay, s/veh / LOS	115.9	F		141.9	F		40.7	D		39.1	D	
Intersection Delay, s/veh / LOS	60.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.6	D	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	1.8	A	1.4	A	1.8	A

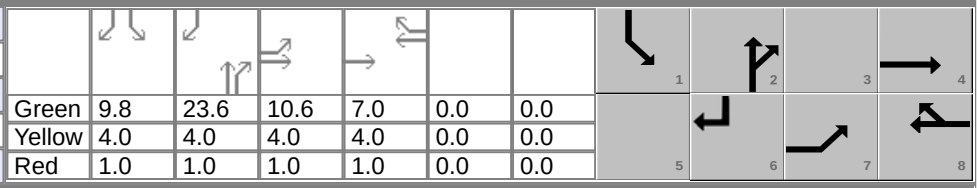
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 AM_SPUI_BROWNSBORO.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	340	244			122	39		380	225	173		700

Signal Information			
Cycle, s	71.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	9.8	23.6	10.6	7.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

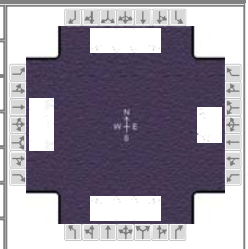
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4		8		2	1	6
Case Number	2.0	4.0		7.3		7.3	2.0	3.0
Phase Duration, s	15.6	27.6		12.0		28.6	14.8	43.4
Change Period, ($Y+R_c$), s	5.0	5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.0		3.0		3.2	3.0	3.2
Queue Clearance Time (g_s), s	9.6	10.4		7.1		16.2	9.6	34.4
Green Extension Time (g_e), s	0.9	0.7		0.0		3.6	0.3	3.6
Phase Call Probability	1.00	1.00		1.00		1.00	0.98	1.00
Max Out Probability	0.00	0.00		1.00		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	378	271			136	43		422	250	192		778
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	7.6	8.4			5.1	1.8		14.2	9.1	7.6		32.4
Cycle Queue Clearance Time (g_c), s	7.6	8.4			5.1	1.8		14.2	9.1	7.6		32.4
Green Ratio (*g/C*)	0.15	0.32			0.10	0.10		0.33	0.33	0.14		0.54
Capacity (*c*), veh/h	512	586			180	153		615	521	245		849
Volume-to-Capacity Ratio (*X*)	0.738	0.463			0.752	0.284		0.687	0.480	0.783		0.917
Back of Queue (*Q*), ft/ln (95 th percentile)	132.9	148			130.5	30.2		235.4	134.5	141.4		355.8
Back of Queue (*Q*), veh/ln (95 th percentile)	5.2	5.8			5.1	1.2		9.2	5.3	5.5		13.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (d_1), s/veh	29.1	19.5			31.5	30.0		20.6	18.9	29.8		14.9
Incremental Delay (d_2), s/veh	0.8	0.2			14.5	0.4		0.5	0.3	2.1		1.8
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	29.9	19.8			46.0	30.3		21.2	19.2	31.8		16.7
Level of Service (LOS)	C	B			D	C		C	B	C		B
Approach Delay, s/veh / LOS	25.7	C		42.2	D		20.4	C		19.7	B	
Intersection Delay, s/veh / LOS	23.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.6	A	0.8	A	1.6	A		F

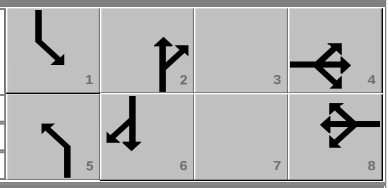
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	RUDY LANE	File Name	2025 PM_SPUI_RUDY.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	251	25	75	55	80	252	75	770	75	181	862	281

Signal Information			
Cycle, s	130.0	Reference Phase	6
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	16.9	3.8	42.0	22.7	24.6	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

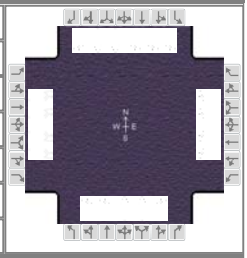
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		27.7		29.6	25.7	50.8	21.9	47.0
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		22.2		23.9	7.4		16.6	
Green Extension Time (g_e), s		0.5		0.7	0.1	0.0	0.3	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.03		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	279	28	78		150	269	83	856	78	201	958	301
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1808	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	20.2	1.6	5.6		9.5	21.9	5.4	27.1	4.4	14.6	33.0	21.0
Cycle Queue Clearance Time (g_c), s	20.2	1.6	5.6		9.5	21.9	5.4	27.1	4.4	14.6	33.0	21.0
Green Ratio (*g/C*)	0.17	0.17	0.17		0.19	0.19	0.16	0.35	0.35	0.13	0.32	0.32
Capacity (*c*), veh/h	307	322	273		342	296	279	1237	550	228	1135	505
Volume-to-Capacity Ratio (*X*)	0.908	0.086	0.285		0.438	0.909	0.298	0.692	0.141	0.881	0.844	0.596
Back of Queue (*Q*), ft/ln (95 th percentile)	394.7	34.2	99.6		194.8	368.1	117.9	445.6	78.6	276.9	544.9	340.2
Back of Queue (*Q*), veh/ln (95 th percentile)	15.4	1.3	3.9		7.6	14.4	4.6	17.4	3.1	10.8	21.3	13.3
Queue Storage Ratio (*RQ*) (95 th percentile)	3.04	0.00	0.77		0.00	0.00	0.69	0.00	1.05	1.32	0.00	2.13
Uniform Delay (d_1), s/veh	52.6	44.9	46.6		46.6	51.6	48.3	36.1	28.7	55.6	40.9	36.9
Incremental Delay (d_2), s/veh	17.4	0.0	0.2		0.3	12.3	2.7	3.2	0.5	4.3	7.7	5.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	70.0	45.0	46.8		46.9	63.9	51.0	39.3	29.2	59.9	48.7	42.0
Level of Service (LOS)	E	D	D		D	E	D	D	C	E	D	D
Approach Delay, s/veh / LOS	63.5	E		57.8	E		39.5	D		48.8	D	
Intersection Delay, s/veh / LOS	48.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.5	B
Bicycle LOS Score / LOS	1.1	A	1.2	A	1.3	A	1.7	A

