Appendix E:
Emission Reduction Calculations

Emission Reduction Based on Mode Shift

Methods to Find the Cost-Effectiveness of Funding Air Quality Projects

For Evaluating
Motor Vehicle Registration Fee Projects
and
Congestion Mitigation and
Air Quality Improvement (CMAQ) Projects

May 2005

California Environmental Protection Agency

Air Resources Board

Caltrans

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The methods handbook was initially prepared by the California Air Resources Board (ARB) in cooperation with the California Department of Transportation (Caltrans) and the California Air Pollution Control Officers Association (CAPCOA). Updates have been prepared by Air Resources Board staff. The principal author is Pam Burmich, Air Pollution Specialist. Current ARB staff contact is Jeff Weir, (916) 445-0098, jweir@arb.ca.gov.

***FOR COPIES** of this handbook, see the ARB or Caltrans websites at www.arb.ca.gov/planning/tsaq/eval/eval.htm or www.dot.ca.gov/hq/transprog/reports/Official_CMAQ_Web_Page.htm, or call the ARB's Transportation Strategies Group at (916) 322-0285. The handbook is also available as a Microsoft Access file that allows the user to enter the appropriate inputs and calculates emission reductions and cost-effectiveness automatically.*

The primary changes in this edition of the handbook are the updating of emission factors and example calculations using ARB's motor vehicle emissions model, EMFAC2002.

Methods to Find the Cost-Effectiveness of Funding Air Quality Projects

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Methods to Find the Cost-Effectiveness of Funding Air Quality Projects

Introduction

Millions of dollars are provided each year to regional and local jurisdictions to help fund projects that reduce emissions from motor vehicles and assist the implementation of transportation measures in regional clean air plans. Two major sources of this funding are the California Motor Vehicle Registration Fee (MV Fees) Program and the federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program.

To ensure that public health benefits are maximized, it is important that projects funded be the most cost-effective at reducing emissions. To achieve this goal, cost-effectiveness evaluations should be used to prioritize projects before final funding decisions are made.

The cost-effectiveness of an air quality project is based on the amount of pollution it eliminates for each dollar spent. This document is a "methods handbook" to help estimate the cost-effectiveness of some of the most widely implemented transportation-related air quality projects:

Cleaner off-road vehicles
Cleaner on-road vehicles
New bus service
Vanpools and shuttles
Cleaner street sweepers
Signal coordination
Bicycle facilities
Telecommuting programs
Ridesharing and pedestrian facilities

For each project type, the methods handbook includes:

- A list of the information needed to evaluate cost-effectiveness.
- "Defaults" that may be used when data are not available.
- Formulas to calculate vehicle emission reductions for three major pollutants:

  Reactive organic gases (ROG)
  Nitrogen oxides (NOx)
  Particulate Matter (PM10)

  Emission factor tables are included for various vehicle and project types.

- Formula to calculate cost-effectiveness
- Sample evaluation to aid in using the method

Cost-Effectiveness

Cost-effectiveness for MV Fees and CMAQ projects should be expressed as dollars spent per pound of pollutant reduced (ROG + NOx + PM10). Cost-effectiveness is typically based on total project costs, including capital investments and operating costs. However, for the purposes of this document, cost-effectiveness is based on clean air funding dollars. Project funding generally covers only the incremental additional costs of a cleaner engine or vehicle.

The funding dollars are amortized over the expected project life using a discount rate. The amortization formula yields a capital recovery factor, which, when multiplied by the funding, gives the annual funding for the project over its expected lifetime. The discount rate reflects the opportunity cost of public funds for the clean air programs. This is the level of earning that could be reasonably expected by investing public funds in various financial instruments, such as U.S. Treasury securities. Cost-effectiveness is determined by dividing annualized funds by annual emission reductions (ROG + NOx + PM10).

The following table gives capital recovery factors that may be used to annualize funding dollars according to project life. The capital recovery factors below are calculated to two decimal places using a discount rate of 3 percent.

Project Life	**Capital Recovery Factor for discount rate of 3%**
1 year	1.03
3 years	0.35
5 years	0.22
7 years	0.16
10 years	0.12
12 years	0.10
15 years	0.08
20 years	0.07

Defaults

The methods in this handbook call for monitored data and information inputs that may not be readily available. Defaults are provided for each method based on local and national travel surveys, surveys conducted by local air districts, research projects funded by the Air Resources Board (ARB) and air districts, and ARB guidance documents. Local data should be used in place of defaults when data are available. Emission factors are based on certification testing and ARB's statewide mobile source inventory.

Federal CMAQ Reporting Requirements

Carbon monoxide. Federal Highway Administration (FHWA) requests that CO emission reductions be reported for CMAQ projects. California's MV Fee Program does not request CO information. CO is a localized pollutant and not a regional pollution problem. Most projects using CMAQ and MV Fee dollars are funded primarily to reduce regional ozone and PM10 and have little impact on localized CO hot spots.

Signal coordination projects, however, may be targeted at specific CO hot spots in CO nonattainment areas. CO emission factors are included in this edition in order to report to FHWA on these types of CMAQ projects. Reporting CO emission reductions should be limited to targeted projects located in CO nonattainment or maintenance areas.

In addition, CO emissions are several orders of magnitude larger than ozone precursors. CO overwhelms cost-effectiveness ratios unless CO emission reductions are scaled back significantly, typically by a factor of seven. This adjustment should be made when using cost-effectiveness ratios as a basis for funding decisions. Another option is to consider CO projects separately from ozone precursor projects.

Kilograms. FHWA requests that emission reductions from CMAQ projects be reported in kilograms per day. The methods handbook therefore includes formulas to convert pounds per year of emission reductions to kilograms per day.

Infrastructure Projects

Supporting infrastructure may be necessary for some kinds of emission reducing projects to be successful. Examples of infrastructure projects are alternative-fueled vehicle refueling stations, electric vehicle recharging facilities, public education programs, multi-modal transit infrastructure projects, and automated transit schedule information. Because infrastructure projects are difficult to evaluate for cost-effectiveness, they are not included in this handbook. However, they should be evaluated with respect to their consistency with clean air plans. Funding priorities can be structured to include supporting projects.

Mobile Source Emission Reduction Credits

The methods handbook should not be used to determine mobile source credits which can be sold or traded. For procedures on how to generate these credits, please refer to the Air Resources Board document, Mobile Source Emission Reduction Credits Guidelines.

Air Resources Board regulations require new motor vehicles (including transit buses) to meet progressively more stringent emission standards. Emission reductions associated with the natural replacement of older vehicles with newer, cleaner models are included in motor vehicle emission inventories in clean air plans, and thus are not surplus emission reductions.

Contact

If you have any questions about the methods handbook, air quality cost-effectiveness analysis of transportation-related projects, or the evaluation of future-year projects for which the emission factor tables may not be best suited, please contact Jeff Weir, Transportation Strategies Group, Air Resources Board, at (916) 445-0098 or jweir@arb.ca.gov.

Bicycle Facilities

Project definition: Bicycle paths (Class 1) or bicycle lanes (Class 2) that are targeted to reduce commute and other non-recreational auto travel. Class 1 facilities are paths that are physically separated from motor vehicle traffic. Class 2 facilities are striped bicycle lanes giving preferential or exclusive use to bicycles. Bike lanes should meet Caltrans' full-width standard depending on street facility type.

How emissions are reduced: Emission reductions result from the decrease in emissions associated with auto trips replaced by bicycle trips for commute or other non-recreational purposes.

Need to know:

Funding dollars
Number of operating days per year
Average length of bicycle trips
Average daily traffic volume on roadway parallel to bicycle project
City population
Project class (1 or 2)
Types of activity centers in the vicinity of the bicycle project
Length of bicycle path or lane

Inputs	Default	Units	Comments
Funding Dollars (**Funding**)		Dollars	
Effectiveness Period (**Life**)	15	Years	Class 1 projects - 20 years Class 2 projects - 15 years
Days (**D**)	200	Days of use/year	Consider local climate in number of days used.
Average Length (**L**) of bicycle trips	1.8	Miles per trip in one direction	Default is based on the National Personal Transportation Survey
Annual Average Daily Traffic (**ADT**)		Trips per day	Two-direction traffic volumes on roadway parallel to bike project. MAXIMUM IS 30,000.
Adjustment (**A**) on ADT for auto trips replaced by bike trips from the bike facility.	.0020		See Adjustment Factors table on the next page. Adjustments are based on facility class, ADT, project length, and community characteristics.
Credit (**C**) for Activity Centers near the project.	.0005		See Activity Centers table on the next page.

ADJUSTMENT FACTORS				
BIKE FACILITY CLASS	**AVERAGE DAILY TRAFFIC (ADT)**	**LENGTH OF BIKE PROJECT (one direction)**	**ADJUSTMENT FACTORS FOR CITIES WITH POP. ≥ 250,000 and non-university towns < 250,000**	**ADJUSTMENT FACTORS FOR UNIVERSITY TOWNS WITH POP. < 250,000**
Class 1 (bike path) & Class 2 (bike lane)	ADT ≤ 12,000 vehicles per day	≤ 1 mile	.0019	.0104
		>1 & ≤ 2 miles	.0029	.0155
		> 2 miles	.0038	.0207
Class 1 (bike path) & Class 2 (bike lane)	12,000< ADT ≤24,000 vehicles per day	≤ 1 mile	.0014	.0073
		>1 & ≤ 2 miles	.0020	.0109
		> 2 miles	.0027	.0145
Class 2 bike lane	24,000< ADT ≤30,000 vehicles per day Maximum is 30,000	≤ 1 mile	.0010	.0052
		>1 & ≤ 2 miles	.0014	.0078
		> 2 miles	.0019	.0104

When evaluating the impact of a new bike project, it is important to consider the location of the bike facility. What types of destinations are accessible from the project? How many of these activity centers are within one-half mile of the facility? How many are within a quarter of a mile? Examine the activity centers in the vicinity of the project and compare them to the list below. Select the credit factor that corresponds to the number of activity centers in the surrounding area.

ACTIVITY CENTERS CREDITS		
Types of Activity Centers: *Bank, church, hospital or HMO, light rail station (park & ride), office park, post office, public library, shopping area or grocery store, university or junior college.*		
Count your activity centers. If there are…	**Credit (C) Within 1/2 mile**	**Credit (C) Within 1/4 mile**
Three (3)	.0005	.001
More than 3 but less than 7	.001	.002
7 or more	.0015	.003

Emission Factor Inputs for Auto Travel

	Default	**Units**	**Default**	**Units**
	Auto Trip End Factor		**Auto VMT Factor**	
ROG Factor	1.020	grams/trip	0.266	grams/mile
NOx Factor	0.458	"	0.319	"
PM10 Factor	0.016	"	0.219	"

For average auto emission factors, see Table 3. Use factors that correspond to the life of the project: 11-15 year factors for Class 2 facilities and 16-20 year factors for Class 1 facilities. Defaults are for a project life of 15 years.

Formulas **Units**

Annual Auto Trip Reduced = (D) * (ADT) * (A + C) trips/year

Annual Auto VMT Reduced = (Auto Trips) * (L) miles/year

Annual Emission Reductions (ROG, NOx, and PM10) = lbs./year

[(Annual Auto Trips Reduced)*(Auto Trip End Factor)
+ (Annual Auto VMT Reduced)*(Auto VMT Factor)]/454

Capital Recovery Factor (CRF) = $\frac{(1 + i)^n (i)}{(1 + i)^n - 1}$

where: i = discount rate (Assume 3 percent)
n = project life

Cost-Effectiveness of
Funding Dollars = (CRF * Funding) / (ROG + NOx + PM10) dollars/lb.

Note: The Federal Highway Administration requests that emission reductions from CMAQ projects be reported as kilograms/day. The conversion is
(lbs. per year) / [(2.2) (365)] = kilograms/day*

Documentation: Adjustment factors were derived from a limited set of bicycle commute mode split data for cities and university towns in the southern and western United States (Source: FHWA National Bicycling And Walking Study, 1992). This data was then averaged and multiplied by 0.7 to estimate potential auto travel diverted to bikes. On average, about 70% of all person trips are taken by auto driving (Source: 2000-01 Statewide Travel Survey), and it is these trips that can be considered as possible auto trips reduced. Finally, this number was multiplied by 0.65 to estimate the growth in bicycle trips from construction of the bike facility. Sixty-five percent represents the average growth in bike trips from a new bike facility as observed in before and after data for bike projects in U.S. DOT's "A Compendium of Available Bicycle and Pedestrian Trip Generation Data in the United States." Benefits are scaled to reflect differences in project structure, length, traffic intensity, community size, and proximity of activity centers. The scale has been adapted from a method developed by Dave Burch of the Bay Area Air Quality Management District (BAAQMD).

Note 1: Because ADT represents vehicles passing a single point, it may neglect vehicles that travel only a short distance on the corridor and, as a result, underestimate total vehicle trips. Therefore, the number of vehicles diverted to bicycles may be underestimated in this method. If actual vehicle trips in the corridor are known, this number should be used in place of ADT.

Note 2: Bicycle usage data is limited. From the data currently available, a positive correlation has been observed between the percentage of an area's arterials that have full width bike lanes, and the percentage of commuters who bike to work. Simply put, more bike lanes are associated with more bike commuting. More specifically, for an area with a given ratio of bike lanes to arterials, we observe that roughly one-fourth of that ratio is equal to the percentage of commuters that bike to work. More research and data are needed to confirm this relationship and to clarify the causes of this positive correlation.

Class 2 Bikeway Facility

The new Class 2 bike lanes are a critical link in the city bike system, allowing residents bicycle access to education, employment, shopping, and transit. Within one-quarter mile of the project, there is a college, a shopping center, a light rail station, and an office building. The project includes installation of new pavement, signage, and Class 2 bike lane striping along both sides of 1.13 miles of arterials. This is primarily a college town, with a population of 128,000.

Inputs to Calculate Cost-Effectiveness:

Funding Dollars **(Funding)**: $40,000
Effectiveness Period **(Life)**: 15 years
Days **(D)**: 200
Average Length **(L)** of bicycle trips: 1.8 miles
Annual Average Daily Traffic **(ADT)**: 20,000
Adjustment **(A)** on ADT for auto trips replaced by bike trips from the bike facility: 0.0109
Credit **(C)** for Activity Centers near the project: 0.002

Emissions Factors (From Table 3, for a 15-year Life):

	Auto Trip End Factor	Auto VMT Factor
ROG Factor	1.020 grams/trip	0.266 grams/ mile
NOx Factor	0.458	0.319
PM10 Factor	0.016	0.219

Calculations:

Annual Auto Trip Reduced = (D) * (ADT) * (A + C)
= (200) * (20,000) * (0.0109 + 0.002)
= 51,600

Annual Auto VMT Reduced = (Auto Trips) * (L)
= (51,600) * (1.8)
= 92,880

Annual Emission Reductions (ROG, NOx and PM10) in lbs. per year

= [(Annual Auto Trips Reduced) * (Auto Trips End Factor)
+ (Annual Auto VMT Reduced) * (Auto VMT Factor)] /454

ROG: [(51,600 * 1.020) + (92,880 * 0.266)]/454 = **170 lbs. per year**

NOx: [(51,600 * 0.458) + (92,880 * 0.319)]/454 = **117 lbs. per year**

PM10: [(51,600 * 0.016) + (92,880 * 0.219)]/454 = **47 lbs. per year**

Bicycle Facilities, Continued . . . ***EXAMPLE***

Capital Recovery Factor (CRF): $\frac{(1 + i)^n(i)}{(1 + i)^n - 1}$ = **0.08** *Where n = project life (15 years)*
(From Table 8) *and i = discount rate (3%)*

Cost-Effectiveness of Funding Dollars: (CRF * Funding) / (ROG + NOx + PM10)
=[.08 *40,000] / [334]
= **$9.58 per lb.**

FOR CMAQ PROJECTS ONLY:
Once emissions reductions have been calculated, add them together (170 + 117 + 47 = 334) and convert lbs. of emissions reductions per year to kg/day:

$$\frac{\text{lbs. reduced per year}}{\text{2.2 lbs./kg * 365 days/year}} = \frac{334}{2.2 * 365} = \textbf{1 kg/day}$$

