

Route 460



Safety and Operations Study

July 2018









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Definition of Terms

Crossover - a break in the landscaped or concrete median.

KAB Crashes - Fatal and severe crashes as noted by the KABCO scale: K = fatal crash; A = incapacitating injury; B = non-incapacitating injury; C = possible injury; and O = no injury.

MUTCD – Manual on Uniform Traffic Control Devices for Streets and Highways. Published by the Federal Highway Administration (FHWA) to provide standardization of traffic control devices throughout the United States. Compliance with the MUTCD helps promote safe, orderly and efficient movement of traffic.

PSI – Potential for Safety Improvement. A statistical measurement providing an indication of where crashes may be reduced with intersection/corridor improvements or upgrades. It is the difference between expected crashes and actual crashes.

Roadway Departure - a crash where the vehicle ran off the road either to the right or to the left.

Safety Edge – a sloped pavement edge to the ground to aid vehicle recovery from a roadway departure.

Vehicle Miles Traveled (VMT) - The number of miles collectively traveled by all vehicles on a specific stretch of roadway for one year.

Sources

American Association of State Highway and Transportation Officials. Highway Safety Manual. U.S. Department of Transportation, Federal Highway Administration.

Federal Highway Administration. Crash Modification Clearinghouse. http:// www.cmfclearinghouse.org/. Federal Highway Administration.

Federal Highway Administration Office of Safety. Integrating the HSM into the Highway Project Development Process. U.S. Department of Transportation, Federal Highway Administration.

Federal Highway Administration Office of Safety. Systemic Safety Project Selection Tool. U.S. Department of Transportation, Federal Highway Administration.

Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition with Revision Numbers 1 and 2 incorporated, dated May 2012. U.S. Department of Transportation.

Virginia Department of Transportation. Corridors of Statewide Significance Corridor Safety Assessment Process Guidelines. Commonwealth of Virginia.

Virginia Department of Transportation. Road Design Manual. Commonwealth of Virginia.

Virginia Department of Transportation. Traffic Operations and Safety Analysis Manual. Commonwealth of Virginia.

GIS Data:

Speed limit data was based on information on the VDOT website: http:// virginiaroads.org/Mapping/#SpeedZones and field review of speed limit signs.

GIS lighting, signs and traffic signals received from VDOT.

Crash records provided by VDOT (2012-2016).

Base map data and graphics throughout this report were created using ArcGIS® software by Esri. ArcGIS® and ArcMap[™] are the intellectual property of Esri and are used herein under license. Copyright © Esri. All rights reserved.

Operational Analysis:

Thursday, May 18, 2017.

Trafficware, LLC. (2017). Synchro Studio 9 User Guide. Sugar Land, TX.

Definitions of Terms and Sources

Existing signal timings received from City of Suffolk and VDOT.

Turning movement counts were conducted by VHB on Tuesday, May 16 and



Executive Summary

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The Virginia Department of Transportation (VDOT) identified the need to evaluate the Route 460 corridor for improved transportation safety and operations within the City of Suffolk and Isle of Wight County. The project corridor spans from 1,500 feet west of the Route 58 and Route 460 interchange to the eastern Town of Windsor limits. This report documents the findings of the safety and operational analyses and presents the final recommendations and plan of action for the corridor. The goal of the study was to identify and develop a plan of low-cost improvements that VDOT can implement to make Route 460 a safer transportation facility.

E.1 Operational Analysis and Recommendation

As part of the study, an operational analysis of signalized and key unsignalized intersections along the project corridor was conducted. The evaluation examined existing conditions, 2040 No Build and 2040 Build conditions. Additionally, a signal warrant screening was conducted at the Old Suffolk Road and Route 460 intersection in order to determine if a signal may be warranted at that intersection. The results of the operational analysis, combined with the safety analysis guided site-specific operational recommendations. The operational recommendations included changes to signal timings and phasing, the implementation of flashing yellow arrow signals for protected/permissive movements, and lane use changes that result in changes to signal phasing.

33% Rear End Animal 1% Motorcycle Other Angle 10% Head On 1% Sideswipe 16% Fixed Object In Road **Roadway Departure** Figure ES.1. **Crash Type Distribution.**

E.2 Recommendations and Action Plan

The study utilized five years of crash data (2012 – 2016) to assess the current safety of the Route 460 corridor in accordance with the Corridor Safety Assessment (CSA) Process Guideline prepared for Corridors of Statewide Significance (CoSS). The data set included 242 crash records categorized as roadway departure, crash with an animal, angle, rear end, sideswipe or other. The distribution by crash type is shown in Figure ES.1.

The data was processed from multiple perspectives to provide the most comprehensive evaluation of the roadway conditions. The results were used to prepare a set of countermeasures which can predictively produce facilities with reduced crash rates after implementation when referencing the Federal Highway Administration's (FHWA) Crash Modification Factors Clearinghouse (http://www. cmfclearinghouse.org).

The safety techniques can be organized into three categories. The three categories, and example measures, are described below:

- Positive guidance and recovery measures widening shoulders, installing safety edge, and enhancing roadway delineation and lighting where needed.
- Unsignalized intersection measures construction of turn lanes at select intersections, installing intersection warning signs, and speed enforcement.
- Signalized intersection measures installing high visibility signal backplates, installing intersection warning signs and lane control markings, installing overhead lane use signs, and speed enforcement.

The countermeasures were assigned throughout the Route 460 corridor through the hybrid approach of addressing crash history and potential crash risk. The analysis led to a series of recommendations which emerged from both systemic and site specific evaluations. All details can be found in the full document and appendices.

Executive Summary



Executive Summary

chapter 1

Introduction



Figure 1.1 Study Area.

VDOT has been working to improve Route 460 within Hampton Roads for decades. There was a proposed widening project along this segment that would have provided a divided four-lane highway. While this project was not funded, VDOT saw there was a need to address safety concerns along Route 460 with low-cost easily implementable solutions.

Based on known safety concerns and changes in traffic on Route 460, VDOT requested that VHB assess the current safety and operational conditions of the corridor. At the conclusion of the assessment, VHB was to determine modifications that would improve safety and operations for personal and commercial traffic. This report documents the findings of the study and presents the following: operational analysis, systemic analysis of intersections and corridor segments, intersection assessment, site specific location evaluation, arterial preservation, evacuation assessment, and recommendations.

1.1 Study Area

The study area is along the Route 460 corridor. The study area begins approximately 1,500 feet west of Route 460 and U.S. Route 58 interchange and extends to the eastern limits of the Town of Windsor, a distance of approximately 6.6 miles. Regionally, Route 460 is a principal east – west corridor linking Norfolk to Petersburg. Within the study area, Route 460 traverses Suffolk and Isle of Wight County.

It should be noted that the original study limits included the Town of Windsor. However, improvements within the Town limits would require substantial right of way impacts and costs for major reconstruction. Based on the initial analysis of traffic data, the crashes that have occurred in the higher speed sections of the corridor resulted in a greater number of persons being injured. As such, the limits of the study were revised to the eastern Town of Windsor limits.

Route 460 has a dual purpose, serving as a "main street" for local residents and also a popular alternative commercial trucking route, in lieu of Interstate 64. Route 460 is a four-lane, undivided highway with uncontrolled access. Speed limits vary from 35 miles per hour (MPH) to 55 MPH.

1.2 Study Team and Coordination

The Study Team includes local and regional staff from VDOT and VHB. A team of Project Stakeholders augments the Study Team to guide the consultant through the duration of the study, review all technical documents, and provide direct input on recommendations. The Stakeholders include representatives from VDOT's Hampton Roads District, in addition to representatives from City of Suffolk, Isle of Wight, Town of Windsor and Hampton Roads Transportation Planning Organization (HRTPO). The Project Stakeholders met at critical decision points throughout project development.

1.3 Study Goals and Coordination

Specific goals and objectives were developed at the outset based on field reviews of the corridor, information received during the initial scoping process, and input from the initial stakeholder meeting. The goal of the study was to set forth a set of tiered recommendations of signs, pavement markings, geometric changes, traffic control techniques and other improvements to enhance safety and operations of the Route 460 corridor. The recommendations were developed through an evaluation of traffic operations and crash history by proactively applying templates of proven safety techniques in combination with site specific measures that have proven safety results.

The objectives in comprehensively assessing the safety of the corridors are as follows:

- Conduct a field review, inventory, and evaluation of existing conditions.
- Identify corridor users, roadway characteristics, and key issues affecting travel along the corridor.
- > Synthesize background, traffic operations, and crash data.
- Develop recommendations that address safety concerns and operational issues.
- Provide planning level cost estimates for associated study recommendations.

This report provides the documentation of the study, results, and recommendations. It is generally organized by existing conditions, operational analysis, systemic evaluation, site specific location evaluation, arterial preservation and evacuation assessment, and recommendations.

Introduction









1

chapter 2





Study Methodology 2.1

The study follows VDOT's Corridor Safety Assessment (CSA) Process Guideline prepared for Corridors of Statewide Significance (CoSS). The CSA process is a systemic approach to proactively reduce potential crashes using a series of templates with tiered application for various geometric conditions. The methodology for this study is based on the layered nine step CSA process, see Figure 2.1. The final recommendations are a product of the systemic analysis, field review and observations, and the site specific location evaluation.

Five-year (2012-2016) crash data was used to measure current crash trends and develop site specific improvements to achieve a reduction in the number of crashes or the severity of crashes. The existing field conditions were documented



Figure 2.1. **Study Process.**

through a field assessment and the database inventory of existing roadway attributes. Signals, pavement condition, pavement markings, and stormwater collection and drainage were the most thoroughly documented attributes, as the scope of this study did not include an asset inventory.

VHB took a hybrid approach to evaluating the corridor using a process that was created by VHB for VDOT's CSA (see Figure 2.2), whereby systemic and site specific approaches were combined to comprehensively review the Route 460 corridor. With this approach, VHB utilized systemic countermeasure packages developed for the improvements as needed. The VDOT approved CoSS templates were modified to be specific to Route 460 and were used to identify up to three tiers of countermeasure treatments to enhance safety. The templates are provided in Appendix A. The findings of the systemic analysis are documented in Chapter 4.

As part of this study, a portion of the recommendations were analyzed using the VDOT Extended Highway Safety Manual (HSM) Part C Spreadsheets to predict the crashes on the corridor. Results are provided in Chapter 4.

GIS mapping tools and crash data analysis for a five-year period were used to identify specific areas of concern or locations that have a potential for safety improvement. A more in-depth review was conducted at 11 site specific locations which are described in detail in Chapter 5.

Through the public involvement process, the citizens in the City of Suffolk and Isle of Wight County expressed concern on two major elements of the corridors: turning lanes and the lack of shoulders. The results and recommendations are discussed in Chapter 6.

2.2 Systemic Analysis Process

The following items are detailed in the study report:

- Recommended upgrades of traffic control devices;
- Recommended systemic countermeasure packages to address identified intersections and corridor segments; and,
- Recommended site specific improvements for 11 locations along the corridor.

Public Involvement 2.3

This study relied heavily on the crash data to guide analysts to the site specific locations, to perform the systemic evaluation, and to apply the appropriate templates; nonetheless, there is always value in hearing citizens' perspectives and concerns. Crash history is a documentation of events, but does not capture the daily experience of the local community. The key components of the public involvement for this study were:

Figure 2.2. Systemic Analysis Process.

- Initial Scoping Meetings;

Scoping meetings relied on the collaboration between VDOT Hampton Roads District, City of Suffolk, Isle of Wight, and Hampton Roads Transportation Planning Organization (HRTPO) to define and refine the scope of the study. This process allowed the team to identify other areas or items for consideration and evaluation.

Additionally, four Citizen Information Meetings (CIM) were held; two during the initial investigation phase and two at the final stage. During each phase, one meeting was held in the City of Suffolk and one meeting in the Town of Windsor. Citizen comments were solicited during the CIM#1, held on October 18, 2017 at the Kings Folk Middle School, and CIM#2, held on October 19, 2017 at the Windsor High School. Two follow up meetings, CIM#3 and CIM#4, were held on February 20, 2018 and February 22, 2018, respectively at the same locations to report on analysis results and potential countermeasures which would be in the recommendations.