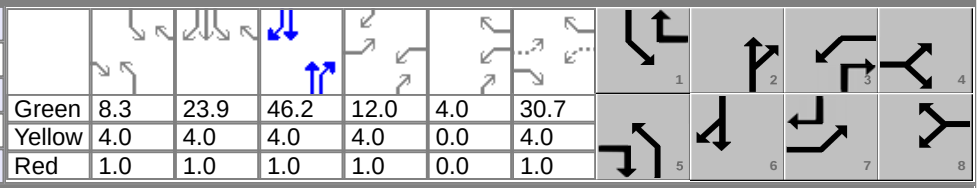
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	PALMER			Duration, h	0.25
Analyst	SDS	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	PM	PHF	0.90
Urban Street	US 42	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	I-264	File Name	2025 PM_SPUI.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	711		240	350		700	125	808	320	1020	699	362

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.3	23.9	46.2	12.0	4.0	30.7		
Yellow	4.0	4.0	4.0	4.0	0.0	4.0		
Red	1.0	1.0	1.0	1.0	0.0	1.0		

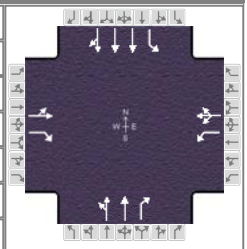
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	17.0	35.7	21.0	39.6	13.3	51.2	42.2	80.1
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.3	3.0	3.3	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s	14.0	13.8	15.2	32.6	8.0		34.1	
Green Extension Time (g_e), s	0.0	3.0	0.8	2.1	0.3	0.0	3.1	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	0.00	0.00	0.25	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	790		267	389		778	139	898	59	1133	777	124
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1383	1706		1383	1706	1756	1563	1706	1756	1563
Queue Service Time (g_s), s	12.0		11.8	13.2		30.6	6.0	35.7	3.4	32.1	21.3	5.4
Cycle Queue Clearance Time (g_c), s	12.0		11.8	13.2		30.6	6.0	35.7	3.4	32.1	21.3	5.4
Green Ratio (*g/C*)	0.28		0.26	0.32		0.48	0.06	0.31	0.41	0.25	0.50	0.58
Capacity (*c*), veh/h	940		719	1031		1325	189	1081	647	1269	1758	907
Volume-to-Capacity Ratio (*X*)	0.840		0.371	0.377		0.587	0.736	0.831	0.091	0.893	0.442	0.137
Back of Queue (*Q*), ft/ln (95 th percentile)	363.6		186	238.1		384.7	122	588.4	61	502.1	350	90.3
Back of Queue (*Q*), veh/ln (95 th percentile)	14.2		7.3	9.3		15.0	4.8	23.0	2.4	19.6	13.7	3.5
Queue Storage Ratio (*RQ*) (95 th percentile)	1.04		0.46	0.68		0.96	0.55	0.00	0.31	1.12	0.00	0.00
Uniform Delay (d_1), s/veh	51.4		45.5	39.5		28.3	69.8	48.3	26.7	54.5	24.0	14.3
Incremental Delay (d_2), s/veh	6.5		0.1	0.1		0.3	2.1	7.4	0.3	0.9	0.8	0.3
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	57.9		45.6	39.5		28.6	71.9	55.7	27.0	55.4	24.8	14.7
Level of Service (LOS)	E		D	D		C	E	E	C	E	C	B
Approach Delay, s/veh / LOS	54.8	D		32.3	C		56.2	E		41.2	D	
Intersection Delay, s/veh / LOS	45.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	C	3.5	D	3.3	C	2.9	C
Bicycle LOS Score / LOS		F		F	1.4	A	2.2	B

HCS 2010 Signalized Intersection Results Summary

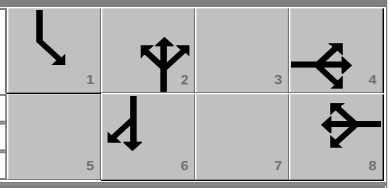
General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	NORTHFIELD DRIVE	File Name	2025 PM_SPUI_NORTHFIELD.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	26	25	886	21	45	10	1720	474	15	1170	20

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.4	67.6	3.0	56.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0