*Weighted average ADT of the corridor based on length

Home Road Corridor

Segment	2040 Volume*	Length**	
Limestone to Grube	13,200	470	
Grube to N. High School Place	14,300	1830	
N. High School Place to Northmoor	15,700	1340	
Northmoor to Derr	15,300	1210	
Derr to Belmont	12,100	2800	
Belmont to Mechanicsburg	6,800	3210	
		10860	2.06 miles
Average ADT	11,800		

*If ADT differed between intersections, assumed higher of the two volumes
**Length (in feet) from Synchro Network, rounded to nearest 10 feet

Derr Road Corridor

Segment	2040 Volume*	Length**	
Home to Providence	10,700	3620	
Providence to Northland Plaza	10,800	970	
Northland Plaza to Villa	8,200	710	
		5300	1.00 miles
Average ADT	10,400		

*If ADT differed between intersections, assumed higher of the two volumes
**Length (in feet) from Synchro Network, rounded to nearest 10 feet

Home Road Corridor - West of Derr

Segment	2040 Volume*	Length**	
Limestone to Grube	13,200	470	
Grube to N. High School Place	14,300	1830	
N. High School Place to Northmoor	15,700	1340	
Northmoor to Derr	15,300	1210	
		4850	0.92 miles
Average ADT	14,800		

*If ADT differed between intersections, assumed higher of the two volumes
**Length (in feet) from Synchro Network, rounded to nearest 10 feet

Home Road Corridor - East of Derr

Segment	2040 Volume*	Length**	
Derr to Belmont	12,100	2800	
Belmont to Mechanicsburg	6,800	3210	
		6010	
Average ADT	9,300		

*If ADT differed between intersections, assumed higher of the two volumes
**Length (in feet) from Synchro Network, rounded to nearest 10 feet

1.14 miles

Adjustment Factors

Bike Facility Class	Average Daily Traffic (ADT)	Length of Bike Project (one direction)	Adjustment Factors for Cities with Pop. ≥ 250,000 and non-university towns < 250,000	Adjustment Factors for University Towns with Pop. < 250,000
Class 1 (bike path) & Class 2 (bike lane)	ADT ≤ 12,000 vpd	≤ 1 mile	0.0019	0.0104
		> 1 mile & ≤ 2 miles	0.0029	0.0155
		> 2 miles	0.0038	0.0207

Derr Road & Home Road East
Home Road West
Home Road Total

Based on *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects, May 2005*

Activity Centers Credits		
Types of Activity Centers: Bank, church, hospital or HMO, light rail station (park & ride), office park, post office, public library, shopping area or grocery store, university or junior college.		
Number of Activity Centers	**Credit**	
	Within 1/2 mile	**Within 1/4 mile**
Three	0.0005	0.001
More than 3 but less than 7	0.001	0.002
Seven or more	0.0015	0.003

Based on *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects, May 2005*

Emission Factor Inputs for Auto Travel

11 - 15 Years (Class 2 Facilities - Bike Lanes)				
	Auto Trip End Factor*		**Auto VMT Factor**	
	Default	**Units**	**Default**	**Units**
ROG Factor	0.399	grams/trip end	0.132	grams/mile
NOX Factor	0.189	grams/trip end	0.146	grams/mile
PM2.5 Factor	0.003	grams/trip end	0.087	grams/mile
16 - 20 Years (Class 1 Facilities - Bike Paths)				
	Auto Trip End Factor*		**Auto VMT Factor**	
	Default	**Units**	**Default**	**Units**
ROG Factor	0.353	grams/trip end	0.119	grams/mile
NOX Factor	0.162	grams/trip end	0.130	grams/mile
PM2.5 Factor	0.004	grams/trip end	0.087	grams/mile

Based on *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects* , Emission Factor Tables (Table 3), May 2013

* Average Trip Ends

Home Road Total

Inputs	Default	Project Specific	Units	Comments
Days (D)	200	200	Days of use/year	Consider local climate in number of days used
Average Length (L) of bicycle trips	1.8	1.8	Miles per trip in one direction	Default is based on the National Personal Transportation Survey
Annual Average Daily Traffic (ADT)		11,800	Trips per day	Two-direction traffic volumes on roadway parallel to bike project
Adjustment (A) on ADT for auto trips replaced by bike trips from the bike facility	0.0020	0.0038		See Adjustment Factors table. Adjustments are based on facility class, ADT, projected length, and community characteristics.
Credit (C) for Activity Centers near the project	0.0005	0.002		See Activity Centers table

Calculations

Annual Auto Trip Reduced = D x ADT x (A + C)

Annual Auto Trip Reduced = 13,688

Annual Auto VMT Reduced = (Auto Trips) x L

Annual Auto VMT Reduced = 24,638

Annual Emission Reductions = [(Annual Auto Trips Reduced) x (Auto Trip End Factor) + (Annual Auto VMT Reduced) x (Auto VMT Factor)]/454

Bike Lane

Annual Emission Reductions (ROG) =	19.19	lbs/year	
	0.024	kg/day	8.72 kg/year
Annual Emission Reductions (NOx) =	13.62	lbs/year	
	0.017	kg/day	6.19 kg/year
Annual Emission Reductions (PM 2.5) =	4.81	lbs/year	
	0.006	kg/day	2.19 kg/year

Bike Path

Annual Emission Reductions (ROG) =	17.10	lbs/year	
	0.021	kg/day	7.77 kg/year
Annual Emission Reductions (NOx) =	11.94	lbs/year	
	0.015	kg/day	5.43 kg/year
Annual Emission Reductions (PM 2.5) =	4.84	lbs/year	
	0.006	kg/day	2.20 kg/year

Home Road West

Inputs	Default	Project Specific	Units	Comments
Days (D)	200	200	Days of use/year	Consider local climate in number of days used
Average Length (L) of bicycle trips	1.8	1.8	Miles per trip in one direction	Default is based on the National Personal Transportation Survey
Annual Average Daily Traffic (ADT)		14,800	Trips per day	Two-direction traffic volumes on roadway parallel to bike project
Adjustment (A) on ADT for auto trips replaced by bike trips from the bike facility	0.0020	0.0019		See Adjustment Factors table. Adjustments are based on facility class, ADT, projected length, and community characteristics.
Credit (C) for Activity Centers near the project	0.0005	0.003		See Activity Centers table

Calculations

Annual Auto Trip Reduced = D x ADT x (A + C)

Annual Auto Trip Reduced = 14,504

Annual Auto VMT Reduced = (Auto Trips) x L

Annual Auto VMT Reduced = 26,107

Annual Emission Reductions = [(Annual Auto Trips Reduced) x (Auto Trip End Factor) + (Annual Auto VMT Reduced) x (Auto VMT Factor)]/454

Bike Lane

Annual Emission Reductions (ROG) =	20.34	lbs/year	
	0.025	kg/day	9.24 kg/year
Annual Emission Reductions (NOx) =	14.43	lbs/year	
	0.018	kg/day	6.56 kg/year
Annual Emission Reductions (PM 2.5) =	5.10	lbs/year	
	0.006	kg/day	2.32 kg/year

Bike Path

Annual Emission Reductions (ROG) =	18.12	lbs/year	
	0.023	kg/day	8.24 kg/year
Annual Emission Reductions (NOx) =	12.65	lbs/year	
	0.016	kg/day	5.75 kg/year
Annual Emission Reductions (PM 2.5) =	5.13	lbs/year	
	0.006	kg/day	2.33 kg/year

Home Road East

Inputs	Default	Project Specific	Units	Comments
Days (D)	200	200	Days of use/year	Consider local climate in number of days used
Average Length (L) of bicycle trips	1.8	1.8	Miles per trip in one direction	Default is based on the National Personal Transportation Survey
Annual Average Daily Traffic (ADT)		9,300	Trips per day	Two-direction traffic volumes on roadway parallel to bike project
Adjustment (A) on ADT for auto trips replaced by bike trips from the bike facility	0.0020	0.0029		See Adjustment Factors table. Adjustments are based on facility class, ADT, projected length, and community characteristics.
Credit (C) for Activity Centers near the project	0.0005	0.0005		See Activity Centers table

Calculations

Annual Auto Trip Reduced = D x ADT x (A + C)

Annual Auto Trip Reduced = 6,324

Annual Auto VMT Reduced = (Auto Trips) x L

Annual Auto VMT Reduced = 11,383

Annual Emission Reductions = [(Annual Auto Trips Reduced) x (Auto Trip End Factor) + (Annual Auto VMT Reduced) x (Auto VMT Factor)]/454

Bike Lane

Annual Emission Reductions (ROG) =	8.87	lbs/year	
	0.011	kg/day	4.03 kg/year
Annual Emission Reductions (NOx) =	6.29	lbs/year	
	0.008	kg/day	2.86 kg/year
Annual Emission Reductions (PM 2.5) =	2.22	lbs/year	
	0.003	kg/day	1.01 kg/year

Bike Path

Annual Emission Reductions (ROG) =	7.90	lbs/year	
	0.010	kg/day	3.59 kg/year
Annual Emission Reductions (NOx) =	5.52	lbs/year	
	0.007	kg/day	2.51 kg/year
Annual Emission Reductions (PM 2.5) =	2.24	lbs/year	
	0.003	kg/day	1.02 kg/year

Derr Road

Inputs	Default	Project Specific	Units	Comments
Days (D)	200	200	Days of use/year	Consider local climate in number of days used
Average Length (L) of bicycle trips	1.8	1.8	Miles per trip in one direction	Default is based on the National Personal Transportation Survey
Annual Average Daily Traffic (ADT)		10,400	Trips per day	Two-direction traffic volumes on roadway parallel to bike project
Adjustment (A) on ADT for auto trips replaced by bike trips from the bike facility	0.0020	0.0019		See Adjustment Factors table. Adjustments are based on facility class, ADT, projected length, and community characteristics.
Credit (C) for Activity Centers near the project	0.0005	0.002		See Activity Centers table

Calculations

Annual Auto Trip Reduced = D x ADT x (A + C)

Annual Auto Trip Reduced = 8,112

Annual Auto VMT Reduced = (Auto Trips) x L

Annual Auto VMT Reduced = 14,602

Annual Emission Reductions = [(Annual Auto Trips Reduced) x (Auto Trip End Factor) + (Annual Auto VMT Reduced) x (Auto VMT Factor)]/454

Bike Lane

Annual Emission Reductions (ROG) =	11.37	lbs/year	
	0.014	kg/day	5.17 kg/year
Annual Emission Reductions (NOx) =	8.07	lbs/year	
	0.010	kg/day	3.67 kg/year
Annual Emission Reductions (PM 2.5) =	2.85	lbs/year	
	0.004	kg/day	1.30 kg/year

Bike Path

Annual Emission Reductions (ROG) =	10.13	lbs/year	
	0.013	kg/day	4.61 kg/year
Annual Emission Reductions (NOx) =	7.08	lbs/year	
	0.009	kg/day	3.22 kg/year
Annual Emission Reductions (PM 2.5) =	2.87	lbs/year	
	0.004	kg/day	1.30 kg/year

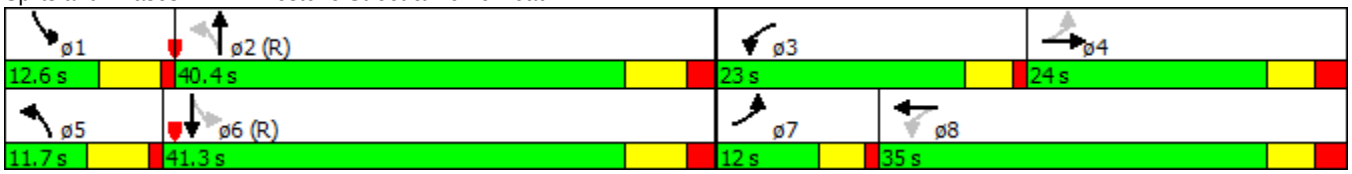
Emission Reduction Based on Arterial Delay

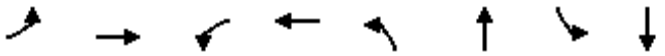
2040 Build Conditions – With Volume Reductions
AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	199	10	279	249	70	20	249	119	109	557	279
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.993			0.967			0.952			0.950	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1850	0	1787	1819	0	1703	3242	0	1770	3362	0
Flt Permitted	0.468			0.300			0.235			0.437		
Satd. Flow (perm)	872	1850	0	564	1819	0	421	3242	0	814	3362	0
Satd. Flow (RTOR)		2			14			85			95	
Adj. Flow (vph)	129	216	11	303	271	76	22	271	129	118	605	303
Lane Group Flow (vph)	129	227	0	303	347	0	22	400	0	118	908	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	12.0	24.0		23.0	35.0		11.7	40.4		12.6	41.3	
Total Lost Time (s)	4.5	6.1		4.5	6.1		5.6	6.8		5.6	6.8	
Act Effct Green (s)	25.1	16.0		38.8	25.3		44.3	37.0		49.2	45.2	
Actuated g/C Ratio	0.25	0.16		0.39	0.25		0.44	0.37		0.49	0.45	
v/c Ratio	0.45	0.76		0.72	0.74		0.08	0.32		0.25	0.58	
Control Delay	26.0	56.6		19.6	28.2		14.8	19.2		15.6	21.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.0	56.6		19.6	28.2		14.8	19.2		15.6	21.8	
LOS	C	E		B	C		B	B		B	C	
Approach Delay		45.5			24.2			18.9			21.1	
Approach LOS		D			C			B			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 81.4 (81%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 25.1	Intersection LOS: C
Intersection Capacity Utilization 75.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Limestone Street & Home Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	227	303	347	22	400	118	908
v/c Ratio	0.45	0.76	0.72	0.74	0.08	0.32	0.25	0.58
Control Delay	26.0	56.6	19.6	28.2	14.8	19.2	15.6	21.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.0	56.6	19.6	28.2	14.8	19.2	15.6	21.8
Queue Length 50th (ft)	51	136	153	211	7	77	40	186
Queue Length 95th (ft)	89	#222	87	253	21	117	74	314
Internal Link Dist (ft)		429		385		541		559
Turn Bay Length (ft)			150		200		100	
Base Capacity (vph)	286	332	444	535	264	1253	471	1572
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.68	0.68	0.65	0.08	0.32	0.25	0.58

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	119	199	10	279	249	70	20	249	119	109	557	279
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1900	1792	1792	1900	1863	1863	1900
Adj Flow Rate, veh/h	129	216	11	303	271	76	22	271	129	118	605	303
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	1	1	1	6	6	6	2	2	2
Cap, veh/h	261	266	14	395	333	93	253	909	421	486	988	494
Arrive On Green	0.08	0.15	0.15	0.16	0.24	0.24	0.03	0.40	0.40	0.06	0.43	0.43
Sat Flow, veh/h	1774	1757	89	1792	1414	397	1707	2262	1048	1774	2286	1144
Grp Volume(v), veh/h	129	0	227	303	0	347	22	202	198	118	468	440
Grp Sat Flow(s),veh/h/ln	1774	0	1847	1792	0	1811	1707	1703	1608	1774	1770	1661
Q Serve(g_s), s	6.1	0.0	11.9	13.6	0.0	18.1	0.7	8.1	8.4	3.9	20.4	20.5
Cycle Q Clear(g_c), s	6.1	0.0	11.9	13.6	0.0	18.1	0.7	8.1	8.4	3.9	20.4	20.5
Prop In Lane	1.00		0.05	1.00		0.22	1.00		0.65	1.00		0.69
Lane Grp Cap(c), veh/h	261	0	280	395	0	427	253	684	646	486	765	718
V/C Ratio(X)	0.49	0.00	0.81	0.77	0.00	0.81	0.09	0.30	0.31	0.24	0.61	0.61
Avail Cap(c_a), veh/h	261	0	331	441	0	523	310	684	646	508	765	718
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.60	0.00	0.60	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.8	0.0	41.0	28.2	0.0	36.2	18.1	20.3	20.4	16.0	21.9	21.9
Incr Delay (d2), s/veh	1.4	0.0	12.3	4.4	0.0	4.9	0.1	1.1	1.2	0.3	3.6	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	7.0	7.1	0.0	9.6	0.4	4.0	4.0	1.9	10.7	10.1
LnGrp Delay(d),s/veh	34.2	0.0	53.3	32.7	0.0	41.1	18.2	21.4	21.6	16.3	25.6	25.8
LnGrp LOS	C		D	C		D	B	C	C	B	C	C
Approach Vol, veh/h		356			650			422			1026	
Approach Delay, s/veh		46.4			37.1			21.3			24.6	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	47.0	20.4	21.3	8.3	50.0	12.0	29.6
Change Period (Y+Rc), s	5.6	* 6.8	4.5	6.1	5.6	* 6.8	4.5	6.1
Max Green Setting (Gmax), s	7.0	* 34	18.5	17.9	6.1	* 35	7.5	28.9
Max Q Clear Time (g_c+I1), s	5.9	10.4	15.6	13.9	2.7	22.5	8.1	20.1
Green Ext Time (p_c), s	0.0	9.0	0.3	1.3	0.0	6.3	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	30.5
HCM 2010 LOS	C