CIM#1 and CIM#2 included boards displayed for viewing, a continuous loop video of the corridor, and study team representatives engaged in conversation with citizens on their experiences along the corridors. A handout was provided for capturing comments which could be mailed in and was made available electronically after the meeting. The comment period was open until October 30, 2017.



- Coordination with Elected Officials and Key Stakeholders; and
- Citizen Information Meetings.

2 Methodology

Ten citizens provided comments (see Appendix B). Of the 14 locations that citizens could comment on, Locations #3, 8, and 11 received the majority of comments. Six comments referenced widening the existing roadway or installing turning lanes. Traffic volume, lack of proper shoulders, and lack of medians made up 3 comments. One citizen commented on how Location #3 needed an advanced warning signal to try and combat observed red-light running.

The comments received were reviewed during the analysis of the corridors and then again after the recommendations were developed. The review was performed to ensure the concerns were taken into consideration during the study.

Two follow-up meetings, CIM#3 which was held on February 20, 2018 at Windsor High School, and CIM#4 which was held on February 22, 2018 at the Kings Fork Middle School, as an update on the progress of the study. The study presentation provided an overview of the study process, some of the countermeasures which were in the recommendations, and the schedule. Additional comments were received and reviewed to ensure concerns were taken into consideration in the report.

2.4 Crash Modification Factors

A crash modification factor (CMF) is a factor, based on documented safety research studies, used to compute the expected number of crashes after implementing a given countermeasure at a specific site. CMFs provide some indication of the potential benefit, or lack thereof, associated with specific countermeasures. The Federal Highway Administration (FHWA) compiles CMF data from published safety studies and posts them in the CMF Clearinghouse (http://www.cmfclearinghouse.org/index.cfm) to help practitioners select the most effective safety treatments. While CMF data is not available for all potential countermeasures, the CMF Clearinghouse provides a useful and consolidated source of data to help engineers, planners, and project owners make informed decisions.

There are many countermeasure techniques recommended in this study and only some of them have CMFs associated with them. Table 2.1, below, is a sample of the techniques and the corresponding CMFs used in the study.

How do CMF's work?

CMFs are a multiplicative factor that can be used to estimate the number of crashes with implementation of the selected countermeasure. The following equation can be used to calculate the estimated crashes with the treatment:

$$\begin{pmatrix} \text{Estimated Crashes} \\ \text{WITH Treatment} \end{pmatrix} = (CMF) \times \begin{pmatrix} \text{Estimated Crashes} \\ \text{WITHOUT Treatment} \end{pmatrix}$$

Example:

A location had 10 crashes per year during the study period. The countermeasure has a CMF of 0.8, meaning according to research, this countermeasure may provide a 20% reduction in crashes. Therefore, the expected crashes after implementation of the countermeasure is 8 crashes per year.

$$\left(\text{Expected crashes}\right) = \left(0.8\right) \times \left(10 \text{ crashes}\right) = \left(\begin{array}{c} 8 \text{ crashes per year} \\ after \text{ implementation} \end{array}\right)$$

Table 2.1. Crash Modification Factors.

Countermeasure	СМҒ	Notes	Source
Install shoulder rumble strips	0.82 (18% reduction)	Roadway Departures - all severities	CMF Clearinghouse
Install center line rumble strips	0.82 (18% reduction)	All Crashes - fatal, serious injury	CMF Clearinghouse
Widen shoulder (paved) (from 2 to 4 ft)	0.89 (11% reduction)	All Crashes - all severities	CMF Clearinghouse
Installation of safety edge treatment	0.85 - 1.00 (0 - 15% reduction)	All Crashes - all severities	CMF Clearinghouse
Add dynamic intersection warning signs	0.814-0.918 (8.2%-18.6% reduction)	All Crashes - all severities	CMF Clearinghouse
Intersection lighting	0.881 - 0.92 (8 - 11.9% reduction)	Nighttime crashes - all severities	CMF Clearinghouse
Directional medians to allow left-turns and u-turns	0.77 (23% reduction)	All Crashes - all severities	CMF Clearinghouse
Replace a direct left turn with a right-turn/u-turn ¹ (RCUT Intersection)	0.8 (20% reduction)	All Crashes - all severities	CMF Clearinghouse
Provide a right-turn lane on one major road approach	0.86 - 0.92 (8 - 14% reduction)	All Crashes - all severities	CMF Clearinghouse
Corridor Access Management	0.77 - 0.95 (5 - 23% reduction)		FHWA Proven Countermeasures

¹RCUT: Restricted Crossing U-Turn (RCUT) Intersection.



chapter

Operational Analysis









Figure 3.1 Existing Lane Configuration.

LEGEND Existing Turning Movements



Operational Analysis

3

Operational Analysis

As part of the Route 460 Study, VDOT requested an analysis of the operational conditions along the corridor to determine areas for improved operations. This evaluation examined the existing, 2040 No Build and 2040 Build conditions. Additionally, the analysis included a high-level signal warrant screening at the intersection of Old Suffolk Road and Route 460.

As part of this analysis, existing turning movement counts were conducted at identified signalized and unsignalized intersections. Those volumes along with existing signal timings and lane geometry were utilized to analyze the existing conditions. Growth rates that were developed from VDOT's regional traffic model were utilized to project the volumes for the 2040 No Build and Build analyses. Intersections with poor level of service, or information gathered from community meetings and safety analysis helped guide the improvements that were tested in the 2040 Build analysis. The following section details the operational analysis and results.

Existing Conditions 3.1

The preparation of operational analysis required a thorough understanding of the existing roadway conditions at the subject intersections. Elements incorporated into the baseline analysis include roadway lane geometry, shown in Figure 3.1, and hourly traffic volumes.

Traffic around the site includes trucks, passenger vehicles, buses and service vehicles as well as emergency response vehicles. Based on the 2016 Annual Daily Traffic (AADT) data available on the Virginia Department of Transportation (VDOT) web site, 20,000-27,000 vehicles per day travel through the study corridor.

3.1.1 2017 Existing Traffic Counts

VHB collected peak hour traffic counts at all study intersections on Tuesday May 16th and on Thursday, May 18, 2017. In addition, 14-hour turning movements counts were taken on Thursday, May 18th, 2017 at the intersection of Route 460/ Windsor Boulevard & Old Suffolk Road. These 14-hour counts were required for a signal warrant screening. As a part of the turning movement counts, pedestrian volumes were also recorded at the subject intersections. Pedestrian traffic was light and most intersections did not have any pedestrian volumes. Detailed count data is provided in Appendix C.

The turning movement traffic counts indicate that there are distinct hours during the weekday when traffic experiences its highest levels at the subject intersections. Based on the traffic count data the peak hours for the observed signalized intersections were identified as shown in Table 3.1.

Despite the variation in peak hours shown in Table 3.1, the AM and PM peak hours were assumed to be consistent along the corridor for the analysis. Therefore the peak hour volume for each intersection was used in the analysis in order to be conservative.

Table 3.1.

Summary of Intersection Peak Hours.

ID	Intersection	AM Peak	PM Peak
1	Route 460 & Northfield Drive	7:15-8:15	4:30-5:30
2	Route 460 & Rob's Drive	7:30-8:30	4:45-5:45
3	Route 460 & Kings Fork Road	7:15-8:15	4:45-5:45
4	Route 460 & Providence Road/Lake Prince Drive	7:00-8:00	4:45-5:45
5	Route 460 Woodlawn Drive	6:45-7:45	4:45-5:45
6	Route 460 & Old Suffolk Road	6:15-7:15	4:45-5:45
7	Route 460 & Dominion Way	6:30-7:30	4:30-5:30

A summary AM and PM peak hour turning movement volumes at each of the intersections in the study network is presented on Figure 3.4.

The posted speed limit on Route 460 along the study corridor ranges between 45 and 55 MPH. There is a school zone speed limit at both westbound and eastbound approaches to Rob's Drive, where the school zone speed limit is 35 MPH during morning and evening drop off hours. The speed limit of 35 MPH at these approaches was used in this analysis since the drop off times fall into actual AM and PM peak hours.

3.1.2 Methodology

Capacity analyses were performed to determine the existing level-of-service (LOS) for the AM and PM peak hours for the study intersections.

Capacity analysis results are expressed in terms of LOS. LOS is a qualitative measurement of traffic operations. It is translated from a measure of delay to drivers in units of time, seconds per vehicle. The Transportation Research Board's (TRB's) Highway Capacity Manual (HCM) defines six levels of service for intersections with LOS "A" representing operating conditions with minimal constraints on traffic movements and LOS "F" representing extremely congested operating conditions. Exhibit 18-4 of the HCM gives the criteria for signal controlled intersections, while HCM Exhibit 19-1 gives the criteria for unsignalized intersections.

As mentioned earlier, levels of service results range from LOS A being the best to LOS F being the worst. LOS D is typically used as the acceptable LOS threshold

Signalized Level of Service	Signal Delay per Vehicle (sec/veh)	Unsignalized Level of Service	Stopped Delay per Vehicle (sec/veh)
A	< <u>≤10.0</u>	A	≤ 10.0
B	> 10.0 and < 20.0	В	> 10.0 and < 15.0
С	> 20.0 and < 35.0	С	> 15.0 and < 25.0
D	> 35.0 and < 55.0	D	> 25.0 and < 35.0
E	> 55.0 and < 80.0	E	> 35.0 and < 50.0
F	> 80.0	F	> 50.0
Figure 3.2		Figure 3.3	

Criteria

HCM Exhibit 19-1: Level of Service

Figure 3.2 HCM Exhibit 18-4: Level of Service Criteria

for many states and cities, including the Commonwealth of Virginia and the City of Suffolk. Sometimes LOS E and F are accepted in certain highly urbanized and constrained areas.

The analysis was performed in accordance with the VDOT requirements and guidelines provided in the Traffic Operations and Safety Analysis Manual (TOSAM). The TOSAM provides consistent and uniform direction and guidance for scoping, conducting, and reporting traffic and safety analyses in the state of Virginia. Synchro 9.1 was the software tool used for analysis determining the delay, capacity and corresponding LOS of the study intersections. The existing LOS capacity analyses were based on: (1) the existing lane use and traffic controls shown on Figure 3.1; (2) the existing AM and PM traffic volumes presented in Figure 3.4; and (3) the HCM methodologies (using Synchro 9.1 software).

LOS results summary for existing conditions are presented in Table 3.2 below. Based on the existing conditions analysis, all intersections in the study area operate acceptably at a LOS A, B, and C.

Table 3.2.

		Control	Existing		
שו	Intersection Name	Control	AM	РМ	
1	Route 460/Pruden Boulevard & Northfield Drive	Signalized	A (SB-C)	B (SB-D)	
2	Route 460/Pruden Boulevard & Rob's Drive	Signalized	B (SB-D)	B (SB-D)	
3	Route 460/Pruden Boulevard & Kings Fork Road	Signalized	C (SB-F)	C (SB-E)	
4	Route 460/Pruden Boulevard&Providence Road/Lake Prince Drive	Signalized	B (SB-C)	B (NB-C)	
5	Route 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	(NB-C)	(NB-B)	
6	Route 460/Windsor Boulevard & Old Suffolk Rd	Unsignalized	(SB-C)	(NB-C)	
7	Route 460/Windsor Boulevard & Dominion Way	Signalized	A (NB-C)	A (NB-C)	

Level of Service

Details on the expected delays at each approach in the study corridor are shown in Table D.2 in Appendix D. The Synchro reports for the 2017 Existing conditions scenario are also included in Appendix D.

The analysis showed that all intersections operate at acceptable LOS C or better in both the AM and PM peak hours. However, even though the intersection of Route 460 and Kings Fork Road is currently operating under LOS C during both AM and PM peak hours, the southbound approach is operating at LOS F with 116 seconds of delay per vehicle (sec/veh) during AM peak hour and at LOS E with 64 sec/veh of delay during PM peak hour.

2017 Existing Conditions Level of Service Results Summary.

Legend: X - Overall Level of Service, (XX-X) - Worst Approach-Worst Approach











Figure 3.4 2017 Existing Peak Hour Turning Movement Volumes.