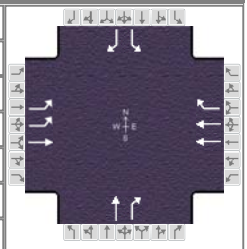
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		8.0		61.0		72.6	8.4	81.0
Change Period, (*Y+R c*), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (*g s*), s		5.0		58.0			3.4	
Green Extension Time (*g e*), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.93		1.00			1.00	
Max Out Probability		1.00		1.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		51	11	984	73		1007	916	249	17	884	438
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1805	1563	1757	1643		1815	1679	1563	1757	1845	1828
Queue Service Time (*g s*), s		3.0	1.1	56.0	4.4		28.9	67.6	15.6	1.4	23.3	23.3
Cycle Queue Clearance Time (*g c*), s		3.0	1.1	56.0	4.4		67.6	67.6	15.6	1.4	23.3	23.3
Green Ratio (*g/C*)		0.02	0.02	0.37	0.37		0.45	0.45	0.45	0.02	0.51	0.51
Capacity (*c*), veh/h		36	31	656	613		842	756	704	40	1869	926
Volume-to-Capacity Ratio (*X*)		1.415	0.355	1.501	0.120		1.195	1.211	0.353	0.418	0.473	0.473
Back of Queue (*Q*), ft/ln (95 th percentile)		199.5	20.2	2555.9	79.9		1908.7	1774.7	256.3	30.1	391.9	395.8
Back of Queue (*Q*), veh/ln (95 th percentile)		7.8	0.8	99.8	3.1		74.6	69.3	10.0	1.2	15.3	15.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	1.22	0.09	0.00	0.00
Uniform Delay (*d 1*), s/veh		73.5	72.5	47.0	30.8		41.9	41.2	26.9	72.3	24.0	24.0
Incremental Delay (*d 2*), s/veh		294.7	2.5	233.4	0.0		99.4	106.9	1.4	2.6	0.9	1.7
Initial Queue Delay (*d 3*), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		368.2	75.1	280.4	30.9		141.2	148.1	28.3	74.9	24.9	25.7
Level of Service (LOS)		F	E	F	C		F	F	C	E	C	C
Approach Delay, s/veh / LOS	315.9	F		263.1	F		131.2	F		25.8	C	
Intersection Delay, s/veh / LOS	133.3						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	D	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.2	B	2.3	B	1.2	A

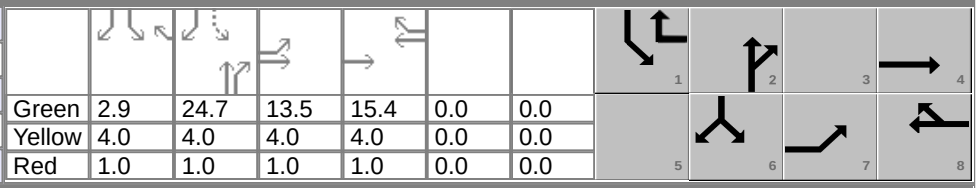
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 PM_SPUI_BROWNSBORO.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	430	65			497	128		460	55	36		475

Signal Information			
Cycle, s	76.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	2.9	24.7	13.5	15.4	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4		8		2	1	6
Case Number	2.0	4.0		7.3		7.3	1.0	3.0
Phase Duration, s	18.5	38.8		20.4		29.7	7.9	37.6
Change Period, ($Y+R_c$), s	5.0	5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.0		3.0		3.1	3.0	3.1
Queue Clearance Time (g_s), s	12.4	3.8		13.5		22.0	3.1	24.6
Green Extension Time (g_e), s	0.9	1.6		1.6		2.3	0.0	2.3
Phase Call Probability	1.00	1.00		1.00		1.00	0.58	1.00
Max Out Probability	0.00	0.00		0.00		0.00	0.00	0.00

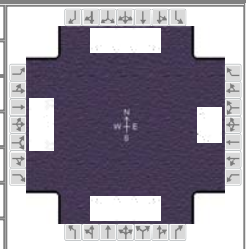
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	478	72			552	142		511	61	40		528
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706	1845			1756	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	10.4	1.8			11.5	5.9		20.0	2.1	1.1		22.6
Cycle Queue Clearance Time (g_c), s	10.4	1.8			11.5	5.9		20.0	2.1	1.1		22.6
Green Ratio (*g/C*)	0.18	0.44			0.20	0.24		0.32	0.32	0.39		0.43
Capacity (*c*), veh/h	604	818			708	375		598	507	218		668
Volume-to-Capacity Ratio (*X*)	0.792	0.088			0.780	0.379		0.854	0.120	0.184		0.790
Back of Queue (*Q*), ft/ln (95 th percentile)	184.2	29.3			205.2	92.9		322.9	32.4	18.4		293.9
Back of Queue (*Q*), veh/ln (95 th percentile)	7.2	1.1			8.0	3.6		12.6	1.3	0.7		11.5
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.06		0.00
Uniform Delay (d_1), s/veh	30.4	12.5			29.2	24.6		24.4	18.4	18.1		19.1
Incremental Delay (d_2), s/veh	0.9	0.0			0.7	0.2		1.4	0.0	0.1		0.8
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	31.3	12.5			29.9	24.8		25.8	18.4	18.2		19.9
Level of Service (LOS)	C	B			C	C		C	B	B		B
Approach Delay, s/veh / LOS	28.9	C		28.9	C		25.0	C		19.8	B	
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.4	B	2.8	C
Bicycle LOS Score / LOS	1.4	A	1.1	A	1.4	A		F