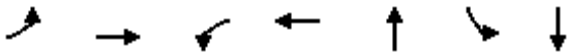
Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	398	20	30	547	10	10	10	20	10	0	20
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.997			0.932			0.850	
Flt Protected	0.950			0.950				0.988		0.950		
Satd. Flow (prot)	1770	1850	0	1787	1876	0	0	1682	0	1736	1553	0
Flt Permitted	0.224			0.315				0.954		0.728		
Satd. Flow (perm)	417	1850	0	593	1876	0	0	1624	0	1330	1553	0
Satd. Flow (RTOR)		5			2			22			392	
Adj. Flow (vph)	11	433	22	33	595	11	11	11	22	11	0	22
Lane Group Flow (vph)	11	455	0	33	606	0	0	44	0	11	22	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	12.0	70.0		12.0	70.0		18.0	18.0		18.0	18.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Act Effct Green (s)	42.6	39.0		45.0	43.8			41.8		41.8	41.8	
Actuated g/C Ratio	0.43	0.39		0.45	0.44			0.42		0.42	0.42	
v/c Ratio	0.04	0.63		0.10	0.74			0.06		0.02	0.03	
Control Delay	14.9	37.5		6.1	20.7			16.5		26.3	0.1	
Queue Delay	0.0	0.1		0.0	0.0			0.0		0.0	0.0	
Total Delay	14.9	37.6		6.1	20.7			16.5		26.3	0.1	
LOS	B	D		A	C			B		C	A	
Approach Delay		37.1			20.0			16.5			8.8	
Approach LOS		D			B			B			A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 77 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 26.3	Intersection LOS: C
Intersection Capacity Utilization 49.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Grube Street/Kroger & Home Road



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	11	455	33	606	44	11	22
v/c Ratio	0.04	0.63	0.10	0.74	0.06	0.02	0.03
Control Delay	14.9	37.5	6.1	20.7	16.5	26.3	0.1
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	37.6	6.1	20.7	16.5	26.3	0.1
Queue Length 50th (ft)	5	311	7	321	8	4	0
Queue Length 95th (ft)	m7	304	9	275	41	21	0
Internal Link Dist (ft)		385		1749	320		103
Turn Bay Length (ft)	50		50				
Base Capacity (vph)	258	1185	338	1201	690	555	876
Starvation Cap Reductn	0	159	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.44	0.10	0.50	0.06	0.02	0.03

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	398	20	30	547	10	10	10	20	10	0	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1900	1900	1827	1900	1827	1827	1900
Adj Flow Rate, veh/h	11	433	22	33	595	11	11	11	22	11	0	22
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	1	1	1	4	4	4	4	4	4
Cap, veh/h	182	652	33	292	720	13	182	188	325	633	0	641
Arrive On Green	0.02	0.37	0.37	0.04	0.39	0.39	0.41	0.41	0.41	0.41	0.00	0.41
Sat Flow, veh/h	1774	1758	89	1792	1841	34	332	454	787	1344	0	1553
Grp Volume(v), veh/h	11	0	455	33	0	606	44	0	0	11	0	22
Grp Sat Flow(s),veh/h/ln	1774	0	1847	1792	0	1875	1573	0	0	1344	0	1553
Q Serve(g_s), s	0.4	0.0	20.6	1.1	0.0	29.1	0.0	0.0	0.0	0.0	0.0	0.8
Cycle Q Clear(g_c), s	0.4	0.0	20.6	1.1	0.0	29.1	1.6	0.0	0.0	0.4	0.0	0.8
Prop In Lane	1.00		0.05	1.00		0.02	0.25		0.50	1.00		1.00
Lane Grp Cap(c), veh/h	182	0	685	292	0	734	695	0	0	633	0	641
V/C Ratio(X)	0.06	0.00	0.66	0.11	0.00	0.83	0.06	0.00	0.00	0.02	0.00	0.03
Avail Cap(c_a), veh/h	260	0	1182	335	0	1200	695	0	0	633	0	641
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.00	0.78	0.87	0.00	0.87	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.6	0.0	26.2	20.1	0.0	27.4	17.7	0.0	0.0	17.3	0.0	17.5
Incr Delay (d2), s/veh	0.1	0.0	0.9	0.1	0.0	2.2	0.2	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	10.7	0.6	0.0	15.4	0.8	0.0	0.0	0.2	0.0	0.4
LnGrp Delay(d),s/veh	22.7	0.0	27.1	20.2	0.0	29.6	17.9	0.0	0.0	17.4	0.0	17.6
LnGrp LOS	C		C	C		C	B			B		B
Approach Vol, veh/h		466			639			44			33	
Approach Delay, s/veh		27.0			29.1			17.9			17.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		47.3	9.6	43.1		47.3	7.6	45.1
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		12.0	6.0	64.0		12.0	6.0	64.0
Max Q Clear Time (g_c+I1), s		3.6	3.1	22.6		2.8	2.4	31.1
Green Ext Time (p_c), s		0.2	0.0	8.4		0.2	0.0	8.1

Intersection Summary	
HCM 2010 Ctrl Delay	27.5
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	448	80	249	508	60	159
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1844	0	1770	1863	1752	1568
Flt Permitted			0.169		0.950	
Satd. Flow (perm)	1844	0	315	1863	1752	1568
Satd. Flow (RTOR)	15					173
Adj. Flow (vph)	487	87	271	552	65	173
Lane Group Flow (vph)	574	0	271	552	65	173
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Total Split (s)	63.0		17.0	80.0	20.0	20.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Act Effct Green (s)	39.5		56.5	56.5	31.5	31.5
Actuated g/C Ratio	0.40		0.56	0.56	0.32	0.32
v/c Ratio	0.78		0.80	0.52	0.12	0.28
Control Delay	34.1		28.3	9.8	29.5	6.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	34.1		28.3	9.8	29.5	6.5
LOS	C		C	A	C	A
Approach Delay	34.1			15.9	12.8	
Approach LOS	C			B	B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 29 (29%), Referenced to phase 2:NBL and 6:, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 21.8	Intersection LOS: C
Intersection Capacity Utilization 67.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: N High School Place & Home Road

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	574	271	552	65	173
v/c Ratio	0.78	0.80	0.52	0.12	0.28
Control Delay	34.1	28.3	9.8	29.5	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	28.3	9.8	29.5	6.5
Queue Length 50th (ft)	376	72	184	30	0
Queue Length 95th (ft)	352	m108	m94	73	55
Internal Link Dist (ft)	1749		1289	740	
Turn Bay Length (ft)		225			
Base Capacity (vph)	1057	338	1378	551	612
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.54	0.80	0.40	0.12	0.28

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	448	80	249	508	60	159
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1863	1863	1845	1845
Adj Flow Rate, veh/h	487	87	271	552	65	173
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	2	2	3	3
Cap, veh/h	597	107	350	1029	576	514
Arrive On Green	0.38	0.38	0.11	0.55	0.33	0.33
Sat Flow, veh/h	1554	278	1774	1863	1757	1568
Grp Volume(v), veh/h	0	574	271	552	65	173
Grp Sat Flow(s),veh/h/ln	0	1832	1774	1863	1757	1568
Q Serve(g_s), s	0.0	28.1	8.8	18.9	2.6	8.3
Cycle Q Clear(g_c), s	0.0	28.1	8.8	18.9	2.6	8.3
Prop In Lane		0.15	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	704	350	1029	576	514
V/C Ratio(X)	0.00	0.82	0.77	0.54	0.11	0.34
Avail Cap(c_a), veh/h	0	1044	353	1378	576	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.75	0.50	0.50	1.00	1.00
Uniform Delay (d), s/veh	0.0	27.6	20.6	14.2	23.5	25.4
Incr Delay (d2), s/veh	0.0	2.4	5.3	0.2	0.4	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	14.7	4.7	9.7	1.3	3.9
LnGrp Delay(d),s/veh	0.0	30.1	25.9	14.5	23.9	27.2
LnGrp LOS		C	C	B	C	C
Approach Vol, veh/h	574			823	238	
Approach Delay, s/veh	30.1			18.2	26.3	
Approach LOS	C			B	C	

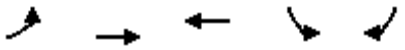
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		38.8	16.8	44.4				61.2
Change Period (Y+Rc), s		6.0	6.0	6.0				6.0
Max Green Setting (Gmax), s		14.0	11.0	57.0				74.0
Max Q Clear Time (g_c+I1), s		10.3	10.8	30.1				20.9
Green Ext Time (p_c), s		0.3	0.0	8.3				9.5

Intersection Summary	
HCM 2010 Ctrl Delay	23.5
HCM 2010 LOS	C

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	30	577	697	10	30	60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.998			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1787	1881	1859	0	1752	1568
Flt Permitted	0.167				0.950	
Satd. Flow (perm)	314	1881	1859	0	1752	1568
Satd. Flow (RTOR)			2			65
Adj. Flow (vph)	33	627	758	11	33	65
Lane Group Flow (vph)	33	627	769	0	33	65
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Total Split (s)	32.0	32.0	32.0		18.0	18.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Act Effct Green (s)	24.1	24.1	24.1		13.9	13.9
Actuated g/C Ratio	0.48	0.48	0.48		0.28	0.28
v/c Ratio	0.22	0.69	0.86		0.07	0.14
Control Delay	13.9	25.6	24.3		15.2	6.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	13.9	25.6	24.3		15.2	6.0
LOS	B	C	C		B	A
Approach Delay		25.0	24.3		9.1	
Approach LOS		C	C		A	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 47 (94%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 23.6	Intersection LOS: C
Intersection Capacity Utilization 57.3%	ICU Level of Service B
Analysis Period (min) 15	

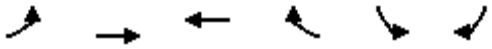
Splits and Phases: 4: Home Road & Northmoor Drive



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	33	627	769	33	65
v/c Ratio	0.22	0.69	0.86	0.07	0.14
Control Delay	13.9	25.6	24.3	15.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	25.6	24.3	15.2	6.0
Queue Length 50th (ft)	14	370	341	8	0
Queue Length 95th (ft)	m25	447	445	24	22
Internal Link Dist (ft)		1289	1125	460	
Turn Bay Length (ft)	100			50	
Base Capacity (vph)	163	978	967	485	481
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.64	0.80	0.07	0.14

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	30	577	697	10	30	60
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1863	1900	1845	1845
Adj Flow Rate, veh/h	33	627	758	11	33	65
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	2	2	3	3
Cap, veh/h	245	936	911	13	461	411
Arrive On Green	0.50	0.50	0.50	0.50	0.26	0.26
Sat Flow, veh/h	704	1881	1831	27	1757	1568
Grp Volume(v), veh/h	33	627	0	769	33	65
Grp Sat Flow(s),veh/h/ln	704	1881	0	1858	1757	1568
Q Serve(g_s), s	2.1	12.6	0.0	17.7	0.7	1.6
Cycle Q Clear(g_c), s	19.8	12.6	0.0	17.7	0.7	1.6
Prop In Lane	1.00			0.01	1.00	1.00
Lane Grp Cap(c), veh/h	245	936	0	925	461	411
V/C Ratio(X)	0.13	0.67	0.00	0.83	0.07	0.16
Avail Cap(c_a), veh/h	260	978	0	966	461	411
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70	0.00	0.55	1.00	1.00
Uniform Delay (d), s/veh	19.3	9.5	0.0	10.8	13.9	14.2
Incr Delay (d2), s/veh	0.2	1.2	0.0	3.4	0.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	6.8	0.0	9.9	0.4	0.8
LnGrp Delay(d),s/veh	19.4	10.6	0.0	14.2	14.2	15.0
LnGrp LOS	B	B		B	B	B
Approach Vol, veh/h		660	769		98	
Approach Delay, s/veh		11.1	14.2		14.7	
Approach LOS		B	B		B	

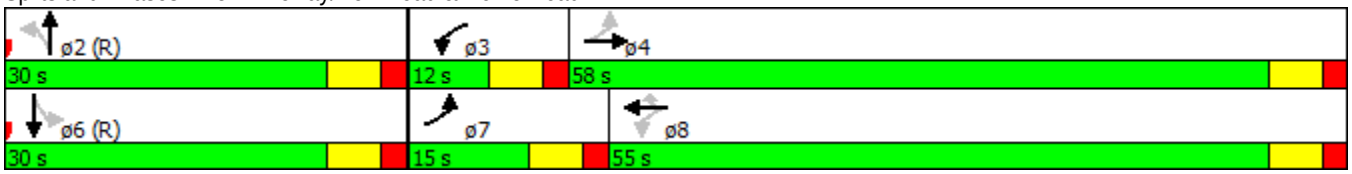
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				30.9		19.1		30.9
Change Period (Y+Rc), s				6.0		6.0		6.0
Max Green Setting (Gmax), s				26.0		12.0		26.0
Max Q Clear Time (g_c+I1), s				21.8		3.6		19.7
Green Ext Time (p_c), s				3.0		0.1		4.3

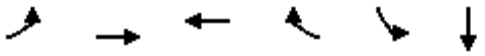
Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	179	279	0	0	408	129	0	0	0	139	0	388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1736	1827	0	1845	1845	1568	0	1900	0	1770	1583	0
Flt Permitted	0.201									0.757		
Satd. Flow (perm)	367	1827	0	1845	1845	1568	0	1900	0	1410	1583	0
Satd. Flow (RTOR)						112					420	
Adj. Flow (vph)	195	303	0	0	443	140	0	0	0	151	0	422
Lane Group Flow (vph)	195	303	0	0	443	140	0	0	0	151	422	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm				Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	15.0	58.0		12.0	55.0	55.0	30.0	30.0		30.0	30.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	
Act Effct Green (s)	46.2	46.2			31.2	31.2				41.8	41.8	
Actuated g/C Ratio	0.46	0.46			0.31	0.31				0.42	0.42	
v/c Ratio	0.67	0.36			0.77	0.25				0.26	0.47	
Control Delay	26.2	17.9			39.8	9.7				23.2	7.4	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	26.2	17.9			39.8	9.7				23.2	7.4	
LOS	C	B			D	A				C	A	
Approach Delay		21.2			32.6						11.6	
Approach LOS		C			C						B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 38 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 70.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Driveway/Derr Road & Home Road





Lane Group	EBL	EBT	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	195	303	443	140	151	422
v/c Ratio	0.67	0.36	0.77	0.25	0.26	0.47
Control Delay	26.2	17.9	39.8	9.7	23.2	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	17.9	39.8	9.7	23.2	7.4
Queue Length 50th (ft)	106	166	223	1	56	0
Queue Length 95th (ft)	114	161	339	48	135	98
Internal Link Dist (ft)		1125	2716			3537
Turn Bay Length (ft)	200			100	100	
Base Capacity (vph)	292	965	904	825	589	906
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.31	0.49	0.17	0.26	0.47