AM (PM) Volumes

LEGEND

Operational Analysis

3

3 Operational Analysis

3.1.3 Signal Warrant Screening

Evaluation of the need for a traffic signal at an intersection requires the examination of various factors such as traffic volumes, traffic flow and progression, and overall safety of the intersection to determine if a traffic signal would be warranted. Each of these elements should be considered in the signal warrant analysis. As a part of this study, a high-level traffic signal warrant screening was performed for the intersection of Route 460/Windsor Boulevard and Old Suffolk Road, to determine whether a signal would be warranted under the existing conditions. This signal warrant screening process only included screening the peak hour and four-hour volume warrants for the existing conditions and was performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD).

More detailed documented results are presented in Appendix E. The results of the signal warrant screening showed that under the existing conditions the subject intersection does not meet the two traffic signal warrants outlined by the MUTCD, and therefore traffic signal installation is not recommended at the subject intersection under the existing conditions. However, further evaluation should be performed to determine whether signal installation would be warranted in the future if growth occurs.

3.2 2040 No Build Conditions

The preparation of the 2040 No Build operational analysis required an understanding of future growth and how that growth would affect the traffic volumes along the Route 460 corridor. The elements incorporated into the future 2040 No Build analysis include: existing roadway lane geometry, 2040 forecasted peak hour traffic volumes and existing signal timing plans.

3.2.1 Future Traffic Growth

The 2040 No Build traffic volumes were calculated in accordance with the HRTPO 2040 Long Range Plan model. The annual average daily traffic (AADT) information from the existing model for year 2009 and projected year 2040, provided by VDOT, shown in Appendix F, was used to calculate average growth rates to be used for 2040 peak hour volume projections. A summary of the calculated growth rates is presented in the Table 3.3.

Table 3.3.

Annual Average Daily Traffic Growth Rates.

	2009	2009	2040	2040	Growth	Growth
Area	WB	EB	WB	EB	Rate	Rate
Route 58 to Rob's Drive	10,859	11,087	18,755	19,161	1.78%	1.78%
Rob's Drive to Kings Fork Road	10,738	10,972	17,223	17,573	1.54%	1.53%
Kings Fork Road to Lake Prince Drive	9,472	9,630	13,350	13,469	1.11%	1.09%
Lake Prince Drive to Lovers Lane	9,311	9,397	12,530	12,592	0.96%	0.95%

After the discussion with VDOT on the summary of the growth rates presented in Table 3.3, the decision was made to use the following growth rates:

- 1.78% conservative growth rate to be used on the eastern project segment (Route 58 to Woodlawn Drive) along the Route 460 corridor;
- 1% growth rate to be used on the western project segment (Old Suffolk Road to Dominion Way) along the Route 460 corridor;
- > 0.5% growth rate on the side streets.

Based on the above growth rates, peak hour turning volumes were calculated for the 2040 No Build scenario. Projected volumes are presented Figure 3.5.

3.2.2 Methodology

Capacity analyses were performed to determine the 2040 No Build scenario LOS for the AM and PM peak hours for the study intersections.

Similar to the existing conditions analysis, the 2040 No Build analysis was performed in accordance to the VDOT requirements and guidelines provided in the TOSAM. Synchro 9.1 was the software tool used for analysis determining the delay, capacity and corresponding LOS of the study intersections. The 2040 No Build LOS capacity analyses were based on: (1) the existing lane use and traffic controls shown in Figure 3.1; (2) the 2040 projected AM and PM traffic volumes presented on Figure 3.5; and (3) the HCM methodologies (using Synchro 9.1 software).

LOS results summary for 2040 No Build conditions are presented in Table 3.4.

Table 3.4.

2040 No Build Conditions Level of Service Results Summary.

		Control	2040 No Build		
שו	Intersection Name	Control	AM	РМ	
1	Route 460/Pruden Boulevard & Northfield Drive	Signalized	A (SB-D)	B (SB-D)	
2	Route 460/Pruden Boulevard & Rob's Drive	Signalized	C (SB-D)	B (SB-D)	
3	Route 460/Pruden Boulevard & Kings Fork Road	Signalized	D (SB-F)	E (SB-F)	
4	Route 460/Pruden Boulevard&Providence Road/Lake Prince Drive	Signalized	B (SB-C)	C (NB-E)	
5	Route 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	(NB-D)	(NB-B)	
6	Route 460/Windsor Boulevard & Old Suffolk Road	Unsignalized	(NB-D)	(NB-F)	
7	Route 460/Windsor Boulevard & Dominion Way	Signalized	A (NB-D)	A (NB-D)	

Legend: X - Overall Level of Service, (XX-X) - Worst Approach-Worst Approach Level of Service Details on the expected delays at each approach in the study corridor are shown in Table D.2 in Appendix D. Appendix D also includes the Synchro reports for the 2040 No Build conditions scenario.

The analyses showed that most intersections in the study area will continue to operate at acceptable LOS D or better under 2040 No Build conditions in both the AM and PM peak hours. At the signalized intersection of Route 460/Pruden Boulevard & Kings Fork Road operations during evening peak hour are expected to fall to the unacceptable LOS E. The southbound approach at this intersection is expected to suffer longer delay operating at LOS F during both AM and PM peak hours in 2040 without additional improvements. In addition, the northbound approach at the signalized intersection of Route 460/Pruden Boulevard & Providence Road/Lake Prince Drive is expected to fall to LOS E during evening peak hour, while the overall intersection LOS is expected to be C under 2040 No Build conditions. Also, the northbound approach at unsignalized intersection of Route 460/Windsor Boulevard and Old Suffolk Road is expected to fall to LOS F during peak hour under 2040 No Build conditions.

3.2.3 Recommended Improvements

Operations at signalized intersections may be improved with full corridor coordination and future splits, offsets and cycle lengths optimization. At the intersection of Route 460 and Rob's Drive, an increase in green time should improve operations on side streets. In addition, as mentioned previously, at the intersection of Route 460 and Kings Fork Road, consideration should be given to changing the existing lane configuration on the southbound approach from shared left-turn and through lane and dedicated right-turn lane to exclusive leftturn lane and shared right-turn and through lane. This modification will require signal phasing changes and consideration should be given to alternative phasing with a flashing yellow arrow (FYA) which could reduce delay at this approach. The FYA allows flexibility in left-turn phasing operation and studies have documented that they are better understood by drivers than the standard five-section signal head. The FYA also eliminates the 'yellow trap' decreasing overall delay and increasing driver safety. Therefore, installation of FYA should also be considered on the mainline at the intersection of Route 460 and Providence Road/Lake Prince Drive.











LEGEND AM (PM) Volumes

Figure 3.5 2040 No Build Peak Hour Turning Movement Volumes.

Operational Analysis

3

3.3 2040 Build Conditions

Through the operational analysis of existing conditions and 2040 No Build conditions, potential shortfalls were identified along the corridor and a set of recommendations was developed to mitigate these shortfalls. The 2040 Build scenario includes all the proposed recommendations and the following elements were incorporated into the future 2040 Build analysis: improved roadway lane configuration, forecasted peak hour traffic volumes and optimized splits, offsets and cycle lengths.

3.3.1 Proposed Improvements

After a detailed review of the analysis and recommendations of existing and 2040 No Build conditions, the following changes were incorporated into the 2040 Build scenario:

- At the signalized intersection of Route 460 and Rob's Drive, green time was increased for side streets.
- At the signalized intersection of Route 460 and Kings Fork Road, on southbound approach lane configuration was changed to exclusive leftturn lane and shared through and right-turn lane with FYA implementation on the mainline and required signal phasing changes were incorporated.
- At the signalized intersection of Route 460 and Providence Road/Lake Prince Drive, FYA implementation on the mainline and required phasing changes were incorporated.

3.3.2 Methodology

Capacity analyses were performed to determine the 2040 Build scenario LOS for the AM and PM peak hours for the study intersections.

As with the previous scenarios, the 2040 Build analysis was performed in accordance to the VDOT requirements and guidelines provided in the TOSAM. Synchro 9.1 was the software tool used for analysis determining the delay, capacity and corresponding LOS of the study intersections. The 2040 Build LOS capacity analyses were based on: (1) the proposed lane use and existing traffic controls shown on Figure 3.6; (2) the 2040 projected AM and PM traffic volumes presented on Figure 3.5; and (3) the HCM methodologies (using Synchro 9.1 software).

LOS results summary for 2040 Build conditions are presented in Table 3.5.

Table 3.5. 2040 Build Conditions Level of Service Results Summary.

ID		Control	2040 Build		
שו	Intersection Name	Control	АМ	РМ	
1	Route 460/Pruden Boulevard & Northfield Drive	Signalized	A (SB-D)	B (SB-D)	
2	Route 460/Pruden Boulevard & Rob's Drive	Signalized	C (SB-D)	A (SB-D)	
3	Route 460/Pruden Boulevard & Kings Fork Road	Signalized	D (NB-F)	E (NB-F)	
4	Route 460/Pruden Boulevard&Providence Road/Lake Prince Drive	Signalized	B (SB-C)	C (NB-D)	
5	Route 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	(NB-D)	(NB-B)	
6	Route 460/Windsor Boulevard & Old Suffolk Rd	Unsignalized	(NB-D)	(NB-F)	
7	Route 460/Windsor Boulevard & Dominion Way	Signalized	A (NB-D)	A (NB-D)	

Legend: X - Overall Level of Service, (XX-X) - Worst Approach-Worst Approach Level of Service

Details on the expected delays at each approach in the study corridor are shown in Table D.2 in Appendix D. Appendix D also includes the Synchro reports for the 2040 Build conditions scenario.

The analyses showed that most intersections are expected to continue to operate at acceptable LOS D or better with the proposed improvements in both the AM and PM peak hours with the exception of the intersection of Route 460 Boulevard and Kings Fork Road, where intersection operations are still expected to fall to the unacceptable LOS E during the evening peak hour. The analysis showed, that with the proposed improvements, the LOS at southbound approach will be improved, but LOS on the northbound approach is expected to suffer longer delay operating at LOS F during both AM and PM peak hours. In addition, LOS on the westbound approach is expected to fall to LOS E.

The northbound approach at the signalized intersection of Route 460 and Providence Road/Lake Prince Drive is expected to improve to acceptable LOS D during evening peak hour with recommended improvements under 2040 Build conditions.

The northbound approach at unsignalized intersection of Route 460 and Old Suffolk Road is still expected to fall to LOS F during evening peak hour.

3.3.3 Signal Warrant Screening

As mentioned previously, an evaluation of the need for a traffic signal at an intersection requires the examination of various factors. As a part of this study, a high-level traffic signal warrant screening was performed for the intersection of

Route 460/Windsor Boulevard and Old Suffolk Road, to determine whether a signal would be warranted under the 2040 Build conditions. This signal warrant screening process only included screening of the peak hour and four-hour warrants for the 2040 Build volumes and was performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD).

More detailed documented results are presented in Appendix E (Signal Warrant Screening). The results of the signal warrant screening showed that under the 2040 Build conditions the subject intersection does not meet the two traffic signal warrants outlined by the MUTCD, and therefore traffic signal installation is not recommended at the subject intersection under the 2040 Build conditions. However, further evaluation should be performed to determine whether signal installation is warranted if there are major changes in future growth patterns from what is expected.

3.3.4 Conclusions

The operational analysis of Existing, 2040 No Build and 2040 Build conditions showed that all intersections in the study area are expected to continue to operate at acceptable LOS D or better, with the exception of the signalized intersection of Route 460 and Kings Fork Road. During evening peak hour, the LOS at this intersection is expected to fall to LOS E with 57 sec/veh in delay under 2040 No Build conditions, and will slightly improve to 56 sec/veh in delay with the proposed improvements under the 2040 Build conditions. Analyses of existing conditions showed that even though the overall LOS at this intersection is D, the southbound approach operates at LOS F with 125 sec/veh in delay during morning peak hour and LOS E with 70 sec/veh in delay during evening peak hour. Implementation of the proposed lane configuration changes along with FYA, is expected to improve operations in 2040 on southbound approach to LOS C with 31 sec/veh in delay during morning peak hour and to LOS D with 43 sec/veh in delay during evening peak hour. However, the northbound approach is expected to suffer longer delay under the 2040 Build conditions, operating at LOS F with over 93 sec/veh in delay during both morning and evening peak hours and westbound approach is projected to operate at LOS E with 57 sec/veh in delay during evening peak hour. The proposed improvements should help shift excessive delay on the southbound approach to other approaches, however, the overall LOS at this intersection is still expected to be a LOS E.