Build with Development

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	RUDY LANE	File Name	2025 AM_SPUI_RUDY.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	153	10	50	30	60	133	50	715	15	83	1456	183

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.3	3.2	73.2	14.7	13.6	0.0	1	2	3	4	5	6	7	8
Yellow	4.0	0.0	4.0	4.0	4.0	0.0								
Red	1.0	0.0	1.0	1.0	1.0	0.0								

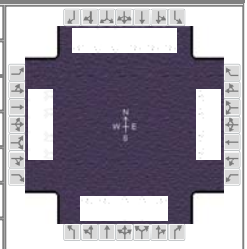
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		19.7		18.6	10.3	78.2	13.5	81.4
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.1	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		14.4		13.2	6.1		8.7	
Green Extension Time (g_e), s		0.4		0.4	0.1	0.0	0.1	0.0
Phase Call Probability		1.00		1.00	0.87		0.96	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	170	11	50		100	137	56	794	11	92	1618	192
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1814	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	12.4	0.7	3.8		6.8	11.2	4.1	16.6	0.4	6.7	45.8	7.5
Cycle Queue Clearance Time (g_c), s	12.4	0.7	3.8		6.8	11.2	4.1	16.6	0.4	6.7	45.8	7.5
Green Ratio (*g/C*)	0.11	0.11	0.11		0.10	0.10	0.04	0.56	0.56	0.07	0.59	0.59
Capacity (*c*), veh/h	199	209	177		189	163	72	1977	880	116	2064	919
Volume-to-Capacity Ratio (*X*)	0.855	0.053	0.283		0.528	0.838	0.773	0.402	0.013	0.798	0.784	0.209
Back of Queue (*Q*), ft/ln (95 th percentile)	241.8	14.8	68.4		142.5	204.5	88	271.2	6.6	142.2	634.8	120.5
Back of Queue (*Q*), veh/ln (95 th percentile)	9.4	0.6	2.7		5.6	8.0	3.4	10.6	0.3	5.6	24.8	4.7
Queue Storage Ratio (*RQ*) (95 th percentile)	1.86	0.00	0.53		0.00	0.00	0.52	0.00	0.09	0.68	0.00	0.75
Uniform Delay (d_1), s/veh	56.6	51.4	52.8		55.2	57.1	61.7	16.0	12.5	59.9	20.5	12.6
Incremental Delay (d_2), s/veh	4.0	0.0	0.3		0.9	4.3	6.4	0.6	0.0	4.7	3.1	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	60.7	51.5	53.1		56.0	61.5	68.2	16.7	12.5	64.6	23.5	13.1
Level of Service (LOS)	E	D	D		E	E	E	B	B	E	C	B
Approach Delay, s/veh / LOS	58.6	E		59.2	E		19.9	B		24.5	C	
Intersection Delay, s/veh / LOS	28.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.9	A	0.9	A	1.2	A	2.1	B

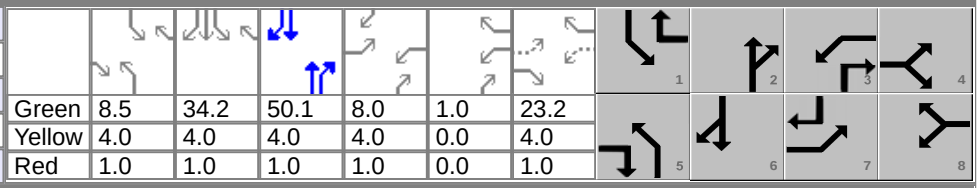
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	PALMER			Duration, h	0.25
Analyst	SDS	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	AM	PHF	0.90
Urban Street	US 42	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	I-264 SPUI	File Name	2025 AM_SPUI.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	301		340	440		500	130	381	480	1324	972	750

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.5	34.2	50.1	8.0	1.0	23.2
Yellow	4.0	4.0	4.0	4.0	0.0	4.0
Red	1.0	1.0	1.0	1.0	0.0	1.0