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	179	279	0	0	408	129	0	0	0	139	0	388
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1845	1845	1845	1900	1900	1900	1863	1863	1900
Adj Flow Rate, veh/h	195	303	0	0	443	140	0	0	0	151	0	422
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	3	3	3	0	0	0	2	2	2
Cap, veh/h	288	814	0	387	545	463	0	826	0	843	0	688
Arrive On Green	0.09	0.45	0.00	0.00	0.30	0.30	0.00	0.00	0.00	0.43	0.00	0.43
Sat Flow, veh/h	1740	1827	0	1757	1845	1568	0	1900	0	1774	0	1583
Grp Volume(v), veh/h	195	303	0	0	443	140	0	0	0	151	0	422
Grp Sat Flow(s),veh/h/ln	1740	1827	0	1757	1845	1568	0	1900	0	1774	0	1583
Q Serve(g_s), s	7.5	11.0	0.0	0.0	22.3	6.9	0.0	0.0	0.0	5.3	0.0	20.5
Cycle Q Clear(g_c), s	7.5	11.0	0.0	0.0	22.3	6.9	0.0	0.0	0.0	5.3	0.0	20.5
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	814	0	387	545	463	0	826	0	843	0	688
V/C Ratio(X)	0.68	0.37	0.00	0.00	0.81	0.30	0.00	0.00	0.00	0.18	0.00	0.61
Avail Cap(c_a), veh/h	288	950	0	491	904	768	0	826	0	843	0	688
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.70	0.70	0.00	0.00	0.90	0.90	0.00	0.00	0.00	0.94	0.00	0.94
Uniform Delay (d), s/veh	23.8	18.4	0.0	0.0	32.7	27.3	0.0	0.0	0.0	17.5	0.0	21.8
Incr Delay (d2), s/veh	4.4	0.2	0.0	0.0	2.7	0.3	0.0	0.0	0.0	0.4	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	5.6	0.0	0.0	11.7	3.0	0.0	0.0	0.0	2.7	0.0	9.6
LnGrp Delay(d),s/veh	28.2	18.6	0.0	0.0	35.4	27.6	0.0	0.0	0.0	17.9	0.0	25.6
LnGrp LOS	C	B			D	C				B		C
Approach Vol, veh/h		498			583			0			573	
Approach Delay, s/veh		22.4			33.5			0.0			23.6	
Approach LOS		C			C						C	

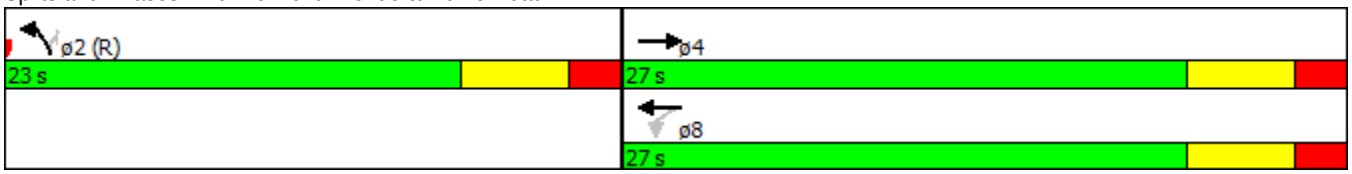
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		49.5	0.0	50.5		49.5	15.0	35.5
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		24.0	6.0	52.0		24.0	9.0	49.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	13.0		22.5	9.5	24.3
Green Ext Time (p_c), s		0.0	0.0	5.7		0.5	0.0	5.3

Intersection Summary	
HCM 2010 Ctrl Delay	26.7
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	199	140	40	279	209	20
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.944					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1758	0	1770	1863	1770	1583
Flt Permitted			0.431		0.950	
Satd. Flow (perm)	1758	0	803	1863	1770	1583
Satd. Flow (RTOR)	87					22
Adj. Flow (vph)	216	152	43	303	227	22
Lane Group Flow (vph)	368	0	43	303	227	22
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Total Split (s)	27.0		27.0	27.0	23.0	23.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Act Effct Green (s)	14.8		14.8	14.8	23.2	23.2
Actuated g/C Ratio	0.30		0.30	0.30	0.46	0.46
v/c Ratio	0.63		0.18	0.55	0.28	0.03
Control Delay	17.6		9.9	14.0	10.6	5.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	17.6		9.9	14.0	10.6	5.2
LOS	B		A	B	B	A
Approach Delay	17.6			13.5	10.1	
Approach LOS	B			B	B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 19 (38%), Referenced to phase 2:NBL and 6:, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 14.2	Intersection LOS: B
Intersection Capacity Utilization 54.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Belmont Avenue & Home Road



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	368	43	303	227	22
v/c Ratio	0.63	0.18	0.55	0.28	0.03
Control Delay	17.6	9.9	14.0	10.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	9.9	14.0	10.6	5.2
Queue Length 50th (ft)	145	10	75	35	0
Queue Length 95th (ft)	119	m13	m111	92	11
Internal Link Dist (ft)	2716		3133	1033	
Turn Bay Length (ft)		100			175
Base Capacity (vph)	788	337	782	821	746
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.13	0.39	0.28	0.03

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	199	140	40	279	209	20
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	216	152	43	303	227	22
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	321	226	276	587	789	704
Arrive On Green	0.32	0.32	0.32	0.32	0.44	0.44
Sat Flow, veh/h	1019	717	1010	1863	1774	1583
Grp Volume(v), veh/h	0	368	43	303	227	22
Grp Sat Flow(s),veh/h/ln	0	1736	1010	1863	1774	1583
Q Serve(g_s), s	0.0	9.2	1.9	6.7	4.1	0.4
Cycle Q Clear(g_c), s	0.0	9.2	11.1	6.7	4.1	0.4
Prop In Lane		0.41	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	547	276	587	789	704
V/C Ratio(X)	0.00	0.67	0.16	0.52	0.29	0.03
Avail Cap(c_a), veh/h	0	729	382	782	789	704
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.96	0.72	0.72	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.9	19.7	14.0	8.8	7.8
Incr Delay (d2), s/veh	0.0	1.4	0.2	0.5	0.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.6	0.6	3.4	2.2	0.2
LnGrp Delay(d),s/veh	0.0	16.3	19.9	14.5	9.8	7.9
LnGrp LOS		B	B	B	A	A
Approach Vol, veh/h	368			346	249	
Approach Delay, s/veh	16.3			15.2	9.6	
Approach LOS	B			B	A	

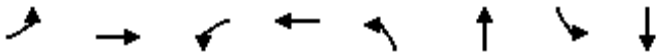
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		28.2		21.8				21.8
Change Period (Y+Rc), s		6.0		6.0				6.0
Max Green Setting (Gmax), s		17.0		21.0				21.0
Max Q Clear Time (g_c+I1), s		6.1		11.2				13.1
Green Ext Time (p_c), s		0.5		3.0				2.6

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	90	40	20	189	149	40	259	20	269	528	80
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.954			0.934			0.989			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1743	0	1787	1757	0	1770	3500	0	1770	3468	0
Flt Permitted	0.400			0.667			0.400			0.567		
Satd. Flow (perm)	731	1743	0	1255	1757	0	745	3500	0	1056	3468	0
Satd. Flow (RTOR)		43			79			22			46	
Adj. Flow (vph)	43	98	43	22	205	162	43	282	22	292	574	87
Lane Group Flow (vph)	43	141	0	22	367	0	43	304	0	292	661	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	20.0	20.0		20.0	20.0		30.0	30.0		30.0	30.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	13.1	13.1		13.1	13.1		24.9	24.9		24.9	24.9	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.50	0.50		0.50	0.50	
v/c Ratio	0.22	0.29		0.07	0.71		0.12	0.17		0.56	0.38	
Control Delay	12.9	8.1		14.0	21.7		8.2	6.9		14.2	8.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.9	8.1		14.0	21.7		8.2	6.9		14.2	8.2	
LOS	B	A		B	C		A	A		B	A	
Approach Delay		9.2			21.3			7.1			10.0	
Approach LOS		A			C			A			B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 38 (76%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 11.7	Intersection LOS: B
Intersection Capacity Utilization 75.4%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Mechanicsburg Road & Home Road/Croft Road



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	141	22	367	43	304	292	661
v/c Ratio	0.22	0.29	0.07	0.71	0.12	0.17	0.56	0.38
Control Delay	12.9	8.1	14.0	21.7	8.2	6.9	14.2	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	8.1	14.0	21.7	8.2	6.9	14.2	8.2
Queue Length 50th (ft)	16	45	5	73	6	22	55	53
Queue Length 95th (ft)	m26	49	17	#159	20	40	122	85
Internal Link Dist (ft)		3133		843		1034		682
Turn Bay Length (ft)	100		150				475	
Base Capacity (vph)	204	519	351	548	370	1751	525	1747
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.27	0.06	0.67	0.12	0.17	0.56	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	90	40	20	189	149	40	259	20	269	528	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1881	1881	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	43	98	43	22	205	162	43	282	22	292	574	87
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	1	1	1	2	2	2	2	2	2
Cap, veh/h	227	333	146	410	269	213	425	1610	125	610	1492	225
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	991	1205	529	1255	975	770	771	3329	258	1071	3084	466
Grp Volume(v), veh/h	43	0	141	22	0	367	43	149	155	292	329	332
Grp Sat Flow(s),veh/h/ln	991	0	1734	1255	0	1745	771	1770	1817	1071	1770	1780
Q Serve(g_s), s	2.1	0.0	3.2	0.7	0.0	9.6	1.9	2.4	2.4	10.6	5.9	5.9
Cycle Q Clear(g_c), s	11.7	0.0	3.2	3.9	0.0	9.6	7.8	2.4	2.4	13.0	5.9	5.9
Prop In Lane	1.00		0.30	1.00		0.44	1.00		0.14	1.00		0.26
Lane Grp Cap(c), veh/h	227	0	479	410	0	482	425	856	879	610	856	861
V/C Ratio(X)	0.19	0.00	0.29	0.05	0.00	0.76	0.10	0.17	0.18	0.48	0.38	0.39
Avail Cap(c_a), veh/h	231	0	485	415	0	489	425	856	879	610	856	861
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.77	0.00	0.77	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.9	0.0	14.3	15.8	0.0	16.6	10.7	7.3	7.3	11.0	8.2	8.2
Incr Delay (d2), s/veh	0.3	0.0	0.3	0.1	0.0	6.8	0.5	0.4	0.4	2.7	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.6	0.3	0.0	5.5	0.5	1.3	1.3	3.5	3.1	3.2
LnGrp Delay(d),s/veh	22.3	0.0	14.5	15.8	0.0	23.4	11.1	7.7	7.7	13.6	9.5	9.5
LnGrp LOS	C		B	B		C	B	A	A	B	A	A
Approach Vol, veh/h		184			389			347			953	
Approach Delay, s/veh		16.3			23.0			8.1			10.8	
Approach LOS		B			C			A			B	

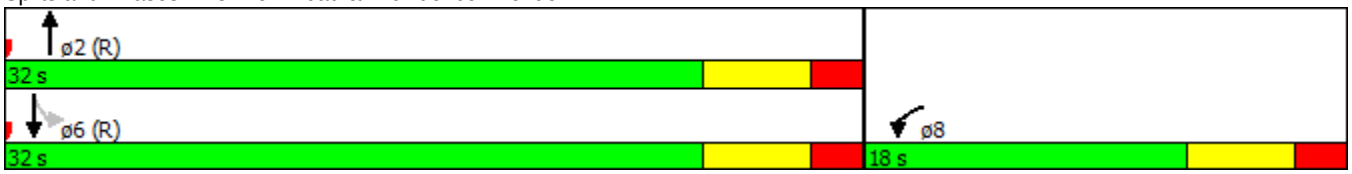
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.2		19.8		30.2		19.8
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		24.0		14.0		24.0		14.0
Max Q Clear Time (g_c+I1), s		9.8		13.7		15.0		11.6
Green Ext Time (p_c), s		6.4		0.1		4.8		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	13.4
HCM 2010 LOS	B

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	100	90	259	30	30	349
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.936		0.986			
Flt Protected	0.974				0.950	
Satd. Flow (prot)	1698	0	1819	0	1752	1845
Flt Permitted	0.974				0.569	
Satd. Flow (perm)	1698	0	1819	0	1050	1845
Satd. Flow (RTOR)	85		18			
Adj. Flow (vph)	109	98	282	33	33	379
Lane Group Flow (vph)	207	0	315	0	33	379
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Total Split (s)	18.0		32.0		32.0	32.0
Total Lost Time (s)	6.0		6.0		6.0	6.0
Act Effct Green (s)	12.0		30.8		30.8	30.8
Actuated g/C Ratio	0.24		0.62		0.62	0.62
v/c Ratio	0.44		0.28		0.05	0.33
Control Delay	13.3		4.8		4.4	6.1
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	13.3		4.8		4.4	6.1
LOS	B		A		A	A
Approach Delay	13.3		4.8			6.0
Approach LOS	B		A			A

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 31 (62%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.44	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 46.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 8: Derr Road & Providence Avenue



Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	207	315	33	379
v/c Ratio	0.44	0.28	0.05	0.33
Control Delay	13.3	4.8	4.4	6.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.3	4.8	4.4	6.1
Queue Length 50th (ft)	29	49	5	83
Queue Length 95th (ft)	76	104	6	40
Internal Link Dist (ft)	566	3537		893
Turn Bay Length (ft)			50	
Base Capacity (vph)	472	1127	647	1136
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.28	0.05	0.33

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	100	90	259	30	30	349
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1845	1900	1845	1845
Adj Flow Rate, veh/h	109	98	282	33	33	379
Adj No. of Lanes	0	0	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	3	3	3	3
Cap, veh/h	199	179	865	101	601	984
Arrive On Green	0.23	0.23	0.53	0.53	0.53	0.53
Sat Flow, veh/h	880	791	1621	190	1050	1845
Grp Volume(v), veh/h	208	0	0	315	33	379
Grp Sat Flow(s),veh/h/ln	1679	0	0	1811	1050	1845
Q Serve(g_s), s	5.5	0.0	0.0	4.9	0.9	6.0
Cycle Q Clear(g_c), s	5.5	0.0	0.0	4.9	5.8	6.0
Prop In Lane	0.52	0.47		0.10	1.00	
Lane Grp Cap(c), veh/h	381	0	0	966	601	984
V/C Ratio(X)	0.55	0.00	0.00	0.33	0.05	0.39
Avail Cap(c_a), veh/h	403	0	0	966	601	984
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.86	0.98	0.98
Uniform Delay (d), s/veh	17.1	0.0	0.0	6.6	8.2	6.9
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.8	0.2	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	0.0	2.7	0.3	3.4
LnGrp Delay(d),s/veh	18.4	0.0	0.0	7.4	8.4	8.0
LnGrp LOS	B			A	A	A
Approach Vol, veh/h	208		315			412
Approach Delay, s/veh	18.4		7.4			8.0
Approach LOS	B		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		32.7				32.7		17.3
Change Period (Y+Rc), s		6.0				6.0		6.0
Max Green Setting (Gmax), s		26.0				26.0		12.0
Max Q Clear Time (g_c+I1), s		6.9				8.0		7.5
Green Ext Time (p_c), s		4.2				4.1		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.1
HCM 2010 LOS	B

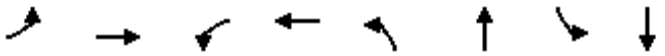
Notes

User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	10	20	70	10	20	20	189	60	10	209	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.900			0.900			0.964			0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1543	1462	0	1787	1693	0	1752	1778	0	1752	1832	0
Flt Permitted	0.736			0.453			0.589			0.590		
Satd. Flow (perm)	1195	1462	0	852	1693	0	1087	1778	0	1088	1832	0
Satd. Flow (RTOR)		22			22			20			3	
Adj. Flow (vph)	11	11	22	76	11	22	22	205	65	11	227	11
Lane Group Flow (vph)	11	33	0	76	33	0	22	270	0	11	238	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	14.0	22.0		16.0	24.0		14.0	48.0		14.0	48.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	13.5	12.0		19.5	18.7		69.2	69.0		67.7	66.5	
Actuated g/C Ratio	0.14	0.12		0.20	0.19		0.69	0.69		0.68	0.66	
v/c Ratio	0.06	0.17		0.30	0.10		0.03	0.22		0.01	0.20	
Control Delay	27.8	23.4		32.9	18.3		3.8	5.0		6.8	9.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.8	23.4		32.9	18.3		3.8	5.0		6.8	9.8	
LOS	C	C		C	B		A	A		A	A	
Approach Delay		24.5			28.5			4.9			9.6	
Approach LOS		C			C			A			A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 76 (76%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 37.2%	ICU Level of Service A
Analysis Period (min) 15	

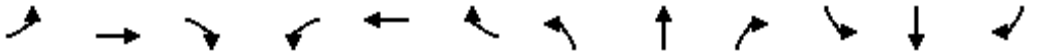
Splits and Phases: 9: Derr Road & Northland Plaza Shopping Center