The proposed changes at the signalized intersection of Route 460/Pruden Boulevard and Providence Road/Lake Prince Drive are expected to improve the overall intersection delay and should improve the northbound approach operations from LOS E with 56 sec/veh in delay under 2040 No Build conditions to LOS D with 49 sec/veh in delay under 2040 Build conditions.

The City of Suffolk and VDOT should continue to monitor traffic volumes in the study corridor to determine if the growth in this area occurs as predicted and whether other roadway improvements should be considered to improve operations.







Figure 3.6 2040 Build Lane Configuration.

460

Operational Analysis

3



chapter

Systemic Analysis



Introduction and Methodology 4.1

There are two primary approaches to addressing safety: using a site specific approach to address locations with a history of high or severe crashes, and using a systemic approach to proactively address safety by identifying and targeting specific risk factors. This chapter describes how the systemic analysis was applied to the study area.

The project team used the methodology created for the VDOT CSA for CoSS whereby a set of risk reducing templates are provided for intersections and for corridors throughout the study area. Templates applicable to this project are provided in Appendix A. The countermeasures in the templates are grouped into tiers and are applied to the intersections and corridors based upon the presence of systemic risk factors, crash risk, and their Potential for Safety Improvement (PSI). Each of these three factors and how they impact tier selection are described in this chapter. The AASHTO Highway Safety Manual and FHWA systemic methodology guided the analysis and identification of systemic risk factors present throughout the study area.¹²

• The call-out boxes in this chapter highlight elements related to the focus area risk factor determination.

Systemic Risk Factor Analysis 4.2

The following analysis involves the identification of focus areas and the associated risk factors. The data set used in the analysis includes 242 crashes for the fiveyear period 2012-2016 over 6.6 miles, an average of 7 crashes per year/mile.

4.2.1 Primary Focus Areas

There are two possible types of focus areas in systemic data analysis: focus crash types and focus facility types. With the available robust crash dataset, the analysis was guided by the focus crash types. The following describes which focus areas were selected and what factors were used in that determination.

The highest proportion of crashes are rear end followed by roadway departure and angle crash types as shown in Table 4.1. Together these three crash types comprised 75 percent of the total crashes and 84 percent of the severe crashes within the study area. (Note: KAB Crashes are fatal and severe crashes as noted by the KABCO scale: K = fatal crash, A = incapacitating injury, B = nonincapacitating injury, C = possible injury, and O = no injury.)



Figure 4.1.

Systemic Process.

Table 4.1.

Focus Crash Types.

Crash Types	All Crashes	% of Total (n=242	KAB crashes	% of Total (n=49
Rear End	79	33%	13	27%
Animal	24	10%	0	0%
Motorcyclist	2	1%	1	2%
Angle	39	16%	11	22%
Head On	6	2%	2	4%
Sideswipe	20	8%	1	2%
Fixed Object in Road	1	1%	0	0%
Roadway Departure	63	26%	17	35%
Other	8	3%	4	8%
Total	242	100%	49	100%

Risk Factor Determination 4.3

The following is a description and overview of the risk factor determination for the focus crash types: rear end, angle, and roadway departure crashes. Included with the analysis are callout boxes highlighting elements related to the focus area risk factors.

4.3.1 Rear End Crashes

Rear end crashes were the most prevalent crash type with 33 percent of the total crashes and 27 percent of the severe crashes. There were 79 total rear end crashes of which 13 were severe. Table 4.2 presents rear end, angle, and total crashes with respect to the intersection type (signalized, unsignalized, or non-intersection).

Almost half (44 percent) of the total rear end crashes and the majority of severe crashes (69 percent) occurred at unsignalized intersection locations. This is almost double the proportion of total crash and severe crashes for all crash types within the study area.

Systemic Analysis



• Rear end crashes are most prevalent at unsignalized intersection locations.

¹ American Association of State Highway and Transportation Officials. Highway Safety Manual. U.S. Department of Transportation, Federal Highway Administration

² Federal Highway Administration Office of Safety. Systemic Safety Project Selection Tool. U.S. Department of Transportation, Federal Highway Administration.

Table 4.2.

Crashes By Intersection Type.

All Crash Types	Total Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Rear End Crashes	% of Total (n=79)	Rear End KAB Crashes	% of Total (n=13)	Angle Total Crashes	% of Total (n=39)	Angle KAB Crashes	% of Total (n-11)
Unsignalized Intersection-Related	68	28%	16	33%	35	44%	9	69%	10	26%	4	36%
Signalized Intersection-Related	61	25%	8	16%	24	30%	1	8%	19	49%	3	27%
Not Intersection-Related	113	47%	25	51%	20	25%	3	23%	10	26%	4	36%
Total	242	100%	49	100%	79	100%	13	100%	39	100%	11	100%

Crashes along the corridor typically occurred during the morning and evening commuting times of 6 to 9 AM (16 percent of total crashes and 20 percent of severe crashes) and 3 to 6 PM (25 percent of total crashes and 22 percent of severe crashes), as shown in Table 4.3. Each of the focus crash types differ in the primary time of day for that crash. Rear end crashes and severe crashes most often occurred during the evening commuting hours of 3 to 6 PM (38 percent of total crashes and 31 percent of severe rear end crashes).

This pattern could be due to local traffic patterns and behaviors, such as higher traffic volumes, speeds, vehicle type, distracted driving, or following too closely. Table 4-4 shows rear end crashes by speed limit, indicating that the highest total number and severe crashes along the corridor occur in the 55 MPH speed limit zone (58 percent of total crashes and 67 percent of severe crashes. There are also considerably more severe rear end crashes on sections of roadway with the higher speed limit of 55 MPH (85 percent). In only 11 percent of the total rear end crashes did the reporting officer determine that the driver was speeding (see Figure 4.2). However, the project team reviewed the extents of the speed limit zone in relation to crashes and believe there may be discrepancy in the posted speed and the speed limit indicated on the crash report form.

Heavier vehicles require longer stopping distances and given the high percentage of heavy vehicles along the corridor, the vehicle type may contribute to the high number of rear end crashes. However, the crash analysis shown in Table 4.5 does not support that theory as only five percent of rear end crashes was caused by heavy vehicles.



Figure 4.2. Speeding Determination for Rear End Crashes.

Table 4.5. Rear End Crashe

Vehicle Type	Rear End Crashes	% of Total (n=79)
Passenger Car	50	63%
Motorcycle	2	3%
Truck - Passenger Pick-up/SUV	18	23%
Van	5	6%
Truck (2 Axles)	1	1%
Truck (3 Axles or More)	3	4%
Total	79	100%
Table 4.6.		

Table 4.6. Rear End Crashe

Vel	hic

Following Too Clo
Driver Distraction
Improper Parking

No Improper Actio

Exceeded Safe Spe

Limit) Avoiding Other Veh

Other

Fail to Maintain Pro Total

Table 4.3. Crashes by Time of Day.

Time of Day	All Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Rear End Crashes	% of Total (n=79)	Rear End KAB Crashes	% of Total (n=13)	Angle Total Crashes	% of Total (n=39)	Angle KAB Crashes	% of Total (n-11)	Roadway Departure Crashes	% of Total (n-63)	Roadway Departure KAB Crashes	% of Total (n-17)
0 AM TO 3 AM	12	5%	4	8%	0	0%	0	0%	1	3%	1	9%	9	14%	3	18%
3 AM TO 6 AM	19	8%	3	6%	2	3%	2	15%	1	3%	0	0%	3	5%	2	12%
6 AM TO 9 AM	38	16%	10	20%	9	11%	2	15%	13	33%	6	55%	10	16%	1	6%
9 AM TO 12 PM	31	13%	3	6%	15	19%	2	15%	5	13%	0	0%	10	16%	1	6%
12 PM TO 3 PM	33	14%	7	14%	15	19%	1	8%	5	13%	2	18%	9	14%	2	12%
3 PM TO 6 PM	61	25%	11	22%	30	38%	4	31%	8	21%	1	9%	6	10%	3	18%
6 PM TO 9 PM	30	12%	6	12%	8	10%	2	15%	6	15%	1	9%	6	10%	1	6%
9 PM TO 12 AM	18	7%	5	10%	0	0%	0	0%		0%	0	0%	10	16%	4	24%
TOTAL	242	100%	49	100%	79	100%	13	100%	39	100%	11	100%	63	100%	17	100%

Table 4.4.

Rear End Crashes by Speed Limit.

Speed Limit	All Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Rear End Crashes	% of Total (n=79)	Rear End KAB Crashes	% of Total (n=13)
45	81	33%	11	22%	28	35%	2	15%
55	141	58%	33	67%	46	58%	11	85%
Unknown	20	8%	5	10%	5	6%	0	0%
Total	242	100%	49	100%	79	100%	13	100%

Rear End Crashes by Vehicle Type.

Rear End Crashes by Vehicle Driver Actions.

е Туре	Rear End Crashes	% of Total (n=79)
ı	5	6%
e	40	51%
	4	5%
	2	3%
ed (But Not Speed	3	4%
icle	1	1%
	8	10%
oper Control	16	20%
	79	100%

- The influence of speeding on rear end crashes is unclear.
- Rear end crashes typically involve passenger vehicles and non-commercial trucks.
- The action of following too closely led to just over half of rear end crashes.

This rear end crash pattern could also reflect geometric conditions, such as inadequate sight distance or warning of intersections, lack of space for acceleration and deceleration, or inadequate friction. Table 4.7 and Table 4.8 help to assess some of these risks. Consistent with corridor trends, most of the rear end crashes occurred during dry conditions. Half of the intersections in the study area have turn lanes on both the Route 460 eastbound and westbound approaches but just under half (40 percent) do not have any turn lanes on Route 460. For all 13 intersections, there are a total of 11 left turns and 8 right turn lanes. A signage inventory, sight distance evaluation, and friction assessment were not part of this study.

It is possible that the lack of roadway friction is a factor in dry, rear end crashes. Also, providing turn lanes or acceleration and deceleration lanes would provide separation from vehicles with a large speed differential. The need for additional lanes will be addressed on a site-specific basis (see Chapter 5).

Table 4.7.

Rear End Crashes by Roadway Conditions.

Speed Limit	All Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Rear End Crashes	% of Total (n=79)	Rear End KAB Crashes	% of Total (n=13)
Dry	185	76%	36	73%	61	77%	11	85%
Wet	48	20%	11	22%	17	22%	2	15%
Snowy	3	1%	1	2%	1	1%	0	0%
lcy	5	2%		0%	0	0%	0	0%
Water (Standing, Moving)	1	0%	1	2%	0	0%	0	0%
Total	242	100%	49	100%	79	100%	13	100%

Table 4.8.

Route 460 Turn Lane Summary.

Intersection Turn Lane Presence on Route 460 Approaches	Number of Intersections	% of Total (n=13)	Number of Turn Lanes on Route 460		% of Total (n=19)
Both WB/EB Approaches	6	50%	Right	8	40%
One Approach (WB or EB)	2	20%	Left	11	60%
No Turn Lanes (WB or EB)	5	40%	Total	19	
Total	13	100%			

Unsignalized intersection enhancements, such as intersection warning signs and beacons, or larger signs at the intersection, can help to improve driver awareness of the intersection.

- Most rear end crashes occurred during dry conditions.
- Almost half of the intersections do not have turn lanes on Route 460.

4.3.2 Angle Crashes

Angle crashes were the third most prevalent crash type in the study area, but were the second highest crash type at intersections. There were 39 total angle crashes, of which 11 were severe angle crashes. Relative to all other crash types, angle crashes comprised 16 percent of all the total crashes and 22 percent of the severe crashes. As shown in Table 4.2, approximately half of the total angle crashes (49%) occurred at signalized intersection locations, which is considerable higher than for all crash types (25%).

Total and severe angle crashes most often occurred during the morning commuting hours of 6 AM to 9 AM (33 percent of total crashes and 55 percent of severe angle crashes).

This pattern could be due to local traffic patterns and behaviors, such as higher traffic volumes, speeds, or drivers in a rush, all of which could result in misjudging adequate gaps in traffic.

Most of the angle crashes (41 percent of all crashes and 45 percent of severe crashes) occurred in the portion of the corridor with the lower 45 MPH speed limit. For only 13 percent of angle crashes did the law enforcement officer indicate that the driver was speeding. The project team reviewed the extents of the speed limit zone in relation to crashes and believe there may be discrepancy in the posted speed and the speed limit indicated on the crash report form.