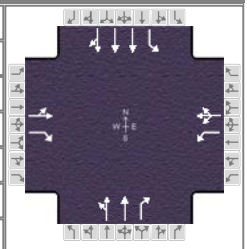
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	13.0	28.2	14.0	29.2	13.5	55.1	52.7	94.2
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.3	3.0	3.3	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s	10.0	20.7	11.0	21.6	8.3		43.3	
Green Extension Time (g_e), s	0.0	2.5	0.0	2.5	0.3	0.0	4.4	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	0.00	1.00	0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	334		378	489		556	144	423	89	1471	1080	233
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1383	1706		1383	1706	1756	1563	1706	1756	1563
Queue Service Time (g_s), s	8.0		18.7	9.0		19.6	6.3	13.7	5.5	41.3	27.0	9.3
Cycle Queue Clearance Time (g_c), s	8.0		18.7	9.0		19.6	6.3	13.7	5.5	41.3	27.0	9.3
Green Ratio (*g/C*)	0.21		0.21	0.21		0.48	0.06	0.33	0.39	0.32	0.59	0.65
Capacity (*c*), veh/h	692		586	733		1327	194	1173	616	1628	2090	1013
Volume-to-Capacity Ratio (*X*)	0.483		0.645	0.667		0.419	0.743	0.361	0.144	0.904	0.517	0.230
Back of Queue (*Q*), ft/ln (95 th percentile)	241.5		271.4	200.9		267.2	126.7	255.3	98.1	615.4	410	147.1
Back of Queue (*Q*), veh/ln (95 th percentile)	9.4		10.6	7.8		10.4	4.9	10.0	3.8	24.0	16.0	5.7
Queue Storage Ratio (*RQ*) (95 th percentile)	0.69		0.68	0.57		0.67	0.58	0.00	0.49	1.37	0.00	0.00
Uniform Delay (d_1), s/veh	52.7		54.0	54.6		25.4	69.6	37.8	29.2	49.0	17.8	10.9
Incremental Delay (d_2), s/veh	0.2		0.4	1.9		0.1	2.1	0.9	0.5	0.8	0.9	0.5
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	52.9		54.4	56.5		25.5	71.8	38.7	29.7	49.8	18.7	11.4
Level of Service (LOS)	D		D	E		C	E	D	C	D	B	B
Approach Delay, s/veh / LOS	53.7	D		40.0	D		44.8	D		34.5	C	
Intersection Delay, s/veh / LOS	39.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.7	D	4.0	D	3.3	C	2.9	C
Bicycle LOS Score / LOS		F		F	1.0	A	2.8	C

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	NORTHFIELD DRIVE	File Name	2025 AM_SPUI_NORTHFIELD.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	23	150	746	12	30	25	670	472	25	2120	10

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.0	53.0	5.0	47.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

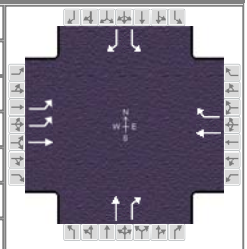
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		10.0		52.0		58.0	10.0	68.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		6.6		49.0			4.0	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.96		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		37	56	829	47		214	558	247	28	1579	788
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1817	1563	1757	1635		635	1679	1563	1757	1845	1840
Queue Service Time (g_s), s		2.6	4.6	47.0	2.4		11.0	38.3	14.4	2.0	50.1	50.2
Cycle Queue Clearance Time (g_c), s		2.6	4.6	47.0	2.4		51.2	38.3	14.4	2.0	50.1	50.2
Green Ratio (*g/C*)		0.04	0.04	0.36	0.36		0.41	0.41	0.41	0.04	0.48	0.48
Capacity (*c*), veh/h		70	60	635	591		290	684	637	68	1788	892
Volume-to-Capacity Ratio (*X*)		0.525	0.924	1.305	0.079		0.739	0.815	0.387	0.411	0.883	0.884
Back of Queue (*Q*), ft/ln (95 th percentile)		56.8	150.2	1707.2	43.3		241.8	603.3	240.2	41.8	773.2	814.9
Back of Queue (*Q*), veh/ln (95 th percentile)		2.2	5.9	66.7	1.7		9.4	23.6	9.4	1.6	30.2	31.8
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	1.14	0.13	0.00	0.00
Uniform Delay (d_1), s/veh		61.3	62.3	41.5	27.3		29.8	34.2	27.1	61.1	30.2	30.2
Incremental Delay (d_2), s/veh		3.5	87.8	148.5	0.0		15.5	10.3	1.8	1.5	6.7	12.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		64.8	150.1	190.0	27.3		45.3	44.5	28.8	62.5	36.9	42.6
Level of Service (LOS)		E	F	F	C		D	D	C	E	D	D
Approach Delay, s/veh / LOS	116.2	F		181.3	F		40.9	D		39.1	D	
Intersection Delay, s/veh / LOS	69.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	D	3.0	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	1.9	A	1.3	A	1.8	A

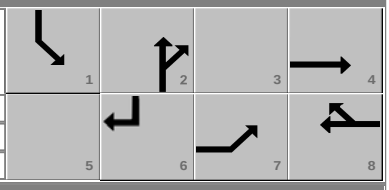
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	am	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 AM_SPUI_BROWNSBORO.xus		
Project Description	2025 AM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	340	115			188	59		380	106	81		700

Signal Information					EB			WB			NB		
Cycle, s	70.5	Reference Phase	2										
Offset, s	0	Reference Point	End	Green	4.9	28.1	10.5	7.0	0.0	0.0			
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.0	1.0	1.0	0.0	0.0			