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	11	33	76	33	22	270	11	238
v/c Ratio	0.06	0.17	0.30	0.10	0.03	0.22	0.01	0.20
Control Delay	27.8	23.4	32.9	18.3	3.8	5.0	6.8	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	23.4	32.9	18.3	3.8	5.0	6.8	9.8
Queue Length 50th (ft)	5	6	37	5	3	31	3	57
Queue Length 95th (ft)	19	35	73	34	m7	131	m9	149
Internal Link Dist (ft)		105		118		893		632
Turn Bay Length (ft)					100		100	
Base Capacity (vph)	209	252	269	384	807	1233	798	1218
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.13	0.28	0.09	0.03	0.22	0.01	0.20

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	10	20	70	10	20	20	189	60	10	209	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1624	1624	1900	1881	1881	1900	1845	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	11	11	22	76	11	22	22	205	65	11	227	11
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	17	17	17	1	1	1	3	3	3	3	3	3
Cap, veh/h	223	51	103	284	80	160	695	787	249	659	1002	49
Arrive On Green	0.02	0.11	0.11	0.05	0.14	0.14	0.03	0.59	0.59	0.02	0.57	0.57
Sat Flow, veh/h	1547	484	969	1792	561	1122	1757	1343	426	1757	1745	85
Grp Volume(v), veh/h	11	0	33	76	0	33	22	0	270	11	0	238
Grp Sat Flow(s),veh/h/ln	1547	0	1453	1792	0	1683	1757	0	1769	1757	0	1830
Q Serve(g_s), s	0.6	0.0	2.1	3.7	0.0	1.7	0.5	0.0	7.5	0.3	0.0	6.4
Cycle Q Clear(g_c), s	0.6	0.0	2.1	3.7	0.0	1.7	0.5	0.0	7.5	0.3	0.0	6.4
Prop In Lane	1.00		0.67	1.00		0.67	1.00		0.24	1.00		0.05
Lane Grp Cap(c), veh/h	223	0	154	284	0	240	695	0	1036	659	0	1050
V/C Ratio(X)	0.05	0.00	0.21	0.27	0.00	0.14	0.03	0.00	0.26	0.02	0.00	0.23
Avail Cap(c_a), veh/h	322	0	232	369	0	303	787	0	1036	772	0	1050
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.97	0.00	0.97	0.97	0.00	0.97
Uniform Delay (d), s/veh	38.9	0.0	40.9	37.0	0.0	37.5	8.3	0.0	10.1	8.7	0.0	10.4
Incr Delay (d2), s/veh	0.1	0.0	0.7	0.5	0.0	0.3	0.0	0.0	0.6	0.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.9	1.9	0.0	0.8	0.2	0.0	3.8	0.1	0.0	3.3
LnGrp Delay(d),s/veh	38.9	0.0	41.6	37.5	0.0	37.7	8.3	0.0	10.7	8.7	0.0	10.9
LnGrp LOS	D		D	D		D	A		B	A		B
Approach Vol, veh/h		44			109			292			249	
Approach Delay, s/veh		40.9			37.6			10.5			10.8	
Approach LOS		D			D			B			B	

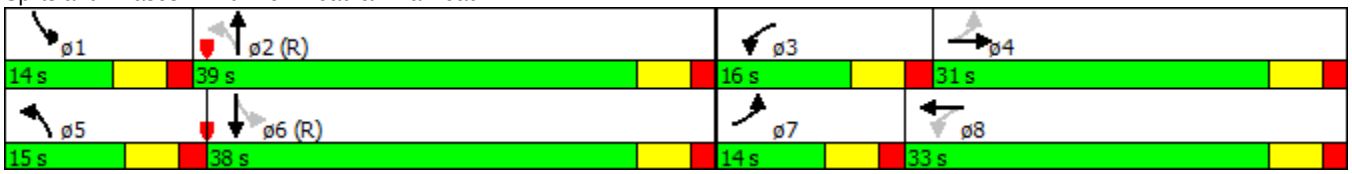
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.6	64.6	11.3	16.6	8.7	63.4	7.6	20.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	8.0	42.0	10.0	16.0	8.0	42.0	8.0	18.0
Max Q Clear Time (g_c+I1), s	2.3	9.5	5.7	4.1	2.5	8.4	2.6	3.7
Green Ext Time (p_c), s	0.0	3.2	0.0	0.2	0.0	3.2	0.0	0.2

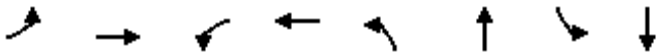
Intersection Summary	
HCM 2010 Ctrl Delay	16.8
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	169	80	80	159	40	80	90	50	60	159	50
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.952			0.970			0.947			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3369	0	1787	1825	0	1752	1747	0	1787	1813	0
Flt Permitted	0.611			0.433			0.583			0.660		
Satd. Flow (perm)	1138	3369	0	815	1825	0	1075	1747	0	1242	1813	0
Satd. Flow (RTOR)		75			12			30			17	
Adj. Flow (vph)	22	184	87	87	173	43	87	98	54	65	173	54
Lane Group Flow (vph)	22	271	0	87	216	0	87	152	0	65	227	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	14.0	31.0		16.0	33.0		15.0	39.0		14.0	38.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	19.9	14.5		25.4	21.4		57.1	50.4		55.9	49.8	
Actuated g/C Ratio	0.20	0.14		0.25	0.21		0.57	0.50		0.56	0.50	
v/c Ratio	0.08	0.49		0.30	0.54		0.13	0.17		0.09	0.25	
Control Delay	24.1	30.7		28.1	38.1		5.0	6.3		10.8	17.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.1	30.7		28.1	38.1		5.0	6.3		10.8	17.7	
LOS	C	C		C	D		A	A		B	B	
Approach Delay		30.2			35.2			5.8			16.2	
Approach LOS		C			D			A			B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 95 (95%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 22.8	Intersection LOS: C
Intersection Capacity Utilization 52.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Derr Road & Villa Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	271	87	216	87	152	65	227
v/c Ratio	0.08	0.49	0.30	0.54	0.13	0.17	0.09	0.25
Control Delay	24.1	30.7	28.1	38.1	5.0	6.3	10.8	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	30.7	28.1	38.1	5.0	6.3	10.8	17.7
Queue Length 50th (ft)	10	62	42	107	8	39	16	77
Queue Length 95th (ft)	25	94	71	188	17	17	42	160
Internal Link Dist (ft)		616		681		632		459
Turn Bay Length (ft)	100		225		75		50	
Base Capacity (vph)	288	898	303	502	684	895	746	911
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.30	0.29	0.43	0.13	0.17	0.09	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	169	80	80	159	40	80	90	50	60	159	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1900	1845	1845	1900	1881	1881	1900
Adj Flow Rate, veh/h	22	184	87	87	173	43	87	98	54	65	173	54
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	171	303	138	230	229	57	682	588	324	758	717	224
Arrive On Green	0.03	0.13	0.13	0.06	0.16	0.16	0.05	0.53	0.53	0.05	0.52	0.52
Sat Flow, veh/h	1774	2368	1075	1792	1456	362	1757	1119	617	1792	1376	429
Grp Volume(v), veh/h	22	136	135	87	0	216	87	0	152	65	0	227
Grp Sat Flow(s),veh/h/ln	1774	1770	1673	1792	0	1817	1757	0	1736	1792	0	1805
Q Serve(g_s), s	1.1	7.2	7.7	4.2	0.0	11.4	2.2	0.0	4.6	1.6	0.0	6.9
Cycle Q Clear(g_c), s	1.1	7.2	7.7	4.2	0.0	11.4	2.2	0.0	4.6	1.6	0.0	6.9
Prop In Lane	1.00		0.64	1.00		0.20	1.00		0.36	1.00		0.24
Lane Grp Cap(c), veh/h	171	226	214	230	0	285	682	0	912	758	0	940
V/C Ratio(X)	0.13	0.60	0.63	0.38	0.00	0.76	0.13	0.00	0.17	0.09	0.00	0.24
Avail Cap(c_a), veh/h	264	442	418	308	0	491	744	0	912	811	0	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.99	0.00	0.99	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.5	41.2	41.4	35.3	0.0	40.3	9.7	0.0	12.3	9.6	0.0	13.1
Incr Delay (d2), s/veh	0.3	2.5	3.1	1.0	0.0	4.1	0.1	0.0	0.4	0.0	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	3.7	3.7	2.1	0.0	6.0	1.1	0.0	2.3	0.8	0.0	3.6
LnGrp Delay(d),s/veh	36.8	43.7	44.4	36.3	0.0	44.4	9.8	0.0	12.7	9.7	0.0	13.7
LnGrp LOS	D	D	D	D		D	A		B	A		B
Approach Vol, veh/h		293			303			239			292	
Approach Delay, s/veh		43.5			42.1			11.7			12.8	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	58.5	11.7	18.8	11.5	58.1	8.7	21.7
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	8.0	33.0	10.0	25.0	9.0	32.0	8.0	27.0
Max Q Clear Time (g_c+I1), s	3.6	6.6	6.2	9.7	4.2	8.9	3.1	13.4
Green Ext Time (p_c), s	0.0	2.2	0.1	2.5	0.1	2.2	0.0	2.3

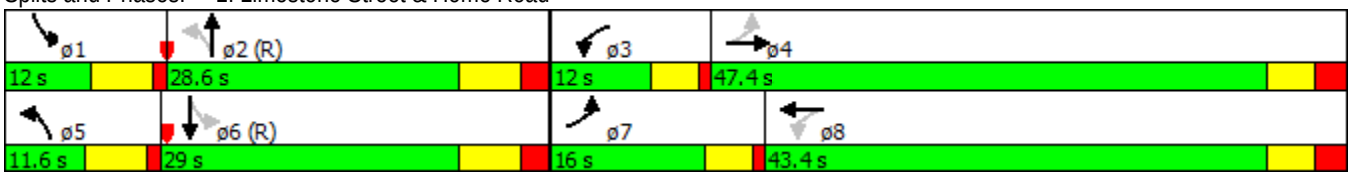
Intersection Summary	
HCM 2010 Ctrl Delay	28.4
HCM 2010 LOS	C

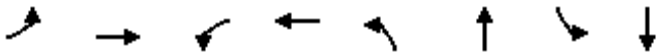
2040 Build Conditions – With Volume Reductions
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	299	338	20	289	338	100	50	488	249	129	617	199
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.992			0.966			0.949			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1866	0	1787	1817	0	1787	3392	0	1787	3442	0
Flt Permitted	0.165			0.393			0.152			0.136		
Satd. Flow (perm)	310	1866	0	739	1817	0	286	3392	0	256	3442	0
Satd. Flow (RTOR)		4			17			83			40	
Adj. Flow (vph)	325	367	22	314	367	109	54	530	271	140	671	216
Lane Group Flow (vph)	325	389	0	314	476	0	54	801	0	140	887	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	16.0	47.4		12.0	43.4		11.6	28.6		12.0	29.0	
Total Lost Time (s)	4.5	6.1		4.5	6.1		5.6	6.8		5.6	6.8	
Act Effct Green (s)	47.6	34.5		39.6	30.5		34.4	26.5		38.8	30.6	
Actuated g/C Ratio	0.48	0.34		0.40	0.30		0.34	0.26		0.39	0.31	
v/c Ratio	1.03	0.60		0.85	0.84		0.27	0.84		0.61	0.82	
Control Delay	78.9	30.2		29.7	33.6		23.9	41.7		35.2	41.1	
Queue Delay	0.0	0.0		0.0	0.3		0.0	0.1		0.1	0.0	
Total Delay	78.9	30.2		29.7	33.8		23.9	41.9		35.2	41.1	
LOS	E	C		C	C		C	D		D	D	
Approach Delay		52.4			32.2			40.7			40.3	
Approach LOS		D			C			D			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 10 (10%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Limestone Street & Home Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	325	389	314	476	54	801	140	887
v/c Ratio	1.03	0.60	0.85	0.84	0.27	0.84	0.61	0.82
Control Delay	78.9	30.2	29.7	33.6	23.9	41.7	35.2	41.1
Queue Delay	0.0	0.0	0.0	0.3	0.0	0.1	0.1	0.0
Total Delay	78.9	30.2	29.7	33.8	23.9	41.9	35.2	41.1
Queue Length 50th (ft)	~137	199	99	187	20	240	56	277
Queue Length 95th (ft)	#289	266	#113	305	50	#378	#149	#459
Internal Link Dist (ft)		429		385		541		559
Turn Bay Length (ft)			150		200		100	
Base Capacity (vph)	317	773	371	688	200	958	230	1079
Starvation Cap Reductn	0	0	0	22	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	6	1	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.50	0.85	0.71	0.27	0.84	0.61	0.82

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	299	338	20	289	338	100	50	488	249	129	617	199
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	325	367	22	314	367	109	54	530	271	140	671	216
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	333	610	37	381	428	127	197	651	332	233	802	258
Arrive On Green	0.12	0.35	0.35	0.08	0.31	0.31	0.05	0.28	0.28	0.06	0.30	0.30
Sat Flow, veh/h	1792	1757	105	1792	1394	414	1792	2293	1169	1792	2661	856
Grp Volume(v), veh/h	325	0	389	314	0	476	54	413	388	140	451	436
Grp Sat Flow(s),veh/h/ln	1792	0	1863	1792	0	1808	1792	1787	1675	1792	1787	1730
Q Serve(g_s), s	11.5	0.0	17.2	7.5	0.0	24.8	2.1	21.5	21.6	5.5	23.6	23.6
Cycle Q Clear(g_c), s	11.5	0.0	17.2	7.5	0.0	24.8	2.1	21.5	21.6	5.5	23.6	23.6
Prop In Lane	1.00		0.06	1.00		0.23	1.00		0.70	1.00		0.49
Lane Grp Cap(c), veh/h	333	0	646	381	0	555	197	508	476	233	539	521
V/C Ratio(X)	0.98	0.00	0.60	0.82	0.00	0.86	0.27	0.81	0.82	0.60	0.84	0.84
Avail Cap(c_a), veh/h	333	0	769	381	0	674	221	508	476	233	539	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.71	0.00	0.71	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	0.0	26.9	30.4	0.0	32.6	25.7	33.3	33.4	26.0	32.6	32.6
Incr Delay (d2), s/veh	42.8	0.0	0.9	10.1	0.0	6.8	0.7	13.3	14.3	4.2	14.3	14.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.9	0.0	9.0	7.0	0.0	13.3	1.1	12.4	11.9	3.0	13.8	13.4
LnGrp Delay(d),s/veh	68.2	0.0	27.9	40.5	0.0	39.4	26.5	46.7	47.7	30.2	46.9	47.4
LnGrp LOS	E		C	D		D	C	D	D	C	D	D
Approach Vol, veh/h		714			790			855			1027	
Approach Delay, s/veh		46.3			39.8			45.9			44.9	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	35.2	12.0	40.8	10.3	36.9	16.0	36.8
Change Period (Y+Rc), s	5.6	* 6.8	4.5	6.1	5.6	* 6.8	4.5	6.1
Max Green Setting (Gmax), s	6.4	* 22	7.5	41.3	6.0	* 22	11.5	37.3
Max Q Clear Time (g_c+I1), s	7.5	23.6	9.5	19.2	4.1	25.6	13.5	26.8
Green Ext Time (p_c), s	0.0	0.0	0.0	5.6	0.0	0.0	0.0	3.9

Intersection Summary	
HCM 2010 Ctrl Delay	44.2
HCM 2010 LOS	D

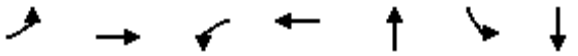
Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	657	40	60	617	30	50	10	70	40	10	50
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.993			0.927			0.875	
Flt Protected	0.950			0.950				0.981		0.950		
Satd. Flow (prot)	1787	1864	0	1787	1868	0	0	1728	0	1805	1662	0
Flt Permitted	0.263			0.190				0.855		0.643		
Satd. Flow (perm)	495	1864	0	357	1868	0	0	1506	0	1222	1662	0
Satd. Flow (RTOR)		6			5			48			54	
Adj. Flow (vph)	22	714	43	65	671	33	54	11	76	43	11	54
Lane Group Flow (vph)	22	757	0	65	704	0	0	141	0	43	65	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	12.0	70.0		12.0	70.0		18.0	18.0		18.0	18.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Act Effct Green (s)	57.8	53.0		60.2	57.8			25.4		25.4	25.4	
Actuated g/C Ratio	0.58	0.53		0.60	0.58			0.25		0.25	0.25	
v/c Ratio	0.06	0.76		0.22	0.65			0.34		0.14	0.14	
Control Delay	2.8	19.8		7.9	19.2			27.4		37.9	14.8	
Queue Delay	0.0	0.6		0.0	0.1			0.0		0.0	0.0	
Total Delay	2.8	20.4		7.9	19.4			27.5		37.9	14.8	
LOS	A	C		A	B			C		D	B	
Approach Delay		19.9			18.4			27.5			24.0	
Approach LOS		B			B			C			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 94 (94%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 20.1	Intersection LOS: C
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Grube Street/Kroger & Home Road