Table 4.9.	
Angle Crashes	by Speed Limit.

Speed Limit	All Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Rear End Crashes	% of Total (n=79)	Rear End KAB Crashes	% of Total (n=13)
45	81	33%	11	22%	16	41%	5	45%
55	141	58%	33	67%	13	33%	3	27%
Unknown	20	8%	5	10%	10	26%	3	27%
Total	242	100%	49	100%	39	100%	11	100%



Speeding Determination for Angle Crashes.

• Angle crashes were the most prevalent at signalized intersection locations.

Not Speeding

Speeding

Systemic Analysis

Heavier vehicles may have a difficult time finding an acceptable gap in traffic due to their difficulty accelerating. However, as shown in Table 4.10, only five percent of angle crashes were caused by heavy vehicles.

Table 4.11 contains a summary of the drivers actions for angle crashes. Drivers who did not have right-of-way, conducted improper turns, or disregarded the traffic signal were involved in 66 percent of the crashes. As shown in Table 4.12,

Table 4.10.

Angle Crashes by Vehicle Type.

Vehicle Type	Angle Crashes	% of Total (n=39)
Passenger Car	18	46%
Motorcycle	0	0%
Truck - Passenger Pick-up/SUV	19	49%
Van	0	0%
Truck (2 Axles)	0	0%
Truck (3 Axles or More)	2	5%
Total	39	100%

Table 4.11.

Angle Crashes by Vehicle Driver Actions.

Vehicle Type	Angle Crashes	% of Total (n=39)
No Improper Action	4	10%
Following Too Close	15	38%
Driver Distraction	1	3%
Improper Parking	7	18%
Exceeded Safe Speed (But Not Speed Limit)	1	3%
Avoiding Other Vehicle	4	10%
Other	4	10%
Fail to Maintain Proper Control	3	8%
Total	39	100%

Table 4.12.

Angle Crashes by Direction of Travel.

Direction	Angle Crashes	% of Total (n=39)	Angle KAB Crashes	% of Total (n=11)
East	7	18%	2	18%
West	14	36%	4	36%
North	6	15%	2	18%
South	11	28%	2	18%
Unknown	1	3%	1	9%
Total	39	100%	11	100%

while the east and westbound directions of travel (on Route 460) have much higher traffic volumes, crashes involving vehicles traveling north and south occurred in 43 percent of the angle crashes and 36 percent of the severe angle crashes.

For those crashes where drivers did not have right-of-way, there are several elements that may have contributed to misjudging gaps such as speed, heavy traffic volumes, large vehicles obscuring the view of other on-coming vehicles, and possibly a lack of sufficient protected turn phasing. Improper turns or disregarding the traffic signal could be indicative of other factors such as speed, heavy traffic volumes, lack of intersection awareness and preparation, or signal phasing issues. In addition to the countermeasures identified through the template application shown in Figure 4.5, education and enforcement of the posted speed limit throughout the study area could also help to address speed related crashes.

- Angle crashes are most prevalent during morning commute time of 6 to 9 AM.
- Drivers who did not have right-of-way, conducted improper turns, or disregarded the traffic signal were involved in 66 percent of the crashes.
- North and southbound vehicles accounted for 43 percent of the crashes.

Table 4.13.

Roadway Departure Crashes by Corridor Type.

Corridor Type	Length (Mile - Eastbound)	% of Total (n=6.64)	Roadway Departure Crashes	% of Total (n=63)	Crashes/ Mile	Roadway Departure KAB Crashes	% of Total (n=17)	KAB Crashes/ Mile
Curve	0.34	5%	3	5%	9	0	0%	0
Tangent	6.30	95%	60	95%	10	17	100%	3
Total	6.64	100%	63	100%	9	17	100%	3

Table 4.14. Roadway Departure Crashes by Direction of Travel.

Direction of Travel	All Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Roadway Departure Crashes	% of Total (n=63)	Roadway Departure KAB Crashes	% of Total (n=17)
East	88	36%	19	39%	30	48%	8	47%
West	106	44%	22	45%	26	41%	8	47%
North	16	7%	3	6%	3	5%	1	6%
South	25	10%	3	6%	3	5%	0	0%
Unknown	7	3%	2	4%	1	2%	0	0%
Total	242	100%	49	100%	63	100%	17	100%

4.3.3 Roadway Departure Crashes

Roadway departure crashes were the most prevalent severe crash type with 26 percent of the total crashes and 35 percent of the severe crashes. There were 63 total roadway departure crashes of which 17 were severe. Table 4.13 presents roadway departure crashes and total crashes with respect to the corridor type (tangent or curve). The majority of the crashes (95 percent of all crashes and 100 percent of the severe crashes) occurred on tangent sections.

The trend of higher percentages of crashes within tangent sections persisted for rear end and angle crash types. However, roadway departure crashes were relatively evenly dispersed throughout the time periods and severe roadway departure crashes primarily occurred at night with 54 percent occurring between the hours of 9 PM to 6 AM.

As shown in Table 4.14, there were more roadway departure crashes in the eastbound direction (36 percent for total crashes to 48 percent for roadway departure), compared to eastbound crashes for all crash types on the corridor. However, the directional split for roadway departure crashes was relatively even (48 percent eastbound and 41 percent westbound).

 The majority of roadway departure crashes occurred during the nighttime hours of 9 PM to 6 AM.

• The roadway departure crash directional split was relatively even for eastbound and westbound travel.

With respect to road conditions, most of the corridor and roadway departurespecific crashes occurred during dry conditions (76 and 70 percent respectively). A comparison of roadway departure crashes to all crash types is shown in Table 4.15. A slightly higher proportion of roadway departure crashes (70 percent for total crashes and 76 percent for severe crashes for roadway departure crash types), compared to all crash types (20 percent for total crashes and 22 percent for severe crashes for all crash types), occurred when the roads were wet.

Table 4.16 provides crashes by vehicle type. Most of the vehicles involved in roadway departure crashes are passenger cars (63 percent). However, roughly double the amount of large commercial trucks are involved in roadway departure crashes compared to all crash types on the corridor (13 percent of roadway departure crashes compared to 7 percent for all crash types).

As shown in Figure 4.3, in only 13 percent of the crashes did the officer find that the driver was speeding prior to the crash. Table 4.17 and Table 4.18 provide information on driver's actions at the time of the crash. In most of the roadway departure crashes (60 percent), it was noted that the driver "failed to maintain control". Looking specifically at driver distraction, 68 percent of the total crashes involved driver distraction, but only 8 percent for roadway departure crashes. Driver fatigue was noted in 19 percent of the roadway departure crashes, which comprise almost all driver fatigue crashes along the corridor (92 percent).

Table 4.17. Roadway Departure Crashes by Vehicle Driver Actions.

Veh No Improper Act Improper Turn Improper Lane C Exceeded Safe L Driver Distractio Avoiding Other V Avoiding Animal **Avoiding Object** Hit and Run Fail to Maintain I **Over Correction** Other

Table 4.15. Road Conditions for Roadway Departure Crashes.

Road Conditions	Total Crashes	% of Total (n=242)	KAB Crashes	% of Total (n=49)	Roadway Departure Crashes	% of Total (n=63)	Roadway Departure KAB Crashes	% of Total (n=17)
Dry	185	76%	36	73%	44	70%	11	65%
Wet	48	20%	11	22%	16	25%	4	24%
Snowy	3	1%	1	2%	1	2%	0	0%
lcy	5	2%	0	0%	1	2%	1	6%
Water (Standing, Moving)	1	0%	1	2%	1	2%	1	6%
Total	242	100%	49	100%	63	100%	17	100%

Table 4.16.

Roadway Crashes by Vehicle Type.

Vehicle Type	Total Crashes	% of Total (n=242)	Roadway Departure Crashes	% of Total (n=63)
Passenger Car	141	58%	40	63%
Motorcycle	5	2%	0	0%
Truck - Passenger Pick-up/ SUV	64	26%	11	17%
Van	8	3%	2	3%
Truck Tractor (Bobtail - No Trailer)	3	1%	2	3%
Truck (2 Axles)	2	1%	0	0%
Truck (3 Axles or More)	18	7%	8	13%
RV	1	0%	0	0%
Total	242	100%	63	100%



Figure 4.4. Speeding Determination for Roadway Departure Crashes.

Table 4.18.

Total

Driver Distraction	Total Crashes	% of Total (n=242)	Roadway Departure Crashes	% of Roadway Departure Total (n=63)	% of Distraction Type (n=varies)
Distracted	43	68%	5	8%	12%
Not Distracted	186	295%	46	73%	25%
Driver Fatigue	13	21%	12	19%	92%
Total	242	384%	63	100%	26%

cle Type	Roadway Departure Crashes	% of Total (n=63)
ion	4	6%
	2	3%
hange	1	2%
mit	2	3%
n	1	2%
'ehicle	2	3%
	4	6%
In Road	1	2%
	1	2%
Proper Control	38	60%
	3	5%
	4	6%
	63	100%

Roadway Departure Crashes by Driver Condition.

 Most of the vehicles involved in roadway departure crashes are passenger cars; however, twice as many large commercial trucks are involved as compared to all crash types on the corridor.

• Almost all driver fatigue crashes were roadway departure crash types. Fatigue was noted in just under 20 percent of the roadway departure crashes.


Systemic Conclusion 4.4

Through the systemic analysis specific countermeasures were identified in the risk reducing templates. All Tier 1 countermeasures are to be applied systemically. Specific Tier 2 and Tier 3 countermeasures were chosen based on the crash data and analysis. The application of templates across the corridor is shown in Figure 4.5.

4.5 **HSM Spreadsheets**

A portion of the safety recommendations were analyzed using the VDOT Extended Highway Safety Manual (HSM) Part C Spreadsheets to predict the changes to crashes on the corridor. This tool only takes into account a portion of the safety countermeasures recommended for the corridor. This method for estimating the benefit of recommended countermeasures is included in the VDOT TOSAM³. Additional details about these spreadsheets can be found within the TOSAM and also in the FHWA Integrating the HSM into the Highway Project Development Process⁴. It is anticipated that this project will, on average, experience 52 crashes per year, while a similar project, on average would experience 145.8 crashes per year. A summary of findings from the HSM spreadsheets is included in Figure 7.1 and the full report is provided in Appendix G.

The spreadsheets used to create these summary tables have been provided as a supplement to this study report. The spreadsheets are tools that can be used in planning the implementation of the countermeasures. Considerations for implementation include the most influential techniques in reducing the most severe crash types, the time frame in which countermeasures can be installed, and the funding source identified. This study and the spreadsheets provide a basis for an action plan that VDOT can use to improve safety and operations on Route 460.





- Predicted average crash frequency Average safety performance of projects consisting of similar elements (anticipated average crashes/yr)
- Expected average crash frequency Actual long-term safety performance of the project (anticipated average crashes/yr)
- Potential for Safety Improvement (anticipated average crashes/yr)

³ Virginia Department of Transportation. Traffic Operations and Safety Manual. Available: http://www.virginiadot.org/business/resources/ TOSAM.pdf.

⁴ Federal Highway Administration. Integrating the HSM into the Highway Project Development Process. Available: https://safety.fhwa.dot. gov/hsm/hsm integration/sec2.cfm.





chapter

Site Specific Analysis



Figure 5.1. Site Study Locations.

5.1 Introduction

The third approach to addressing safety in the corridor is site specific analysis. In the CSA process, the pre-field review data analysis guided the approach to the field review and assessment. The analysis of a five-year period (2012-2016) of crash data led to the identification of 11 site specific locations due to their crash history and severity, see Figure 5.1. The site specific locations were chosen based on their potential to show reduced average crash frequency or severity. Once the locations were identified, field reviews were conducted in accordance with standard Road Safety Audit (RSA) practices of evaluation and documentation. In addition, a directional video recording of the corridors through the driver's perspective was generated. The 11 locations are listed in Table 5.1.