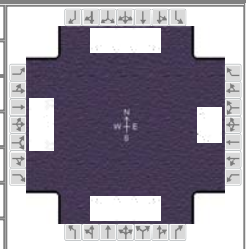
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4		8		2	1	6
Case Number	2.0	4.0		7.3		7.3	2.0	3.0
Phase Duration, s	15.5	27.5		12.0		33.1	9.9	43.0
Change Period, (*Y+R c*), s	5.0	5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.0		3.0		3.2	3.0	3.2
Queue Clearance Time (*g s*), s	9.5	5.6		9.0		14.7	5.6	34.4
Green Extension Time (*g e*), s	0.9	0.7		0.0		3.2	0.1	3.2
Phase Call Probability	1.00	1.00		1.00		1.00	0.83	1.00
Max Out Probability	0.00	0.00		1.00		0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	378	128			209	66		422	118	90		778
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706	1845			1845	1563		1845	1563	1757		1563
Queue Service Time (*g s*), s	7.5	3.6			7.0	2.8		12.7	3.5	3.6		32.4
Cycle Queue Clearance Time (*g c*), s	7.5	3.6			7.0	2.8		12.7	3.5	3.6		32.4
Green Ratio (*g/C*)	0.15	0.32			0.10	0.10		0.40	0.40	0.07		0.54
Capacity (*c*), veh/h	513	588			182	154		739	626	122		845
Volume-to-Capacity Ratio (*X*)	0.737	0.217			1.151	0.426		0.572	0.188	0.735		0.921
Back of Queue (*Q*), ft/ln (95 th percentile)	131.9	63			360.4	46.3		207.1	49	69.6		355.4
Back of Queue (*Q*), veh/ln (95 th percentile)	5.2	2.5			14.1	1.8		8.1	1.9	2.7		13.9
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.00		0.00
Uniform Delay (*d 1*), s/veh	28.9	17.7			32.1	30.2		16.6	13.8	32.4		14.9
Incremental Delay (*d 2*), s/veh	0.8	0.1			113.1	0.7		0.3	0.1	3.2		1.9
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	29.7	17.8			145.2	30.9		16.8	13.9	35.6		16.8
Level of Service (LOS)	C	B			F	C		B	B	D		B
Approach Delay, s/veh / LOS	26.7	C		117.9	F		16.2	B		18.8	B	
Intersection Delay, s/veh / LOS	32.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.3	B	2.4	B
Bicycle LOS Score / LOS	1.3	A	0.9	A	1.4	A		F

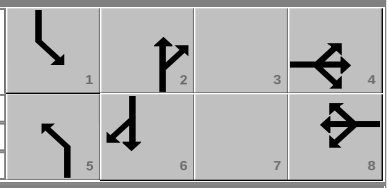
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	7/31/2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	RUDY LANE	File Name	2025 PM_SPUI_RUDY.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	254	25	75	55	80	254	75	806	75	180	840	280

Signal Information			
Cycle, s	130.0	Reference Phase	6
Offset, s	0	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	16.8	3.4	42.0	23.0	24.8	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	1.0	0.0	1.0	1.0	1.0	0.0

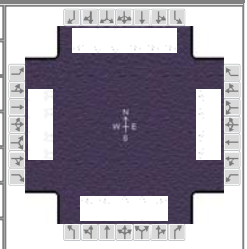
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		9.0		11.0	2.0	3.0	2.0	3.0
Phase Duration, s		28.0		29.8	25.3	50.4	21.8	47.0
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.1		3.2	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s		22.5		24.1	7.5		16.5	
Green Extension Time (g_e), s		0.5		0.7	0.1	0.0	0.3	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		0.04		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	282	28	78		150	271	83	896	78	200	933	300
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1757	1845	1563		1808	1563	1757	1756	1563	1757	1756	1563
Queue Service Time (g_s), s	20.5	1.6	5.6		9.5	22.1	5.5	28.9	4.4	14.5	31.8	20.9
Cycle Queue Clearance Time (g_c), s	20.5	1.6	5.6		9.5	22.1	5.5	28.9	4.4	14.5	31.8	20.9
Green Ratio (*g/C*)	0.18	0.18	0.18		0.19	0.19	0.16	0.35	0.35	0.13	0.32	0.32
Capacity (*c*), veh/h	310	326	276		345	298	274	1228	546	227	1135	505
Volume-to-Capacity Ratio (*X*)	0.910	0.085	0.282		0.435	0.910	0.305	0.729	0.142	0.880	0.822	0.594
Back of Queue (*Q*), ft/ln (95 th percentile)	399.6	34.2	99.4		194.7	372.1	118.6	472.6	78.9	275.3	525.7	338.7
Back of Queue (*Q*), veh/ln (95 th percentile)	15.6	1.3	3.9		7.6	14.5	4.6	18.5	3.1	10.8	20.5	13.2
Queue Storage Ratio (*RQ*) (95 th percentile)	3.07	0.00	0.76		0.00	0.00	0.70	0.00	1.05	1.31	0.00	2.12
Uniform Delay (d_1), s/veh	52.5	44.7	46.4		46.4	51.5	48.6	36.9	28.9	55.6	40.6	36.9
Incremental Delay (d_2), s/veh	17.9	0.0	0.2		0.3	12.9	2.9	3.8	0.5	4.3	6.8	5.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	70.4	44.8	46.6		46.8	64.4	51.5	40.7	29.5	59.9	47.3	41.9
Level of Service (LOS)	E	D	D		D	E	D	D	C	E	D	D
Approach Delay, s/veh / LOS	63.8	E		58.1	E		40.8	D		48.0	D	
Intersection Delay, s/veh / LOS	48.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.3	B	2.5	B
Bicycle LOS Score / LOS	1.1	A	1.2	A	1.4	A	1.7	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	PALMER			Duration, h	0.25
Analyst	SDS	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	PM	PHF	0.90
Urban Street	US 42	Analysis Year	2040	Analysis Period	1> 7:00
Intersection	I-264 SPUI	File Name	2025 PM_SPUI.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	782		240	350		700	125	849	320	955	675	333