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	22	757	65	704	141	43	65
v/c Ratio	0.06	0.76	0.22	0.65	0.34	0.14	0.14
Control Delay	2.8	19.8	7.9	19.2	27.4	37.9	14.8
Queue Delay	0.0	0.6	0.0	0.1	0.0	0.0	0.0
Total Delay	2.8	20.4	7.9	19.4	27.5	37.9	14.8
Queue Length 50th (ft)	3	311	15	187	50	22	6
Queue Length 95th (ft)	m2	m367	m19	210	#132	60	46
Internal Link Dist (ft)		385		1749	320		103
Turn Bay Length (ft)	50		50				
Base Capacity (vph)	363	1195	300	1205	417	310	462
Starvation Cap Reductn	0	163	0	0	0	0	0
Spillback Cap Reductn	0	0	0	69	1	0	2
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.73	0.22	0.62	0.34	0.14	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	657	40	60	617	30	50	10	70	40	10	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	22	714	43	65	671	33	54	11	76	43	11	54
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	284	861	52	262	912	45	194	55	233	436	78	385
Arrive On Green	0.03	0.49	0.49	0.05	0.51	0.51	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1792	1757	106	1792	1778	87	516	197	834	1331	280	1377
Grp Volume(v), veh/h	22	0	757	65	0	704	141	0	0	43	0	65
Grp Sat Flow(s),veh/h/ln	1792	0	1863	1792	0	1866	1547	0	0	1331	0	1657
Q Serve(g_s), s	0.6	0.0	34.9	1.7	0.0	29.5	3.6	0.0	0.0	0.0	0.0	2.9
Cycle Q Clear(g_c), s	0.6	0.0	34.9	1.7	0.0	29.5	6.9	0.0	0.0	2.7	0.0	2.9
Prop In Lane	1.00		0.06	1.00		0.05	0.38		0.54	1.00		0.83
Lane Grp Cap(c), veh/h	284	0	913	262	0	957	483	0	0	436	0	464
V/C Ratio(X)	0.08	0.00	0.83	0.25	0.00	0.74	0.29	0.00	0.00	0.10	0.00	0.14
Avail Cap(c_a), veh/h	342	0	1192	280	0	1194	483	0	0	436	0	464
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.76	0.00	0.76	0.77	0.00	0.77	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.6	0.0	21.9	17.7	0.0	19.1	28.3	0.0	0.0	26.9	0.0	27.0
Incr Delay (d2), s/veh	0.1	0.0	3.0	0.4	0.0	1.4	1.5	0.0	0.0	0.5	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	18.6	0.9	0.0	15.4	3.3	0.0	0.0	0.9	0.0	1.4
LnGrp Delay(d),s/veh	15.7	0.0	24.9	18.1	0.0	20.5	29.8	0.0	0.0	27.3	0.0	27.6
LnGrp LOS	B		C	B		C	C			C		C
Approach Vol, veh/h		779			769			141			108	
Approach Delay, s/veh		24.7			20.3			29.8			27.5	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		34.0	11.0	55.0		34.0	8.7	57.3
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		12.0	6.0	64.0		12.0	6.0	64.0
Max Q Clear Time (g_c+I1), s		8.9	3.7	36.9		4.9	2.6	31.5
Green Ext Time (p_c), s		0.4	0.0	12.1		0.7	0.0	13.1

Intersection Summary	
HCM 2010 Ctrl Delay	23.4
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	786	30	90	736	80	169
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1853	0	1770	1863	1770	1425
Flt Permitted			0.123		0.950	
Satd. Flow (perm)	1853	0	229	1863	1770	1425
Satd. Flow (RTOR)	4					184
Adj. Flow (vph)	854	33	98	800	87	184
Lane Group Flow (vph)	887	0	98	800	87	184
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Total Split (s)	69.0		12.0	81.0	19.0	19.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Act Effct Green (s)	58.2		67.8	67.8	20.2	20.2
Actuated g/C Ratio	0.58		0.68	0.68	0.20	0.20
v/c Ratio	0.82		0.40	0.63	0.24	0.42
Control Delay	22.2		12.1	16.4	40.3	9.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.2		12.1	16.4	40.3	9.5
LOS	C		B	B	D	A
Approach Delay	22.2			15.9	19.4	
Approach LOS	C			B	B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 19.1	Intersection LOS: B
Intersection Capacity Utilization 73.2%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: N High School Place & Home Road

Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	887	98	800	87	184
v/c Ratio	0.82	0.40	0.63	0.24	0.42
Control Delay	22.2	12.1	16.4	40.3	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	12.1	16.4	40.3	9.5
Queue Length 50th (ft)	294	33	343	50	0
Queue Length 95th (ft)	371	m44	328	100	62
Internal Link Dist (ft)	1749		1289	740	
Turn Bay Length (ft)		225			
Base Capacity (vph)	1168	247	1397	358	435
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.76	0.40	0.57	0.24	0.42

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	786	30	90	736	80	169
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	854	33	98	800	87	184
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	987	38	261	1248	373	299
Arrive On Green	0.55	0.55	0.06	0.67	0.21	0.21
Sat Flow, veh/h	1782	69	1774	1863	1774	1425
Grp Volume(v), veh/h	0	887	98	800	87	184
Grp Sat Flow(s),veh/h/ln	0	1851	1774	1863	1774	1425
Q Serve(g_s), s	0.0	41.1	2.2	24.8	4.1	11.7
Cycle Q Clear(g_c), s	0.0	41.1	2.2	24.8	4.1	11.7
Prop In Lane		0.04	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	1025	261	1248	373	299
V/C Ratio(X)	0.00	0.87	0.38	0.64	0.23	0.61
Avail Cap(c_a), veh/h	0	1166	268	1397	373	299
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.61	0.77	0.77	1.00	1.00
Uniform Delay (d), s/veh	0.0	19.1	18.2	9.5	32.8	35.8
Incr Delay (d2), s/veh	0.0	4.0	0.7	0.7	1.5	9.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	21.8	1.4	12.9	2.2	5.4
LnGrp Delay(d),s/veh	0.0	23.1	18.9	10.2	34.3	44.9
LnGrp LOS		C	B	B	C	D
Approach Vol, veh/h	887			898	271	
Approach Delay, s/veh	23.1			11.2	41.5	
Approach LOS	C			B	D	

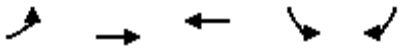
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		27.0	11.6	61.4				73.0
Change Period (Y+Rc), s		6.0	6.0	6.0				6.0
Max Green Setting (Gmax), s		13.0	6.0	63.0				75.0
Max Q Clear Time (g_c+I1), s		13.7	4.2	43.1				26.8
Green Ext Time (p_c), s		0.0	0.0	12.3				19.4

Intersection Summary	
HCM 2010 Ctrl Delay	20.3
HCM 2010 LOS	C

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	50	886	746	20	30	60
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.996			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1855	0	1805	1615
Flt Permitted	0.259				0.950	
Satd. Flow (perm)	482	1863	1855	0	1805	1615
Satd. Flow (RTOR)			4			65
Adj. Flow (vph)	54	963	811	22	33	65
Lane Group Flow (vph)	54	963	833	0	33	65
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Total Split (s)	82.0	82.0	82.0		18.0	18.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Act Effct Green (s)	71.1	71.1	71.1		16.9	16.9
Actuated g/C Ratio	0.71	0.71	0.71		0.17	0.17
v/c Ratio	0.16	0.73	0.63		0.11	0.20
Control Delay	6.8	14.0	9.9		40.2	12.1
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	6.8	14.0	9.9		40.2	12.1
LOS	A	B	A		D	B
Approach Delay		13.7	9.9		21.6	
Approach LOS		B	A		C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 66.6%	ICU Level of Service C
Analysis Period (min) 15	

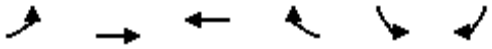
Splits and Phases: 4: Home Road & Northmoor Drive



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	54	963	833	33	65
v/c Ratio	0.16	0.73	0.63	0.11	0.20
Control Delay	6.8	14.0	9.9	40.2	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	14.0	9.9	40.2	12.1
Queue Length 50th (ft)	12	236	84	19	0
Queue Length 95th (ft)	m19	350	191	48	39
Internal Link Dist (ft)		1289	1125	460	
Turn Bay Length (ft)	100			50	
Base Capacity (vph)	366	1415	1410	305	327
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.68	0.59	0.11	0.20

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	50	886	746	20	30	60
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1900	1900
Adj Flow Rate, veh/h	54	963	811	22	33	65
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	0	0
Cap, veh/h	274	1153	1117	30	473	422
Arrive On Green	0.62	0.62	0.62	0.62	0.26	0.26
Sat Flow, veh/h	656	1863	1805	49	1810	1615
Grp Volume(v), veh/h	54	963	0	833	33	65
Grp Sat Flow(s),veh/h/ln	656	1863	0	1854	1810	1615
Q Serve(g_s), s	6.2	40.8	0.0	31.1	1.4	3.1
Cycle Q Clear(g_c), s	37.3	40.8	0.0	31.1	1.4	3.1
Prop In Lane	1.00			0.03	1.00	1.00
Lane Grp Cap(c), veh/h	274	1153	0	1147	473	422
V/C Ratio(X)	0.20	0.84	0.00	0.73	0.07	0.15
Avail Cap(c_a), veh/h	367	1416	0	1409	473	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.57	0.57	0.00	0.55	1.00	1.00
Uniform Delay (d), s/veh	26.1	15.0	0.0	13.2	27.8	28.4
Incr Delay (d2), s/veh	0.2	2.2	0.0	0.8	0.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	21.6	0.0	16.0	0.7	1.5
LnGrp Delay(d),s/veh	26.3	17.2	0.0	14.0	28.1	29.2
LnGrp LOS	C	B		B	C	C
Approach Vol, veh/h		1017	833		98	
Approach Delay, s/veh		17.7	14.0		28.8	
Approach LOS		B	B		C	

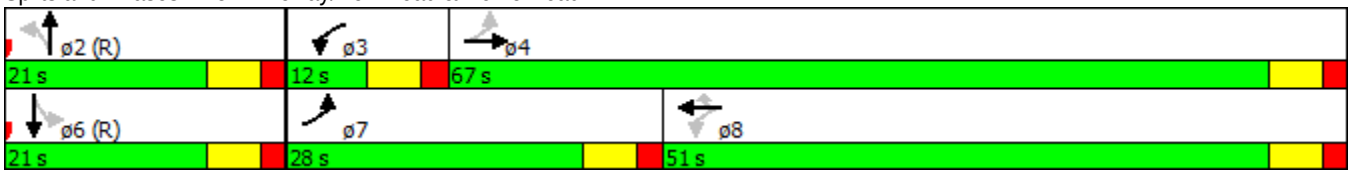
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				67.9		32.1		67.9
Change Period (Y+Rc), s				6.0		6.0		6.0
Max Green Setting (Gmax), s				76.0		12.0		76.0
Max Q Clear Time (g_c+I1), s				42.8		5.1		33.1
Green Ext Time (p_c), s				19.1		0.1		21.9

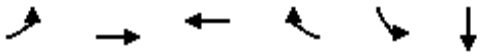
Intersection Summary	
HCM 2010 Ctrl Delay	16.7
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	358	488	0	0	418	269	0	0	0	219	0	328
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850					0.850	
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1770	1863	0	1863	1863	1583	0	1900	0	1787	1599	0
Flt Permitted	0.196									0.757		
Satd. Flow (perm)	365	1863	0	1863	1863	1583	0	1900	0	1424	1599	0
Satd. Flow (RTOR)						210					503	
Adj. Flow (vph)	389	530	0	0	454	292	0	0	0	238	0	357
Lane Group Flow (vph)	389	530	0	0	454	292	0	0	0	238	357	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm				Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Total Split (s)	28.0	67.0		12.0	51.0	51.0	21.0	21.0		21.0	21.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0	6.0		6.0		6.0	6.0	
Act Effct Green (s)	58.9	58.9			31.8	31.8				29.1	29.1	
Actuated g/C Ratio	0.59	0.59			0.32	0.32				0.29	0.29	
v/c Ratio	0.76	0.48			0.77	0.45				0.57	0.43	
Control Delay	33.2	15.6			37.3	11.1				41.2	5.1	
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	
Total Delay	33.2	15.6			37.3	11.1				41.2	5.1	
LOS	C	B			D	B				D	A	
Approach Delay		23.1			27.0						19.6	
Approach LOS		C			C						B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 93 (93%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 77.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Driveway/Derr Road & Home Road

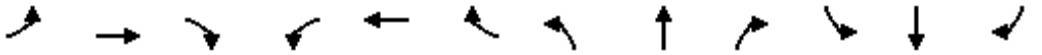




Lane Group	EBL	EBT	WBT	WBR	SBL	SBT
Lane Group Flow (vph)	389	530	454	292	238	357
v/c Ratio	0.76	0.48	0.77	0.45	0.57	0.43
Control Delay	33.2	15.6	37.3	11.1	41.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	15.6	37.3	11.1	41.2	5.1
Queue Length 50th (ft)	179	229	227	31	132	24
Queue Length 95th (ft)	258	241	312	106	#284	46
Internal Link Dist (ft)		1125	2716			3537
Turn Bay Length (ft)	200			100	100	
Base Capacity (vph)	523	1180	838	827	414	821
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.45	0.54	0.35	0.57	0.43

Intersection Summary

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	358	488	0	0	418	269	0	0	0	219	0	328
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1900	1900	1881	1881	1900
Adj Flow Rate, veh/h	389	530	0	0	454	292	0	0	0	238	0	357
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	0	0	0	1	1	1
Cap, veh/h	435	1010	0	348	588	500	0	642	0	677	0	540
Arrive On Green	0.17	0.54	0.00	0.00	0.32	0.32	0.00	0.00	0.00	0.34	0.00	0.34
Sat Flow, veh/h	1774	1863	0	1774	1863	1583	0	1900	0	1792	0	1599
Grp Volume(v), veh/h	389	530	0	0	454	292	0	0	0	238	0	357
Grp Sat Flow(s),veh/h/ln	1774	1863	0	1774	1863	1583	0	1900	0	1792	0	1599
Q Serve(g_s), s	14.0	18.2	0.0	0.0	22.1	15.5	0.0	0.0	0.0	10.1	0.0	19.0
Cycle Q Clear(g_c), s	14.0	18.2	0.0	0.0	22.1	15.5	0.0	0.0	0.0	10.1	0.0	19.0
Prop In Lane	1.00		0.00	1.00		1.00	0.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	435	1010	0	348	588	500	0	642	0	677	0	540
V/C Ratio(X)	0.89	0.52	0.00	0.00	0.77	0.58	0.00	0.00	0.00	0.35	0.00	0.66
Avail Cap(c_a), veh/h	530	1136	0	453	838	712	0	642	0	677	0	540
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.64	0.64	0.00	0.00	0.78	0.78	0.00	0.00	0.00	0.91	0.00	0.91
Uniform Delay (d), s/veh	20.7	14.7	0.0	0.0	31.0	28.7	0.0	0.0	0.0	25.3	0.0	28.2
Incr Delay (d2), s/veh	10.7	0.3	0.0	0.0	2.2	0.9	0.0	0.0	0.0	1.3	0.0	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	9.4	0.0	0.0	11.7	6.9	0.0	0.0	0.0	5.3	0.0	9.3
LnGrp Delay(d),s/veh	31.4	14.9	0.0	0.0	33.2	29.6	0.0	0.0	0.0	26.6	0.0	33.9
LnGrp LOS	C	B			C	C				C		C
Approach Vol, veh/h		919			746			0			595	
Approach Delay, s/veh		21.9			31.8			0.0			31.0	
Approach LOS		C			C						C	