Table 5.1. **Route 460 Specific Locations.**

1.	Northfield Drive
2.	Rob's Drive
3.	Kings Fork Road
4.	Lake Prince Drive
5.	Prudence Road
6.	1,200 Feet East of Gardner Lane
7.	Gardner Lane
8.	Old Myrtle Road
9.	2,200 Feet West of Old Myrtle Road
10.	1,750 Feet East of Ennis Mill Road
11.	1,000 Feet East of Old Suffolk Road

- Location of site along corridor;
- Aerial photo of location with crash locations shown;
- Description of existing conditions;
- Crash data;
- Key safety concerns;
- Recommended countermeasures and implementation plan for short-term, mid-term and long-term conditions;
- Summarized cost estimate using the templates as shown in Appendix A and other recommended countermeasures listed; and
- Η.

The recommendations are a result of the application of the Templates with the addition of site specific countermeasures. The recommendations are presented in three levels of implementation based on anticipated funding and potential completion. Generally, Tier 1 and Short-Term include countermeasures that are anticipated to be implemented quickly, possibly during maintenance using VDOT crews; Tier 2 and Mid-Term include countermeasures that would require more time to be implemented due to design or funding; and Tier 3 and Long-Term include countermeasures that would require longer lead time due to funding, property acquisition, public hearing, and/or longer construction time.

5

The 11 site specific locations are discussed in full detail on the following pages. For each site, the following information is included:

- Crash mitigation summary for recommended improvements.
- Additional details for the cost estimate can be found in Table 5.2 and in Appendix



Site Specific Location #1 Northfield Drive 5.2

5.2.1 **Existing Conditions**

This location is at the signalized, three-legged intersection of Route 460 and Northfield Drive. Surrounding areas are a combination of commercial and residential development to the north and agricultural fields to the south.

All legs of the intersection are paved. On the eastern leg of the intersection, there is a 195-foot right turn lane with a 150-foot taper and a 105-foot left turn lane with a 195-foot taper with signage denoting the lane for Police Vehicles Only . On the western leg of the intersection there is a 300-foot left turn lane with a 190foot taper. 300-feet west of the intersection, there is a lateral shift in pavement denoted by black and white reflective pavement edge markers. East and westbound directions of Route 460 have raised, plowable pavement markers installed along lane boundaries.

There is sidewalk located on the north side of Route 460 that is approximately 5-feet wide. The sidewalk is well maintained and clear of debris. One crosswalk is installed crossing Northfield Drive. The crosswalk is clearly marked and abuts up to ADA accessible ramps with truncated dome warning surfaces.

Narrow, raised, concrete medians that are roughly two to three feet wide, are present on both eastern and western legs of Route 460. Northfield Drive has an approximately 15-foot, vegetated median separating north and southbound lanes. The north side of Route 460 has curb and gutter while the southern facing edge of Route 460 has a deteriorated or non-existent shoulder, no curb and gutter, and pavement drop off. Grass along the intersection is well maintained and sight distance for all legs are clear. However, along the southern side of the intersection there is a parallel drainage ditch that is obscured by vegetation.

The intersection has large, clearly visible street signs. There is low illumination throughout intersection, as there is only one mounted street lamp installed on

the northeast corner of Route 460 and Northfield Drive. All intersection signals have black backplates but reflectivity borders are not present. Pavement quality is average throughout the intersection, but pavement markings are worn or deteriorating.

Curb and gutter is present on the north side of the intersection and an edgeline is present on the south side. Nighttime drivers have positive guidance through the edgeline on the southern side of the intersection.

5.2.2 Crash Summary

Between 2012 and 2016, nine (9) crashes occurred at Route 460 and Northfield Drive. Sixty-seven percent (6 crashes) resulted in a non-visible injury (crash type C) and 33 percent (3 crashes) resulted in a property damage only crash (crash type O). There were five rear-end crashes, two in the southbound direction, two in the eastbound direction, and one in the westbound direction, with 56 percent (5 crashes) occurring between 3 PM and 6 PM. The remaining crash was deer related. One crash was the result of driving under the influence (DUI). None of the crashes at this location involved commercial vehicles.

5.2.3 Suggested Countermeasures

- Pavement resurfacing the pavement crack sealing is much more apparent than the pavement markings and as such, draws the driver's attention. Resurfacing the road would remove the lines formed by the crack seal. Additionally, given the number of rear end crashes, friction may be reduced and could be improved through repaving.
- Enhanced pavement markings new pavement markings could help to improve visibility of the roadway edge and intersection.
- Reflective border on signal backplates this will help to enhance conspicuity of the intersection signals.

- with roadway stabilization.
- conditions.
- west of the intersection.

LEGEND

→O→ Rear End -►↓ Deer Motorcycle -► 🚵 \otimes Other **→** Angle →O Head On Sideswipe - Same Direction Sideswipe - Opposite Direction →O Fixed Object in Road ➤ Non-Collision Sixed Object - Off Road

Shoulder improvement – shoulders should be widened on the southern side of the intersection to provide a more forgiving roadway and assist

Safety edge – the edge of the roadway should have a safety edge to help drivers re-enter the roadway, in the event a driver leaves the travel way, and also to help preserve the pavement.

Additional intersection lighting – the intersection is currently served by one street light illuminating the northwest corner of the intersection. Additional street lights will enhance intersection conspicuity during dark

Curb and gutter maintenance – vegetation is encroaching on the curb and gutter, reducing the effectiveness and causing pavement deterioration.

Positive guidance on northern side of intersection – There is positive guidance, in the form of edgeline, for drivers on the southern side of the intersection but not on the northern side. Additional positive guidance, such as edgeline or reflective post mounted delineators would enhance nighttime visibility of the roadside, particularly leading the lateral shift just





Site Specific Location #2 Rob's Drive 5.3

5.3.1 **Existing Conditions**

This location is at the signalized, four-legged intersection of Route 460 and Rob's Drive. There is a grade school to the south and a combination of commercial and residential to the north.

All legs of the intersection are paved and undivided. Both the eastern and western legs of the intersection have a two-way center left turn lane that converts to a single left turn lane. On the western leg of Route 460, there is a 100-foot transition to from two-way center turn lane to a 150-foot left turn lane. The eastern leg of Route 460 has a 70-foot transition from two-way center turn lane to a 205-foot single left turn lane.

There are depressions in the roadway, near the curb, at the corners of Route 460 and the southern leg of Rob's Drive which serves as the entrance to Nansemond Suffolk Academy. Standing water was observed in the depressions during the field review. The curb and gutter section is limited to these two corners of the intersection - no other curb or curb and gutter is present at this intersection. Grassy shoulders line the remainder of pavement edges. All intersection signals have black backplates but reflective borders are not present. The intersection has two street lights located on the northwest and southeast corners of Route 460 and Rob's Drive.

Pavement within the legs of the intersection show high wear and moderate deterioration. High amounts of deterioration were identified along turning radiuses between Route 460 and northbound Rob's Drive. Large amounts of crack seal, and the varying difference in pavement and crack seal coloring, is a visual distraction. Pavement markings and edgelines are visible. Edgelines are largely worn due to turning vehicles.

During VHB's field review, one driver commented that changes, made within the last year, to the timing of the intersection, heavily hinders drivers traversing Route 460 from the northern leg of Rob's Drive to the southern leg.

5.3.2 Crash Summary

Between 2012 and 2016, ten (10) crashes occurred at Route 460 and Rob's Drive. Ten percent (1 crash) resulted in ambulatory injury (crash type A), 10 percent (1 crash) resulted in visible injury (crash type B), and 60 percent (6 crashes) resulted in non-visible injury (crash type C). Twenty percent (2 crashes) resulted in property damage only (crash type O). There were five rear-end crashes, four in the eastbound direction, and one in the southbound direction. Three angle crashes occurred at this location, as well as one side-swipe crash and one fixed object off road crash. Two of the angle crashes involved drivers on the southern approach, leaving the school property, and one resulted in a serious injury. Sixty percent (6 crashes) occurred between 6 AM and 12 PM. One crash was the result of DUI.

5.3.3 Suggested Countermeasures

- ▶ Right turn on red prohibition from minor streets on the southern approach drivers are misjudging the acceptable gaps in traffic. This could be due to speed, vehicle size, or heavy traffic volumes. Prohibiting right turns on red would require drivers to enter traffic during a protected phase.
- Education working with the school to educate students, parents, and faculty on local driving risks and safe driving skills could help drivers arrive and leave safety.
- Pavement resurfacing the pavement crack sealing is much more apparent than the pavement markings and as such, draws the driver's attention. Resurfacing the road would remove the lines formed by the crack seal. Additionally, given the number of rear end crashes, friction may be reduced and could be improved through repaving.
- Enhanced pavement markings new pavement markings could help to improve visibility of the roadway edge and intersection.

LEGEND

- →O→ Rear End 🔸 Deer ► → ▲ Motorcycle
- \otimes Other -►0 Angle
- →O→ Head On
- *
- ➤ Non-Collision



Reflective border on signal backplates – this will help to enhance conspicuity of the intersection signals.

> Drainage (curb, gutter, and pavement) improvements on the southern legthe curb and gutter is inconsistent and depressions in the pavement reduce the effectiveness of stormwater facilities potentially resulting in on-street ponding and reduced friction for drivers.





Site Specific Location #3 Kings Fork Road 5.4

5.4.1 **Existing Conditions**

This location is at the signalized, paved, four-legged intersection of Route 460 and Kings Fork Road. Surrounding areas are commercial, with a recreational area in the northeast corner.

All legs of this intersection are paved and undivided. The western leg of Route 460 has a 175-foot left turn lane present with 75-foot taper. The eastern leg is equipped with a two-way left turn lane that ends with a 70-foot transition and a 205-foot single left turn lane. Additionally, there is a 160-foot right turn lane with a 145-foot taper on the eastern leg. There are no permissive left turn signal phases on any of the intersection approaches. In the northern leg of Kings Fork Road, a 30-foot designated right turn lane is present. The southern leg has a single lane for right, left, and traversing traffic.

Curb and gutter is present in the northwest and southwest corners of the intersection. The northwest corner has mountable curb installed and southwest corner has non-mountable curb. A heavy amount of debris can be seen in all curb and gutter sections. Northeast and southeast shoulders show signs of vehicular traffic. Vehicular traffic has caused significant deterioration in the southeast corner. No pedestrian facilities are install at this location.

Large street signs are installed, facilitating wayfinding. All intersection signals have black backplates but are lacking reflective borders. This intersection is illuminated by two mounted street lights. Pavement quality is moderate throughout Route 460 and southern leg of Kings Fork Road. The northern leg of Kings Fork Road has new pavement ending at Route 460. Pavement to gutter transition is not smooth, with the pavement bulging and overlapping the gutter. The edgeline pavement markings on the curb and gutter portions provide positive guidance to drivers, particularly in dark conditions.

Drainage ditches are located along the roadway in the northeast corner of the intersection, along Kings Fork Road, and along the roadway on the southeast

corner of the intersection, along Route 460. Extremely high vegetation can be found in the southwest corner between the intersection and the entrance to ARC3 Gases. Maintained height of vegetation from the gutter ranged upward of 12 to 18 inches. Vegetation is also encroaching on the gutter.

Several sets of tire tracks can be found along the eastbound direction of Route 460. Through observation, it was found that the traffic queue built up quickly in this direction. Horizontal alignment of the road has Route 460 curving up from the south to the intersection with Kings Fork Road. Observation found that sight distance approaching the intersection was limited, especially with the high commercial traffic. Further investigation found that no signal ahead warning sign was present on the approach.

5.4.2 Crash Summary

Between 2012 and 2016, twenty-five (25) crashes occurred at the intersection of Route 460 and Kings Fork Road. Sixteen percent (4 crashes) resulted in visible injury (crash type B), 32 percent (8 crashes) resulted in non visible injury (crash type C), 52 percent (13 crashes) resulted in property damage only (crash type O). Eleven rear ends occurred at this location: four eastbound, four westbound, two southbound and one in the northbound direction. Additionally, eight angle crashes occurred at this location. The remaining crashes were head on, side swipe, and other. Forty-four percent (11 crashes) occurring between 3 PM and 6 PM. None of crashes at this location were the result of DUI.

5.4.3 Suggested Countermeasures

- Curb and gutter improvements:
 - ♦ Remove debris and vegetation from curb and gutter the debris and vegetation found in the gutter pan reduce the effectiveness of stormwater remove and can lead to pavement deterioration.
 - Remove/smooth pavement transition on the northern leg of the intersection.