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.3	21.7	47.8	12.0	3.9	31.3
Yellow	4.0	4.0	4.0	4.0	0.0	4.0
Red	1.0	1.0	1.0	1.0	0.0	1.0

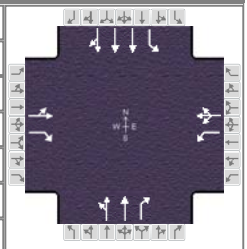
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	17.0	36.3	20.9	40.2	13.3	52.8	40.0	79.5
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.3	3.0	3.3	3.0	0.0	3.0	0.0
Queue Clearance Time (g_s), s	14.0	13.8	15.1	33.2	8.0		32.1	
Green Extension Time (g_e), s	0.0	3.0	0.8	2.0	0.3	0.0	2.9	0.0
Phase Call Probability	1.00	1.00	1.00	1.00	1.00		1.00	
Max Out Probability	1.00	0.00	0.00	0.31	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	869		267	389		778	139	943	67	1061	750	87
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706		1383	1706		1383	1706	1756	1563	1706	1756	1563
Queue Service Time (g_s), s	12.0		11.8	13.1		31.2	6.0	37.5	3.8	30.1	20.5	3.7
Cycle Queue Clearance Time (g_c), s	12.0		11.8	13.1		31.2	6.0	37.5	3.8	30.1	20.5	3.7
Green Ratio (*g/C*)	0.29		0.26	0.32		0.47	0.06	0.32	0.43	0.23	0.50	0.58
Capacity (*c*), veh/h	952		730	1041		1294	189	1120	664	1193	1745	902
Volume-to-Capacity Ratio (*X*)	0.913		0.365	0.374		0.601	0.736	0.842	0.100	0.890	0.430	0.096
Back of Queue (*Q*), ft/ln (95 th percentile)	451.6		184.9	237		393.5	122	614.4	67.9	476.9	339.3	61.8
Back of Queue (*Q*), veh/ln (95 th percentile)	17.6		7.2	9.3		15.4	4.8	24.0	2.7	18.6	13.3	2.4
Queue Storage Ratio (*RQ*) (95 th percentile)	1.29		0.46	0.68		0.98	0.55	0.00	0.34	1.06	0.00	0.00
Uniform Delay (d_1), s/veh	52.8		45.0	39.1		29.6	69.8	47.6	25.9	55.6	24.1	14.2
Incremental Delay (d_2), s/veh	12.6		0.1	0.1		0.4	2.1	7.7	0.3	1.0	0.8	0.2
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	65.4		45.1	39.2		30.0	71.9	55.3	26.2	56.6	24.9	14.4
Level of Service (LOS)	E		D	D		C	E	E	C	E	C	B
Approach Delay, s/veh / LOS	60.6	E		33.0	C		55.6	E		42.2	D	
Intersection Delay, s/veh / LOS	47.0						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	C	3.6	D	3.3	C	2.9	C
Bicycle LOS Score / LOS		F		F	1.4	A	2.1	B

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	US 42	Analysis Year	2013	Analysis Period	1> 16:00
Intersection	NORTHFIELD DRIVE	File Name	2025 PM_SPUI_NORTHFIELD.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	29	25	768	20	35	10	1720	586	15	1170	20

Signal Information			
Cycle, s	150.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	3.4	67.6	3.0	56.0	0.0	0.0	5	6	7	8
Yellow	4.0	4.0	4.0	4.0	0.0	0.0				
Red	1.0	1.0	1.0	1.0	0.0	0.0				

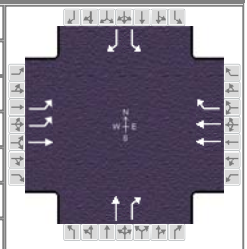
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8		2	1	6
Case Number		11.0		10.0		7.3	2.0	4.0
Phase Duration, s		8.0		61.0		72.6	8.4	81.0
Change Period, ($Y+R_c$), s		5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.0		3.0		0.0	3.0	0.0
Queue Clearance Time (g_s), s		5.0		58.0			3.4	
Green Extension Time (g_e), s		0.0		0.0		0.0	0.0	0.0
Phase Call Probability		0.93		1.00			1.00	
Max Out Probability		1.00		1.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		54	11	853	61		1007	916	301	17	884	438
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1808	1563	1757	1655		1815	1679	1563	1757	1845	1828
Queue Service Time (g_s), s		3.0	1.1	56.0	3.6		28.9	67.6	19.7	1.4	23.3	23.3
Cycle Queue Clearance Time (g_c), s		3.0	1.1	56.0	3.6		67.6	67.6	19.7	1.4	23.3	23.3
Green Ratio (*g/C*)		0.02	0.02	0.37	0.37		0.45	0.45	0.45	0.02	0.51	0.51
Capacity (*c*), veh/h		36	31	656	618		842	756	704	40	1869	926
Volume-to-Capacity Ratio (*X*)		1.506	0.355	1.301	0.099		1.195	1.211	0.427	0.418	0.473	0.473
Back of Queue (*Q*), ft/ln (95 th percentile)		216	20.2	1868.2	66.1		1908.7	1774.7	309.9	30.1	391.9	395.8
Back of Queue (*Q*), veh/ln (95 th percentile)		8.4	0.8	73.0	2.6		74.6	69.3	12.1	1.2	15.3	15.5
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00	0.00	1.48	0.09	0.00	0.00
Uniform Delay (d_1), s/veh		73.5	72.5	47.0	30.6		41.9	41.2	28.0	72.3	24.0	24.0
Incremental Delay (d_2), s/veh		329.9	2.5	146.4	0.0		99.4	106.9	1.9	2.6	0.9	1.7
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		403.4	75.1	193.4	30.6		141.2	148.1	29.9	74.9	24.9	25.7
Level of Service (LOS)		F	E	F	C		F	F	C	E	C	C
Approach Delay, s/veh / LOS	347.7	F		182.6	F		129.0	F		25.8	C	
Intersection Delay, s/veh / LOS	112.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.6	D	3.0	C	2.3	B	2.3	B
Bicycle LOS Score / LOS	0.6	A	2.0	A	2.3	B	1.2	A