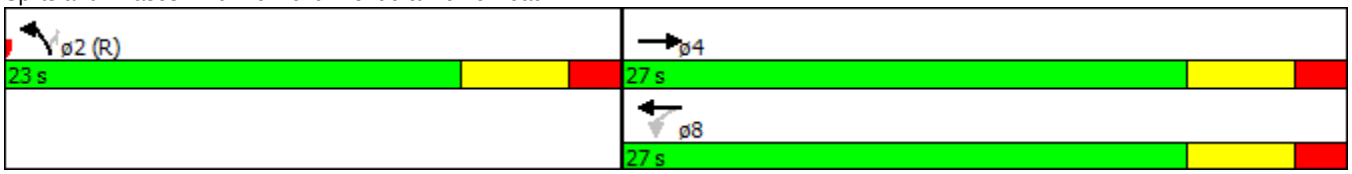
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		39.8	0.0	60.2		39.8	22.6	37.6
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		15.0	6.0	61.0		15.0	22.0	45.0
Max Q Clear Time (g_c+I1), s		0.0	0.0	20.2		21.0	16.0	24.1
Green Ext Time (p_c), s		0.0	0.0	9.0		0.0	0.7	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	27.5
HCM 2010 LOS	C

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	319	189	30	419	299	50
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.950					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1770	0	1770	1863	1770	1583
Flt Permitted			0.250		0.950	
Satd. Flow (perm)	1770	0	466	1863	1770	1583
Satd. Flow (RTOR)	73					54
Adj. Flow (vph)	347	205	33	455	325	54
Lane Group Flow (vph)	552	0	33	455	325	54
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Total Split (s)	27.0		27.0	27.0	23.0	23.0
Total Lost Time (s)	6.0		6.0	6.0	6.0	6.0
Act Effct Green (s)	18.0		18.0	18.0	20.0	20.0
Actuated g/C Ratio	0.36		0.36	0.36	0.40	0.40
v/c Ratio	0.81		0.20	0.68	0.46	0.08
Control Delay	22.2		11.6	17.4	15.0	4.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.2		11.6	17.4	15.0	4.6
LOS	C		B	B	B	A
Approach Delay	22.2			17.0	13.5	
Approach LOS	C			B	B	

Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 30 (60%), Referenced to phase 2:NBL and 6:, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 18.1	Intersection LOS: B
Intersection Capacity Utilization 54.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Belmont Avenue & Home Road



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	552	33	455	325	54
v/c Ratio	0.81	0.20	0.68	0.46	0.08
Control Delay	22.2	11.6	17.4	15.0	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	11.6	17.4	15.0	4.6
Queue Length 50th (ft)	140	6	85	71	0
Queue Length 95th (ft)	181	m12	m138	138	17
Internal Link Dist (ft)	2716		3133	1033	
Turn Bay Length (ft)		100			175
Base Capacity (vph)	785	195	782	706	664
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.17	0.58	0.46	0.08

Intersection Summary

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

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	319	189	30	419	299	50
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	347	205	33	455	325	54
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	433	256	241	733	650	580
Arrive On Green	0.39	0.39	0.39	0.39	0.37	0.37
Sat Flow, veh/h	1099	649	852	1863	1774	1583
Grp Volume(v), veh/h	0	552	33	455	325	54
Grp Sat Flow(s),veh/h/ln	0	1748	852	1863	1774	1583
Q Serve(g_s), s	0.0	14.0	1.8	9.8	7.1	1.1
Cycle Q Clear(g_c), s	0.0	14.0	15.8	9.8	7.1	1.1
Prop In Lane		0.37	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	688	241	733	650	580
V/C Ratio(X)	0.00	0.80	0.14	0.62	0.50	0.09
Avail Cap(c_a), veh/h	0	734	263	782	650	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.85	0.54	0.54	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.4	20.4	12.2	12.3	10.4
Incr Delay (d2), s/veh	0.0	5.2	0.1	0.7	2.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	7.6	0.4	5.1	3.9	0.5
LnGrp Delay(d),s/veh	0.0	18.6	20.6	12.9	15.0	10.7
LnGrp LOS		B	C	B	B	B
Approach Vol, veh/h	552			488	379	
Approach Delay, s/veh	18.6			13.4	14.4	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		24.3		25.7				25.7
Change Period (Y+Rc), s		6.0		6.0				6.0
Max Green Setting (Gmax), s		17.0		21.0				21.0
Max Q Clear Time (g_c+I1), s		9.1		16.0				17.8
Green Ext Time (p_c), s		0.8		2.8				1.9

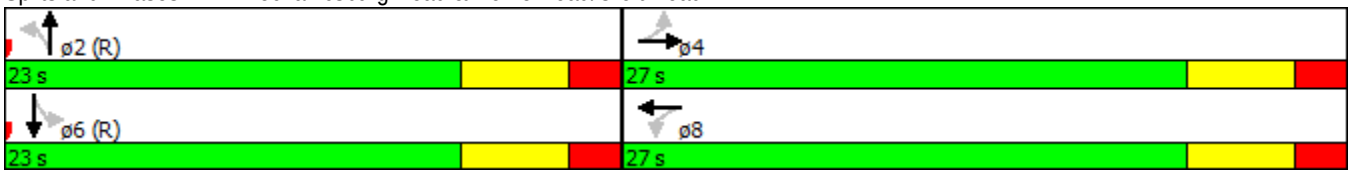
Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

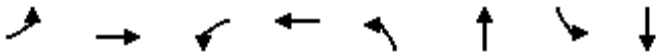
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	199	80	50	229	339	70	458	60	249	508	100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.957			0.911			0.983			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1748	0	1805	1731	0	1770	3479	0	1736	3384	0
Flt Permitted	0.217			0.563			0.374			0.441		
Satd. Flow (perm)	396	1748	0	1070	1731	0	697	3479	0	806	3384	0
Satd. Flow (RTOR)		50			159			31			50	
Adj. Flow (vph)	87	216	87	54	249	368	76	498	65	271	552	109
Lane Group Flow (vph)	87	303	0	54	617	0	76	563	0	271	661	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	27.0	27.0		27.0	27.0		23.0	23.0		23.0	23.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	18.4	18.4		18.4	18.4		19.6	19.6		19.6	19.6	
Actuated g/C Ratio	0.37	0.37		0.37	0.37		0.39	0.39		0.39	0.39	
v/c Ratio	0.60	0.45		0.14	0.84		0.28	0.41		0.86	0.49	
Control Delay	16.9	2.9		10.2	22.1		15.6	12.3		47.7	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.9	2.9		10.2	22.1		15.6	12.3		47.7	12.9	
LOS	B	A		B	C		B	B		D	B	
Approach Delay		6.0			21.1			12.7			23.0	
Approach LOS		A			C			B			C	

Intersection Summary

Cycle Length: 50
Actuated Cycle Length: 50
Offset: 43 (86%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 17.5 — Intersection LOS: B
Intersection Capacity Utilization 91.2% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 7: Mechanicsburg Road & Home Road/Croft Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	303	54	617	76	563	271	661
v/c Ratio	0.60	0.45	0.14	0.84	0.28	0.41	0.86	0.49
Control Delay	16.9	2.9	10.2	22.1	15.6	12.3	47.7	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	2.9	10.2	22.1	15.6	12.3	47.7	12.9
Queue Length 50th (ft)	4	4	9	106	16	61	75	72
Queue Length 95th (ft)	m7	13	26	#263	45	98	#201	116
Internal Link Dist (ft)		3133		843		1034		682
Turn Bay Length (ft)	100		150				475	
Base Capacity (vph)	166	763	449	819	272	1382	316	1356
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.40	0.12	0.75	0.28	0.41	0.86	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	199	80	50	229	339	70	458	60	249	508	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1900	1900	1900	1863	1863	1900	1827	1827	1900
Adj Flow Rate, veh/h	87	216	87	54	249	368	76	498	65	271	552	109
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	0	0	0	2	2	2	4	4	4
Cap, veh/h	219	521	210	469	291	431	286	1071	139	322	984	194
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	787	1240	499	1093	694	1025	771	3150	410	828	2893	569
Grp Volume(v), veh/h	87	0	303	54	0	617	76	279	284	271	330	331
Grp Sat Flow(s),veh/h/ln	787	0	1739	1093	0	1719	771	1770	1790	828	1736	1726
Q Serve(g_s), s	4.8	0.0	6.1	1.8	0.0	16.2	4.5	6.2	6.2	10.8	7.8	7.8
Cycle Q Clear(g_c), s	21.0	0.0	6.1	7.9	0.0	16.2	12.3	6.2	6.2	17.0	7.8	7.8
Prop In Lane	1.00		0.29	1.00		0.60	1.00		0.23	1.00		0.33
Lane Grp Cap(c), veh/h	219	0	730	469	0	722	286	602	609	322	590	587
V/C Ratio(X)	0.40	0.00	0.41	0.12	0.00	0.85	0.27	0.46	0.47	0.84	0.56	0.56
Avail Cap(c_a), veh/h	219	0	730	469	0	722	286	602	609	322	590	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.59	0.00	0.59	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.9	0.0	10.2	13.0	0.0	13.1	18.5	12.9	12.9	21.5	13.5	13.5
Incr Delay (d2), s/veh	0.7	0.0	0.2	0.1	0.0	9.8	2.3	2.6	2.6	22.4	3.8	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	2.9	0.6	0.0	9.5	1.1	3.4	3.5	5.7	4.3	4.3
LnGrp Delay(d),s/veh	23.6	0.0	10.4	13.1	0.0	22.9	20.8	15.5	15.5	43.9	17.3	17.3
LnGrp LOS	C		B	B		C	C	B	B	D	B	B
Approach Vol, veh/h		390			671			639			932	
Approach Delay, s/veh		13.4			22.2			16.1			25.0	
Approach LOS		B			C			B			C	

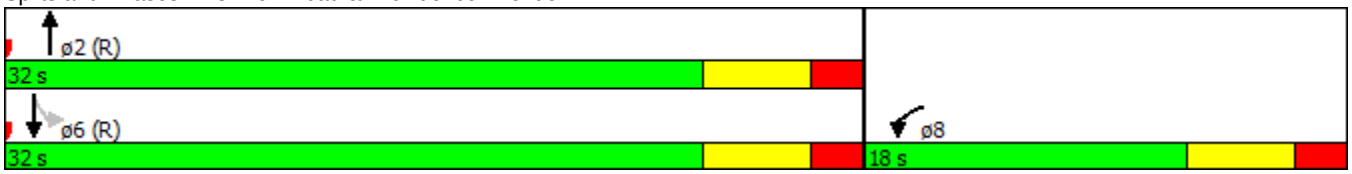
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		23.0		27.0		23.0		27.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		17.0		21.0		17.0		21.0
Max Q Clear Time (g_c+I1), s		14.3		23.0		19.0		18.2
Green Ext Time (p_c), s		2.1		0.0		0.0		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	20.4
HCM 2010 LOS	C

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	70	110	518	60	110	458
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.917		0.986			
Flt Protected	0.981				0.950	
Satd. Flow (prot)	1692	0	1855	0	1787	1881
Flt Permitted	0.981				0.343	
Satd. Flow (perm)	1692	0	1855	0	645	1881
Satd. Flow (RTOR)	120		17			
Adj. Flow (vph)	76	120	563	65	120	498
Lane Group Flow (vph)	196	0	628	0	120	498
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Total Split (s)	18.0		32.0		32.0	32.0
Total Lost Time (s)	6.0		6.0		6.0	6.0
Act Effct Green (s)	12.0		30.8		30.8	30.8
Actuated g/C Ratio	0.24		0.62		0.62	0.62
v/c Ratio	0.39		0.55		0.30	0.43
Control Delay	9.9		7.5		9.0	7.7
Queue Delay	0.0		0.0		0.0	0.0
Total Delay	9.9		7.5		9.0	7.7
LOS	A		A		A	A
Approach Delay	9.9		7.5			7.9
Approach LOS	A		A			A

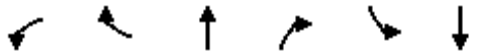
Intersection Summary	
Cycle Length: 50	
Actuated Cycle Length: 50	
Offset: 32 (64%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 8.0	Intersection LOS: A
Intersection Capacity Utilization 66.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 8: Derr Road & Providence Avenue



Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	196	628	120	498
v/c Ratio	0.39	0.55	0.30	0.43
Control Delay	9.9	7.5	9.0	7.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.9	7.5	9.0	7.7
Queue Length 50th (ft)	18	169	13	56
Queue Length 95th (ft)	60	224	55	177
Internal Link Dist (ft)	566	3537		893
Turn Bay Length (ft)			50	
Base Capacity (vph)	497	1149	397	1159
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.39	0.55	0.30	0.43

Intersection Summary



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	70	110	518	60	110	458
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1881	1900	1881	1881
Adj Flow Rate, veh/h	76	120	563	65	120	498
Adj No. of Lanes	0	0	1	0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	145	228	887	102	382	1007
Arrive On Green	0.22	0.22	0.54	0.54	0.54	0.54
Sat Flow, veh/h	644	1017	1656	191	802	1881
Grp Volume(v), veh/h	197	0	0	628	120	498
Grp Sat Flow(s),veh/h/ln	1670	0	0	1847	802	1881
Q Serve(g_s), s	5.2	0.0	0.0	12.0	6.2	8.4
Cycle Q Clear(g_c), s	5.2	0.0	0.0	12.0	18.1	8.4
Prop In Lane	0.39	0.61		0.10	1.00	
Lane Grp Cap(c), veh/h	375	0	0	989	382	1007
V/C Ratio(X)	0.53	0.00	0.00	0.63	0.31	0.49
Avail Cap(c_a), veh/h	401	0	0	989	382	1007
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.74	0.95	0.95
Uniform Delay (d), s/veh	17.0	0.0	0.0	8.2	14.6	7.3
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.3	2.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.0	6.6	1.6	4.8
LnGrp Delay(d),s/veh	18.2	0.0	0.0	10.5	16.6	9.0
LnGrp LOS	B			B	B	A
Approach Vol, veh/h	197		628			618
Approach Delay, s/veh	18.2		10.5			10.5
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		32.8				32.8		17.2
Change Period (Y+Rc), s		6.0				6.0		6.0
Max Green Setting (Gmax), s		26.0				26.0		12.0
Max Q Clear Time (g_c+I1), s		14.0				20.1		7.2
Green Ext Time (p_c), s		6.2				3.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

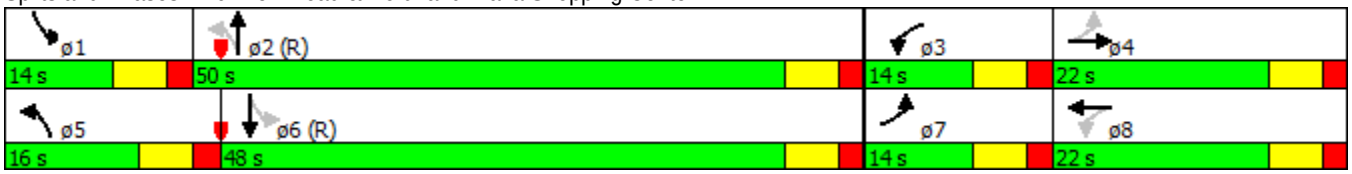
Notes

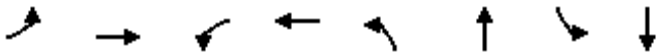
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	10	80	70	10	20	120	279	80	20	299	10
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.867			0.900			0.967			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1631	0	1687	1598	0	1752	1784	0	1770	1853	0
Flt Permitted	0.736			0.604			0.446			0.529		
Satd. Flow (perm)	1385	1631	0	1073	1598	0	823	1784	0	985	1853	0
Satd. Flow (RTOR)		87			22			18			2	
Adj. Flow (vph)	54	11	87	76	11	22	130	303	87	22	325	11
Lane Group Flow (vph)	54	98	0	76	33	0	130	390	0	22	336	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	14.0	22.0		14.0	22.0		16.0	50.0		14.0	48.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	16.9	12.0		18.4	14.8		67.5	64.6		60.1	53.9	
Actuated g/C Ratio	0.17	0.12		0.18	0.15		0.68	0.65		0.60	0.54	
v/c Ratio	0.21	0.36		0.31	0.13		0.21	0.34		0.03	0.34	
Control Delay	30.6	15.2		33.0	22.5		4.9	8.8		7.5	16.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.6	15.2		33.0	22.5		4.9	8.8		7.5	16.8	
LOS	C	B		C	C		A	A		A	B	
Approach Delay		20.7			29.9			7.8			16.2	
Approach LOS		C			C			A			B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 84 (84%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.36	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 50.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 9: Derr Road & Northland Plaza Shopping Center