- disregarding the signal.
- running.
- of the intersection signals.

LE	GEN	חו
	GLI	

- Rear End --1 Deer Motorcycle -► 🚵 \otimes Other -►0 Angle Head On **►**0**<** Sideswipe - Same Direction * Sideswipe - Opposite Direction → Fixed Object in Road ➤ Non-Collision
- Sixed Object Off Road

▶ Red light running enforcement – Some drivers have noted concerns regarding red light running. Also, given the protected only left turn phasing at the intersection, and the amount of angle crashes, drivers are most likely

Education – Messaging directed at drivers regarding speed and red light

Pavement resurfacing – the pavement crack sealing is much more apparent than the pavement markings and as such, draws the driver's attention. Resurfacing the road would remove the lines formed by the crack seal. Additionally, given the number of rear end crashes, friction may be reduced and could be improved through repaving.

• Reflective border on signal backplates – this will help to enhance conspicuity

Advance dynamic signal warning sign on both east and west bound approaches to intersection – this will provide vehicles, particularly heavy vehicles, with advance notice of the red signal at the intersection.





Site Specific Location #4 Lake Prince Drive 5.5

5.5.1 Existing Conditions

This location is a signalized, paved, four-legged intersection located at Route 460, Lake Prince Drive and Providence Road. The surrounding area is comprised of agricultural land with a church property in the southwest corner. There is a lot on the northwestern corner of the intersection that appears to be used seasonally as a farmers market.

The eastern leg of Route 460 has a 190-foot left turn lane with 150-foot taper and a 110-foot right turn lane with a 170-foot taper. Along the western leg, there is a 220-foot left turn lane with a 165-foot taper. Right turn on red is permitted for both eastern and western legs. Protected left turn signal phasing is present in both the east and westbound directions. Both Lake Prince Drive and Providence Road, the northern and southern legs, respectively, have a single travel lane for all directions. Raised plowable pavement markers are installed along the eastern and western approaches. There are two horizontal curves, located east and west of the intersection. Sight distance along Route 460, from Lake Prince Drive or Providence Road, is clear to those points.

There are no medians within the limits of the intersection. Curb and gutter is present in the northeast and southwest corners of the intersection. Debris and vegetation within the gutter pan was visible. Grassy shoulders are present on the northwest and southeast corners of the intersection.

Wayfinding signage is present throughout intersection. It was observed that the 55 MPH sign just west of this location is noticeably smaller than other signs installed in the vicinity of the intersection and the other speed limit signs throughout the rest of the corridor. There are two pole mounted street lamps for illumination. Pavement quality is in average condition; pavement cracking and deterioration, without the application of crack seal, was noticed throughout. Pavement markings are visible, but are worn and deteriorating. Edgelines show signs of heavy wearing from vehicular traffic. All intersection signals have black backplates but are lacking reflective borders.

A fixed object, a concrete bollard, was identified in the northeast quadrant.

5.5.2 Crash Summary

Between 2012 and 2016, twelve crashes occurred at the intersection of Route 460 and Lake Prince Drive. Eight percent (1 crash) resulted in visible injury (crash type B), 25 percent (3 crashes) resulted in non-visible injury (crash type C), and 67 percent (8 crashes) resulted in property damage only (crash type O). Fifty percent (6 crashes) were angle crashes and 25 percent (3 crashes) were rear ends. All rear end crashes occurred in the westbound direction. Three of the six angle crashes involved left turning vehicles; two of those left-turning angle crashes were from left turning vehicles from the southern leg of the intersection. The remaining crashes were side swipe and fixed object off road. Fifty percent (6 crashes) occurred between the hours of 12 PM and 6 PM. One crash was the result of a DUI.

5.5.3 Suggested Countermeasures

- Remove concrete bollard the concrete bollard on the northeast guadrant of the intersection should be removed if possible. If removal is not possible then an object marker should be installed.
- ▶ Remove debris and vegetation from curb and gutter the debris and vegetation found in the gutter pan reduce the effectiveness of stormwater remove and can lead to pavement deterioration.
- Pavement resurfacing the pavement crack sealing is much more apparent than the pavement markings and as such, draws the driver's attention. Resurfacing the road would remove the lines formed by the crack seal. Additionally, given the number of rear end crashes, friction may be reduced and could be improved through repaving.

LEGEND

- →O→ Rear End ->↓ Deer → Motorcycle
- \otimes Other
- **→** Angle →O Head On

- → Fixed Object in Road
- ▶ Non-Collision

5

Reflective border on signal backplates – this will help to enhance conspicuity of the intersection signals.

▶ Intersection warning signage – add intersection warning sign on the westbound approach to warn drivers of the upcoming intersection. An existing signal warning sign with beacons is present on the eastbound approach. If rear end crashes persist, future enhancement could include warning beacons or a dynamic red light warning sign.

> Speed enforcement - conduct speed enforcement on Route 460 intersection approaches.

Larger speed limit sign – replace smaller sized 55 MPH speed limit sign, to the west of the intersection, with a larger sign consistent with other speed limit signs within the study area.





Site Specific Location #5 Prudence Road 5.6

5.6.1 Existing Conditions

This location is the three-legged, unsignalized intersection of Route 460 and Prudence Road. The surrounding area on the northern side of Route 460 is heavily forested. The southern side is commercial, institutional, and church property.

All legs of this intersection are paved. The western leg of Route 460 has a single 115-foot right turn lane, with a 130-foot taper, on to Prudence Road. This intersection is void of any other turn lanes. Sight distance is clear throughout this location. A centerline rumble strip and raised plowable pavement markers are present along this stretch of Route 460. The outer travel lanes at this location are directly adjacent to narrow grassed shoulders. Little to no recovery area is provided between pavement edge and stormwater ditches.

Minimal signage can be seen at this location. Object markers are damaged or missing at all junctions of the drainage ditches and piping. One pole mounted street light is set far off from intersection, on the other side of the drainage ditch. Pavement of Route 460 and the apron of Prudence Road appear to be in good condition. However, heavy deterioration can be identified throughout the Prudence Road approach to the start of the paved apron. During the field review, ponding water was noted along the edge of Prudence Road. Pavement markings at this location are worn, cracking and in some portions, deteriorated. Outside the limits of the intersection, all four "SCHOOL" lane lettering is heavily worn.

All stormwater facilities show erosion and debris build up. There was significant deterioration of the stormwater facilities on the southwestern and southeastern corners of the intersection. Draining water appears to have washed away the dirt around the headwall at the drainage culvert on the southwestern quadrant, causing a hole to form between the headwall and the edge of the roadway.

5.6.2 Crash Summary

Between 2012 and 2016, twenty-two (22) crashes occurred at the intersection of Route 460 and Prudence Road. Nine percent (2 crashes) resulted in visible injury (crash type B), 55 percent (12 crashes) resulted in non visible injury (crash type C) and 36 percent (8 crashes) resulted in property damage only (crash type O). Fiftyfive percent (12 crashes) were rear end crashes, six crashes in the eastbound direction, five in the westbound direction, and one in the northbound direction. Of the remaining 45 percent (10 crashes) four were angle crashes, two were side swipe crashes and three were fixed object off road crashes. Twenty-three percent (5 crashes) occurred during rainy weather conditions, while the other 77 percent occurred with no adverse weather conditions. Thirty-two percent of crashes occurred between 9 AM and 12 PM.

5.6.3 Suggested Countermeasures

- Pavement resurfacing on Prudence Road the Prudence Road approach is significantly deteriorated and provides and unstable surface for drivers. Resurfacing could also help to improve drainage on Prudence Road.
- Enhanced pavement markings new pavement markings, including the "SCHOOL" warning markings could help to improve visibility of the roadway edge and intersection.
- > Drainage ditch improvements the drainage ditch, and facilities on both the southeastern and southwestern corners of the intersection, are significantly deteriorating and should be repaired, regraded, and reseeded to ensure proper function, roadway stability, and remove the steep roadside drop-off that poses a risk to drivers who may leave the roadway.
- Protection/warning of steep roadside ditch guardrail should be considered in the vicinity of the intersection, to protect drivers from the steep drainage ditch on the southern side of the roadway. If guardrail is not installed, or until it can be installed, object marker signs should be installed along the ditch to warn drivers.

LEGEND

Rear End		Fa
Deer		Se
Motorcycle		Vi
Other		No
Angle		Pr
Head On	_	
Sideswipe - S	ame D	irec
Sideswipe - 0	Opposit	e D
Fixed Object	in Road	ł
Non-Collision	ı	
Fixed Object	- Off Ro	ad
	Rear End Deer Motorcycle Other Angle Head On Sideswipe - S Sideswipe - C Fixed Object Non-Collision Fixed Object	Rear End Deer Motorcycle Other Angle Head On Sideswipe - Same D Sideswipe - Opposit Fixed Object in Road Non-Collision

▶ Intersection warning signage – add intersection warning sign on the westbound, and possibly eastbound, approach to warn drivers of the upcoming intersection. An existing sign warning drivers to watch for turning vehicles, with a 45 MPH placard, is present on the westbound approach, prior to the "SCHOOL" pavement markings. An additional sign, closer to the intersection, warning of the intersection could supplement the existing warning sign. If rear end crashes persist, future enhancement could include warning beacons or a dynamic beacons warning of sidestreet traffic in combination with the warning sign.

> Turn lane/acceleration lane - Adding a left turn on the westbound approach, along with a complimentary acceleration lane for vehicles turning left from the school onto westbound Route 460, would remove slower moving traffic from the through traffic.





Site Specific Location #6 1,200 Feet East of 5.7 Gardner Lane

5.7.1 Existing Conditions

This location is the segment of Route 460 located approximately 1200 feet east of Gardner Lane. The surrounding area is a mixture of agriculture and residential land. Sight distance throughout the segment is clear.

Both the eastern and western legs of Route 460 are paved. On the southern side of Route 460, one residential property, with two dirt apron entrances, is present adjacent to the intersection. Alternatively, a paved apron is located on the northside of Route 460, leading to two private residences. The remainder of the surrounding area is agricultural land. No turn or deceleration lanes are present at this location.

Route 460 is undivided with a rumble strip and raised plowable pavement markers A narrow gravel shoulder is present on the southern edge of the intersection with a drop off from the pavement to the gravel and another into ditch. The northern edge has little to no shoulders.

There are no direction or wayfinding signs at this location. Pavement and pavement markings along Route 460 are in good condition but the shoulder. is deteriorating. There is no lighting identified at this location.

5.7.2 Crash Summary

Between 2012 and 2016, eight (8) crashes occurred at the segment of Route 460 located approximately 1200 feet east of Gardner Lane. Thirteen percent (1 crash) resulted in fatality (crash type K), 25 percent (2 crashes) resulted in visible injury (crash type B), 25 percent (2 crashes) resulted in non-injury (crash type C), and the remaining 37 percent (3 crashes) were property damage only (crash type O). At this location, two rear end crashes occurred in the westbound direction, one motorcyclist crash occurred in the southbound direction, one angle crash, one non-collision, one deer collision, and two fixed object off road crashes. Thirtyseven percent of crashes occurred during the hours of 6 AM and 9AM. Sixty-two percent of crashes occurred in the months of April, May, and June.

5.7.3 Suggested Countermeasures

- Pave driveway aprons paving driveway aprons will help to keep debris off the roadway and maintain pavement quality.
- Shoulder widening providing a more forgiving roadway would allow space for to recover from unexpected roadway conditions or leaving the travel lane.

LEGEND

-> Deer

Other

 \otimes

→○

≁►







5.8 Site Specific Location #7 Gardner Lane

5.8.1 Existing Conditions

This location is the three-legged, unsignalized intersection of Route 460 and Gardner Lane. The surrounding area is comprised of agriculture and residential land.

All intersection approaches are paved; however, on the southside of Route 460, two dirt aprons are present to access the residential property located adjacent to the intersection. No turn or deceleration lanes are present at this location. Sight distance around the intersection is clear.

Route 460 is undivided with a rumble strip and raised plowable pavement markers. A small, approximately 3-foot by 8-foot, concrete median is located in the center of Gardner Lane and is the placeholder of a single stop sign. There were raised pavement markers on the stop sign island; however, three of five raised pavement markers are missing and the remaining markers are broken. A gravel shoulder is present on the southern edge of the intersection with immediate drop off into a drainage ditch. Other sections of this location have little to no shoulders. The southern stormwater ditch is in good condition.