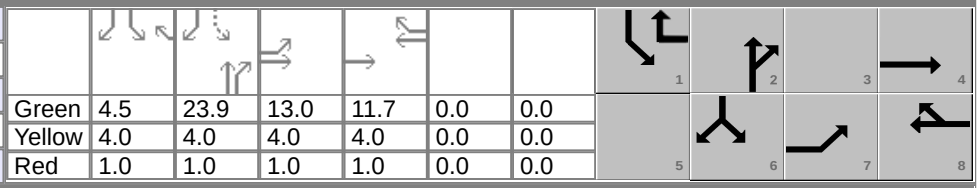
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	palmer			Duration, h	0.25
Analyst	sds	Analysis Date	Oct 10, 2013	Area Type	Other
Jurisdiction		Time Period	pm	PHF	0.90
Urban Street	SLIP RAMP	Analysis Year	2013	Analysis Period	1> 7:00
Intersection	BROWNSBORO ROAD	File Name	2025 PM_SPUI_BROWNSBORO.xus		
Project Description	2025 PM SPUI				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	430	180			368	95		460	150	99		475

Signal Information			
Cycle, s	73.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



	EB			WB			NB			SB		
Green	4.5	23.9		13.0	11.7	0.0	0.0					
Yellow	4.0	4.0		4.0	4.0	0.0	0.0					
Red	1.0	1.0		1.0	1.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4		8		2	1	6
Case Number	2.0	4.0		7.3		7.3	1.0	3.0
Phase Duration, s	18.0	34.7		16.7		28.9	9.5	38.4
Change Period, ($Y+R_c$), s	5.0	5.0		5.0		5.0	5.0	5.0
Max Allow Headway (*MAH*), s	3.0	3.0		3.0		3.1	3.0	3.1
Queue Clearance Time (g_s), s	11.9	7.3		10.2		21.0	4.9	22.4
Green Extension Time (g_e), s	0.9	1.4		1.4		2.6	0.1	2.6
Phase Call Probability	1.00	1.00		1.00		1.00	0.90	1.00
Max Out Probability	0.00	0.00		0.00		0.00	0.06	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4			8	18		2	12	1		16
Adjusted Flow Rate (*v*), veh/h	478	200			409	106		511	167	110		528
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1706	1845			1756	1563		1845	1563	1757		1563
Queue Service Time (g_s), s	9.9	5.3			8.2	4.2		19.0	5.9	2.9		20.4
Cycle Queue Clearance Time (g_c), s	9.9	5.3			8.2	4.2		19.0	5.9	2.9		20.4
Green Ratio (*g/C*)	0.18	0.41			0.16	0.22		0.33	0.33	0.42		0.46
Capacity (*c*), veh/h	608	750			565	348		605	513	268		715
Volume-to-Capacity Ratio (*X*)	0.786	0.267			0.724	0.303		0.844	0.325	0.410		0.738
Back of Queue (*Q*), ft/ln (95 th percentile)	173.7	89.5			147.9	65.3		305	88.6	46.5		260.8
Back of Queue (*Q*), veh/ln (95 th percentile)	6.8	3.5			5.8	2.5		11.9	3.5	1.8		10.2
Queue Storage Ratio (*RQ*) (95 th percentile)	0.00	0.00			0.00	0.00		0.00	0.00	0.15		0.00
Uniform Delay (d_1), s/veh	29.0	14.6			29.4	23.9		23.0	18.6	16.8		16.4
Incremental Delay (d_2), s/veh	0.9	0.1			0.7	0.2		1.3	0.1	0.4		0.6
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0		0.0	0.0	0.0		0.0
Control Delay (*d*), s/veh	29.8	14.6			30.1	24.1		24.3	18.8	17.2		17.0
Level of Service (LOS)	C	B			C	C		C	B	B		B
Approach Delay, s/veh / LOS	25.4	C		28.8	C		22.9	C		17.0	B	
Intersection Delay, s/veh / LOS	23.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.7	A	2.7	B	2.4	B	2.8	C
Bicycle LOS Score / LOS	1.6	A	0.9	A	1.6	A		F

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