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	54	98	76	33	130	390	22	336
v/c Ratio	0.21	0.36	0.31	0.13	0.21	0.34	0.03	0.34
Control Delay	30.6	15.2	33.0	22.5	4.9	8.8	7.5	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.6	15.2	33.0	22.5	4.9	8.8	7.5	16.8
Queue Length 50th (ft)	26	6	38	6	27	114	2	160
Queue Length 95th (ft)	58	54	76	35	39	182	m9	276
Internal Link Dist (ft)		105		118		893		632
Turn Bay Length (ft)					100		100	
Base Capacity (vph)	276	334	251	305	650	1158	672	999
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.29	0.30	0.11	0.20	0.34	0.03	0.34

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	10	80	70	10	20	120	279	80	20	299	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1776	1776	1900	1845	1845	1900	1863	1863	1900
Adj Flow Rate, veh/h	54	11	87	76	11	22	130	303	87	22	325	11
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	7	7	7	3	3	3	2	2	2
Cap, veh/h	303	22	172	239	66	133	613	773	222	553	949	32
Arrive On Green	0.05	0.12	0.12	0.05	0.13	0.13	0.06	0.56	0.56	0.03	0.53	0.53
Sat Flow, veh/h	1792	183	1444	1691	530	1059	1757	1379	396	1774	1791	61
Grp Volume(v), veh/h	54	0	98	76	0	33	130	0	390	22	0	336
Grp Sat Flow(s),veh/h/ln	1792	0	1626	1691	0	1589	1757	0	1775	1774	0	1852
Q Serve(g_s), s	2.6	0.0	5.6	3.9	0.0	1.9	3.3	0.0	12.4	0.6	0.0	10.4
Cycle Q Clear(g_c), s	2.6	0.0	5.6	3.9	0.0	1.9	3.3	0.0	12.4	0.6	0.0	10.4
Prop In Lane	1.00		0.89	1.00		0.67	1.00		0.22	1.00		0.03
Lane Grp Cap(c), veh/h	303	0	194	239	0	199	613	0	995	553	0	981
V/C Ratio(X)	0.18	0.00	0.51	0.32	0.00	0.17	0.21	0.00	0.39	0.04	0.00	0.34
Avail Cap(c_a), veh/h	363	0	260	285	0	254	686	0	995	646	0	981
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.82	0.00	0.82	0.86	0.00	0.86
Uniform Delay (d), s/veh	35.9	0.0	41.3	36.1	0.0	39.1	9.8	0.0	12.4	10.4	0.0	13.5
Incr Delay (d2), s/veh	0.3	0.0	2.0	0.8	0.0	0.4	0.1	0.0	1.0	0.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	2.6	1.8	0.0	0.8	1.6	0.0	6.3	0.3	0.0	5.5
LnGrp Delay(d),s/veh	36.2	0.0	43.3	36.8	0.0	39.4	9.9	0.0	13.3	10.4	0.0	14.3
LnGrp LOS	D		D	D		D	A		B	B		B
Approach Vol, veh/h		152			109			520			358	
Approach Delay, s/veh		40.8			37.6			12.5			14.1	
Approach LOS		D			D			B			B	

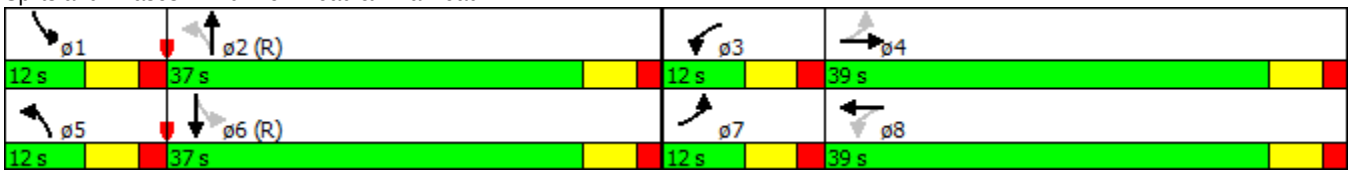
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	62.1	11.3	17.9	11.8	59.0	10.7	18.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	8.0	44.0	8.0	16.0	10.0	42.0	8.0	16.0
Max Q Clear Time (g_c+I1), s	2.6	14.4	5.9	7.6	5.3	12.4	4.6	3.9
Green Ext Time (p_c), s	0.0	4.8	0.0	0.4	0.1	4.8	0.0	0.5

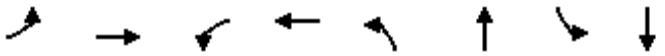
Intersection Summary	
HCM 2010 Ctrl Delay	19.2
HCM 2010 LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	309	129	169	269	40	120	179	120	60	159	50
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.981			0.940			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3417	0	1787	1845	0	1787	1768	0	1805	1832	0
Flt Permitted	0.324			0.335			0.533			0.495		
Satd. Flow (perm)	610	3417	0	630	1845	0	1003	1768	0	940	1832	0
Satd. Flow (RTOR)		68			8			35			16	
Adj. Flow (vph)	87	336	140	184	292	43	130	195	130	65	173	54
Lane Group Flow (vph)	87	476	0	184	335	0	130	325	0	65	227	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	12.0	39.0		12.0	39.0		12.0	37.0		12.0	37.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Act Effct Green (s)	28.5	22.5		29.7	24.9		49.9	42.7		46.3	39.0	
Actuated g/C Ratio	0.28	0.22		0.30	0.25		0.50	0.43		0.46	0.39	
v/c Ratio	0.36	0.58		0.72	0.72		0.23	0.42		0.13	0.31	
Control Delay	24.9	31.4		41.4	42.8		10.3	17.3		14.3	23.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.9	31.4		41.4	42.8		10.3	17.3		14.3	23.2	
LOS	C	C		D	D		B	B		B	C	
Approach Delay		30.4			42.3			15.3			21.2	
Approach LOS		C			D			B			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 6 (6%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 28.6	Intersection LOS: C
Intersection Capacity Utilization 63.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: Derr Road & Villa Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	476	184	335	130	325	65	227
v/c Ratio	0.36	0.58	0.72	0.72	0.23	0.42	0.13	0.31
Control Delay	24.9	31.4	41.4	42.8	10.3	17.3	14.3	23.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.9	31.4	41.4	42.8	10.3	17.3	14.3	23.2
Queue Length 50th (ft)	37	121	84	196	29	123	19	94
Queue Length 95th (ft)	63	155	122	268	44	217	48	172
Internal Link Dist (ft)		616		681		632		459
Turn Bay Length (ft)	100		225		75		50	
Base Capacity (vph)	244	1173	256	614	567	774	497	724
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.41	0.72	0.55	0.23	0.42	0.13	0.31

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	80	309	129	169	269	40	120	179	120	60	159	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	87	336	140	184	292	43	130	195	130	65	173	54
Adj No. of Lanes	1	2	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	234	562	230	275	373	55	562	446	297	476	575	179
Arrive On Green	0.05	0.23	0.23	0.06	0.23	0.23	0.06	0.42	0.42	0.05	0.41	0.41
Sat Flow, veh/h	1792	2476	1013	1792	1603	236	1792	1054	703	1810	1390	434
Grp Volume(v), veh/h	87	241	235	184	0	335	130	0	325	65	0	227
Grp Sat Flow(s),veh/h/ln	1792	1787	1702	1792	0	1840	1792	0	1757	1810	0	1823
Q Serve(g_s), s	3.7	12.0	12.4	6.0	0.0	17.1	4.1	0.0	13.1	2.0	0.0	8.3
Cycle Q Clear(g_c), s	3.7	12.0	12.4	6.0	0.0	17.1	4.1	0.0	13.1	2.0	0.0	8.3
Prop In Lane	1.00		0.60	1.00		0.13	1.00		0.40	1.00		0.24
Lane Grp Cap(c), veh/h	234	406	386	275	0	427	562	0	743	476	0	754
V/C Ratio(X)	0.37	0.59	0.61	0.67	0.00	0.78	0.23	0.00	0.44	0.14	0.00	0.30
Avail Cap(c_a), veh/h	244	590	562	275	0	607	562	0	743	493	0	754
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.96	0.00	0.96	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.6	34.5	34.7	32.4	0.0	36.0	15.4	0.0	20.4	15.7	0.0	19.6
Incr Delay (d2), s/veh	1.0	1.4	1.6	6.2	0.0	4.3	0.2	0.0	1.8	0.1	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	6.1	6.0	4.4	0.0	9.2	2.1	0.0	6.7	1.0	0.0	4.4
LnGrp Delay(d),s/veh	29.6	35.9	36.2	38.6	0.0	40.4	15.6	0.0	22.2	15.8	0.0	20.7
LnGrp LOS	C	D	D	D		D	B		C	B		C
Approach Vol, veh/h		563			519			455			292	
Approach Delay, s/veh		35.1			39.7			20.3			19.6	
Approach LOS		D			D			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	48.3	12.0	28.7	12.0	47.3	11.5	29.2
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	6.0	31.0	6.0	33.0	6.0	31.0	6.0	33.0
Max Q Clear Time (g_c+I1), s	4.0	15.1	8.0	14.4	6.1	10.3	5.7	19.1
Green Ext Time (p_c), s	0.0	3.0	0.0	4.7	0.0	3.3	0.0	4.1

Intersection Summary	
HCM 2010 Ctrl Delay	30.3
HCM 2010 LOS	C

Delay Reduction and Emissions Analysis for MPO-##: Project Title

Home Road West

Project life span (years)	15		
Analysis year	2040		
Days per year	365		
Arterial ADT	14,800		
Vehicles per hour (peak periods)	2,294	16%	of ADT
Vehicles per hour (off-peak periods)	12,506	85%	of ADT
Number of intersections	5		

Legend

Required Inputs
Output

No-Build Conditions

Peak period average vehicle delay (sec/veh)	26.7	from analysis using HCM or Synchro
Off-peak period average vehicle delay (sec/veh)		
Hours of delay/day at peak	85.1	
Hours of delay/day at off-peak	0.0	
Total hours of delay/day, no build	85	

Build Conditions

Peak period average vehicle delay (sec/veh)	27
Off-peak period average vehicle delay (sec/veh)	
Hours of delay/day at peak	86.0
Hours of delay/day at off-peak	0.0
Total hours of delay/day, build	86

Delay Reduction

Delay reduction in hours/day	-1
Total hours of delay reduction per year	-349

Annual Emissions Reduction

	Model Year	Pollutant		
		VOC	NOx	PM2.5
idle Emissions (grams/hour)	2040	2.52	2.59	0.0030
Emissions reductions (kg/yr)	2040	-0.880	-0.903	-0.001
Emissions reductions (kg/day)	2040	-0.0024	-0.0025	0.0000
Emissions reductions (kg/year)	2040	-0.8802	-0.9032	-0.0010

Analyzed by:
Submitted to:
Analysis date:

Delay Reduction and Emissions Analysis for MPO-##: Project Title

Home Road East

Legend: Required Inputs; Output

Project life span (years)	15		
Analysis year	2040		
Days per year	365		
Arterial ADT	9,300		
Vehicles per hour (peak periods)	1,442	16%	of ADT
Vehicles per hour (off-peak periods)	7,859	85%	of ADT
Number of intersections	2		

No-Build Conditions

Peak period average vehicle delay (sec/veh)	17.2	from analysis using HCM or Synchro
Off-peak period average vehicle delay (sec/veh)		
Hours of delay/day at peak	13.8	
Hours of delay/day at off-peak	0.0	
Total hours of delay/day, no build	14	

Build Conditions

Peak period average vehicle delay (sec/veh)	16.6
Off-peak period average vehicle delay (sec/veh)	
Hours of delay/day at peak	13.3
Hours of delay/day at off-peak	0.0
Total hours of delay/day, build	13

Delay Reduction

Delay reduction in hours/day	0
Total hours of delay reduction per year	175

Annual Emissions Reduction

	Model Year	Pollutant		
		VOC	NOx	PM2.5
idle Emissions (grams/hour)	2040	2.52	2.59	0.0030
Emissions reductions (kg/yr)	2040	0.442	0.454	0.001
Emissions reductions (kg/day)	2040	0.0012	0.0012	0.0000
Emissions reductions (kg/year)	2040	0.4425	0.4541	0.0005

Analyzed by:
Submitted to:
Analysis date:

Delay Reduction and Emissions Analysis for MPO-##: Project Title

Derr Road

Project life span (years)	15		
Analysis year	2040		
Days per year	365		
Arterial ADT	10,400		
Vehicles per hour (peak periods)	1,612	16%	of ADT
Vehicles per hour (off-peak periods)	8,788	85%	of ADT
Number of intersections	3		

Legend

Required Inputs
Output

No-Build Conditions

Peak period average vehicle delay (sec/veh)	19.5	from analysis using HCM or Synchro
Off-peak period average vehicle delay (sec/veh)		
Hours of delay/day at peak	26.2	
Hours of delay/day at off-peak	0.0	
Total hours of delay/day, no build	26	

Build Conditions

Peak period average vehicle delay (sec/veh)	20.5
Off-peak period average vehicle delay (sec/veh)	
Hours of delay/day at peak	27.5
Hours of delay/day at off-peak	0.0
Total hours of delay/day, build	28

Delay Reduction

Delay reduction in hours/day	-1
Total hours of delay reduction per year	-490

Annual Emissions Reduction

	Model Year	Pollutant		
		VOC	NOx	PM2.5
idle Emissions (grams/hour)	2040	2.52	2.59	0.0030
Emissions reductions (kg/yr)	2040	-1.237	-1.269	-0.001
Emissions reductions (kg/day)	2040	-0.0034	-0.0035	0.0000
Emissions reductions (kg/year)	2040	-1.2371	-1.2694	-0.0015

Analyzed by:
Submitted to:
Analysis date:

Emission Reduction Summary

Home Road West of Derr Road

Reduction and Emissions Analysis - Based on Vehicular Delay

Peak Hour 15.5% of ADT

Peak Hour Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	(0.88)
NOX	(0.90)
PM2.5	(0.00)
Annual Emissions Reductions	**(1.78)**

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	(5.68)
NOX	(5.83)
PM2.5	(0.01)
Annual Emissions Reductions	**(11.51)**

*Based on vehicular delay, there will be **an increase** in emissions of 11.51 kg/year

Reduction and Emissions Analysis - Based on Mode Shift

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
ROG	9.24
NOX	6.56
PM2.5	2.32
Annual Emissions Reductions	**18.12**

*Based on mode shift, there will be **a decrease** in emissions of 18.12 kg/year

Home Road East of Derr Road

Reduction and Emissions Analysis - Based on Vehicular Delay

Peak Hour 15.5% of ADT

Peak Hour Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	0.44
NOX	0.45
PM2.5	0.00
Annual Emissions Reductions	**0.90**

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	2.85
NOX	2.93
PM2.5	0.00
Annual Emissions Reductions	**5.79**

*Based on vehicular delay, there will be **a decrease** in emissions of 5.79 kg/year

Reduction and Emissions Analysis - Based on Mode Shift

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
ROG	4.03
NOX	2.86
PM2.5	1.01
Annual Emissions Reductions	**7.90**

*Based on mode shift, there will be **a decrease** in emissions of 7.9 kg/year

Derr Road

Reduction and Emissions Analysis - Based on Vehicular Delay

Peak Hour 15.5% of ADT

Peak Hour Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	(1.24)
NOX	(1.27)
PM2.5	(0.00)
Annual Emissions Reductions	**(2.51)**

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
VOC	(7.98)
NOX	(8.19)
PM2.5	(0.01)
Annual Emissions Reductions	**(16.18)**

*Based on vehicular delay, there will be **an increase** in emissions of 16.18 kg/year

Reduction and Emissions Analysis - Based on Mode Shift

Daily Emissions Reduction

Pollutant	Reduction (kg/year)
ROG	5.17
NOX	3.67
PM2.5	1.30
Annual Emissions Reductions	**10.14**

*Based on mode shift, there will be **a decrease** in emissions of 10.14 kg/year