Within the intersection, one stop sign is installed on the Gardner Lane approach and one pole mounted street light is installed on the southern edge. No other direction or wayfinding signs were observed. Pavement and pavement markings along Route 460 are in good condition. Roadway and shoulder deterioration was observed, as well as a lack of pavement markings, including stop bar, on Gardner Lane. Edgelines were not present at the corner radii in either the northeast or northwest corners of the intersection.

5.8.2 Crash Summary

Between 2012 and 2016, twelve (12) crashes occurred at the intersection of Route 460 and Gardner Lane. Twenty-five percent (2 crashes) resulted in visible injury (crash type B), 33 percent (4 crashes) resulted in non-visible injury (crash type C), and 42 percent (5 crashes) resulted in property damage only (crash type O). Forty-two percent of crashes were rear end, two eastbound and three in the westbound direction. Additionally, twenty-five percent of crashes were angle crashes. The angle crashes all involved left-turning vehicles, two turning left from Gardner Lane onto eastbound Route 460 and two turning left from eastbound Route 460 onto Gardner Lane. The remain thirty-three percent of crashes were side swipe, fixed object and deer related crashes. Fifty percent of crashes occurred during the hours of 6 AM and 9AM.

5.8.3 Suggested Countermeasures

- Realign intersection Gardner Lane intersects Route 460 at a skewed angle, restricting sight distance of oncoming traffic and allowing for high speed turns onto Gardner Lane.
- Improve or remove island with stop sign on Gardner Lane.
- Provide turning lanes and acceleration lanes for traffic onto and off of Garner Lane.
- Speed enforcement in vicinity of intersection.

LEGEND

▶0►	Rear End		Fa
-►↓	Deer		Se
-► 🚵	Motorcycle		Vi
\otimes	Other		N
→	Angle	=	P
≁०॑∢	Head On	_	
→	Sideswipe - S	ame Di	red
≁►	Sideswipe - C	pposit	e D
-►0	Fixed Object	in Road	l
*	Non-Collision	1	
-	Fixed Object	- Off Ro	ad





Site Specific Location #8 Old Myrtle Road 5.9

5.9.1 Existing Conditions

This location is the unsignalized, four-legged intersection of Route 460 and Old Myrtle Road. The surrounding area is a combination of agricultural and heavily forested land.

Route 460, in both the eastern and western legs, and the southern leg of Old Myrtle Road are paved. The northern leg of the intersection is gravel, with a dirt pull off just west of the intersection. The Southern leg of Old Myrtle Road creates a skewed intersection. There is a 135-foot right turn lane with a 155foot taper located along the eastern leg of Route 460. Line of sight is hindered by vegetation, signs, and other fixed objects along Route 460.

Curb and gutter is not present at this location. Gravel and grass shoulders are present, albeit narrow, resulting in little to no recovery area. Deep stormwater ditches runs parallel to both sides of Route 460.

Good wayfinding signs are present throughout intersection. One pole mounted street light was identified at this location. Heavy dump truck traffic was observed on southbound Old Myrtle Road to and from commercial business. Despite some pitting in the right turn lane, overall the pavement on Route 460 is in good condition. All pavement edges are showing signs of deterioration and cracking. Between pavement edge and dirt pull off, pavement drop off was noticeable. Pavement markings are visible, but show signs on wearing and deterioration. A centerline rumble strip is present, as well as raised plowable pavement markers.

5.9.2 Crash Summary

Between 2012 and 2016, twenty-eight (28) crashes occurred at the intersection of Route 460 and Old Myrtle Road. Four percent (1 crash) resulted in fatality (crash type K), 11 percent (3 crashes) resulted in ambulatory injury (crash type A), 21 percent (6 crashes) resulted in visible injury (crash type B), 29 percent (8

crashes) resulted in non-injury (crash type C), and the remaining 36 percent (10 crashes) were property damage only (crash type O). Thirteen rear end crashes accounted for forty-six percent of crashes at this location, six in the eastbound directions and seven in the westbound direction. Fourteen percent of crashes were fixed object off road. Eleven percent accounted for deer related crashes and an additional eleven percent were categorized as other crashes. Seven percent were angle crashes, and the remaining twelve percent were a motorcycle crash, a head on crash and a non-collision. Thirty-nine percent of crashes occurred during the hours of 3 PM and 6 PM. One crash was the result of a DUI.

5.9.3 Suggested Countermeasures

- Pave driveway aprons paving driveway aprons will help to keep debris off the roadway and maintain pavement quality.
- Intersection warning signs in both east/westbound directions may want to consider installing dynamic warning signs for both Old Myrtle Road and the private driveway given the high number of crashes.
- Add turn/acceleration lanes:
 - Add left turn lane and left/right turn receiving lanes (from Old Myrtle Road and private driveway in westbound direction).
 - Add left and right turn and acceleration lanes in eastbound direction.

LEGEND →O→ Rear End







5.10 Site Specific Location #9 2,200 Feet West of Old Myrtle Road

5.10.1 Existing Conditions

This location is a segment of Route 460, located 2,200 feet west of Old Myrtle Road. Surrounding area is a combination of residential and forested land. Heavy vegetation is found along the northern side of Route 460.

The four-lane, undivided highway is paved, with dirt aprons leading to residential land. There are no turn lanes present.

A centerline rumble strip is installed along this segment. Steep sloped embankments line both sides of Route 460 and little to no recovery area is available between pavement edge and stormwater ditch.

Pavement along Route 460 is in good condition. Pavement markings, including edgelines, are visible but are deteriorating and cracking. Raised plowable pavement markers are installed along centerline and lane markings. No street lights were observed along this corridor section.

Mailboxes, trees and other fixed objects are present on both sides of Route 460.

5.10.2 Crash Summary

Between 2012 and 2016, five (5) crashes occurred at the segment of Route 460 and 2200ft West of Old Myrtle Road. Twenty percent (1 crash) resulted in a fatality (crash type K), 20 percent (1 crash) resulted in a visible injury (crash type B), 40 percent (2 crashes) resulted in non-visible injury (crash type C), and the remaining 20 percent (1 crash) resulted in property damage only (crash type O). At this location, one crash was a rear end in the westbound direction, one crash was an angle crash, and three crashes were fixed object off road, one in the westbound direction and two in the eastbound direction. Sixty percent of crashes at this location was due to failure to maintain proper control.

5.10.3 Suggested Countermeasures

- Pave driveway aprons paving driveway aprons will help to keep debris off the roadway and maintain pavement quality.
- Shoulder widening providing a more forgiving roadway would allow space for to recover from unexpected roadway conditions or leaving the travel lane.

LEGEND

▶0-▶	Rear End	
-	Real Ella	
►.L	Deer	
►ඣ	Motorcycle	
\otimes	Other	
▶	Angle	
►Ó◀	Head On	
→	Sideswipe - Sa	ame
≁►	Sideswipe - O	ppos
-►0	Fixed Object i	n Roa
-	Non-Collision	
-	Fixed Object -	Off F





5.11 Site Specific Location #10 1,750 Feet East of **Ennis Mill Road**

5.11.1 Existing Conditions

This location is a segment of Route 460 located 1,750 feet east of Ennis Mill Road. It is an undivided 4-lane segment with turn lanes. Both the eastern and western legs of Route 460 are paved while the adjoining pull-off is a gravel access to a vacant commercial building. The area surrounding this location is a mixture of residential and agricultural land. Segment sight distance is fine in both directions. Poles and mailboxes both line Route 460.

There are no medians or curb and gutters along this portion of the corridor. A centerline rumble strip is installed along the centerline, separating east and westbound traffic. This segment is lined with little to no shoulders. Existing shoulders have drop-offs to gravel and stormwater ditches. The transition from pavement edge to drainage ditches are steep and eroded.

Wayfinding signs are not installed along this segment and the existing 55 MPH sign was observed to be smaller than other signs. The pavement is in average condition and pavement marking cracking and wear is evident. Raised paved pavement markers are installed along this stretch of Route 460. One street lamp is installed, but it is for business use.

5.11.2 Crash Summary

Between 2012 and 2016, seven (7) crashes occurred at the segment of Route 460 located 1750ft East of Ennis Mill Road. Fourteen percent (1 crash) resulted in a fatality (crash type K), 14 percent (1 crash) resulted in visible injury (crash type B), 29 percent (2 crashes) resulted in non-visible injury (crash type C), and remaining 43 percent (3 crashes) resulted in property damage only (crash type O). Of the seven crashes at this location, two were rear end crashes, one in each the eastbound and westbound directions, two crashes were side swipe crashes, one in each the eastbound and westbound directions. The remaining three crashes that occurred at this location were a deer-related crash, a fixed object off road, and a crash categorized as other. The remain 58 percent (four crashes) were due to failure to maintain proper control. Seventy-two percent (5 crashes) occurred during no adverse weather conditions, while 14 percent (1 crash) occurred during the rain, and fourteen percent (1 crash) occurred in misty weather. Fifty-eight percent (4 crashes) occurred during the hours 3 PM and 6 PM. Seventy-two percent of crashes occurred with in the months of October, November and December.

5.11.3 Suggested Countermeasures

- Treatments to allow residents to enter/exit road:
 - ♦ Access road to combine driveway access points onto Route 460.
 - ♦ Acceleration/deceleration lanes or a two way left turn lane.
 - Speed enforcement to ensure that drivers have adequate time to see and react to entering vehicles and to also provide sufficient gaps for drivers pulling out of the driveways.

LEGEND

→O→ Rear End -> Deer → 🏍 Motorcycle \otimes Other **→** Angle →O Head On ≁► → Fixed Object in Road ➤ Non-Collision

Site Specific Analysis





5.12 Site Specific Location #11 1,000 Feet East of **Old Suffolk Road**

5.12.1 **Existing Conditions**

This location is an undivided segment of Route 460 located 1,000 feet east of Old Suffolk Road. The area surrounding this location is predominately agricultural crop land divided by two gravel driveways. Sight distance along this segment is clear, with the exception of mailboxes and utility poles.

This location is paved along the eastern and western legs, with three dirt aprons, two on the southern side and one on the northern side. The dirt aprons are not located across from each other. No turn lanes are located along this segment.

This segment contains a pavement marking transition from a double yellow line, with a centerline rumble strip, to a traversable median. A centerline rumble strip is also installed. Raised plowable pavement markers installed throughout the segment.

Little to no shoulders or recovery area are present at this location. There is a steep transition from edge of pavement into stormwater collection ditches. Overgrown vegetation, debris, and build-up can be seen along entire length of ditch and the reinforced concrete piping is blocked or clogged. Two of the entry points to Route 460 are obscured by overgrown vegetation and may lead to unexpected entries into the roadway.

No advanced warning or wayfinding signs are installed within this segment. Additionally, no street lighting was visible in this segment. Pavement markings are in acceptable condition and visible; however, wear and heavy cracking can be observed on edgelines. Pavement appears to be in good condition.

Standing water was observed during and after all rainfall events. Both sides of the roadway ditches were full of sediment and vegetation. Stormwater drainage pipes were 75 percent obstructed during VHB's field review, potentially limiting effective water flow and drainage.

5.12.2 Crash Summary

Between 2012 and 2016, five (5) crashes occurred at the segment of Route 460 and 1,000 feet east of Old Suffolk Road (City Route 636). Forty percent (2 crashes) resulted in an ambulatory injury (crash type A), 40 percent (2 crashes) resulted in visible injury (crash type B), and the remaining 20 percent (1 crash) resulted in property damage only (crash type O). The five crashes that occurred at this location were a westbound rear end, a westbound sideswipe, a non-collision, a fixed object off road, and a crash categorized as other. Forty percent of crashes were caused by failure to maintain proper control. One crash occurred during rain, while the remaining crashes occurred during no adverse weather conditions. Sixty percent of crashes occurred during the months of April, May, and June.

5.12.3 Suggested Countermeasures

- Treatments to allow residents to enter/exit road:
 - ♦ Acceleration/deceleration lanes or a two-way left turn lane.
 - ♦ Speed enforcement to ensure that drivers have adequate time to see and react to entering vehicles and to also provide sufficient gaps for drivers pulling out of the driveways.
 - Trim vegetation to increase visibility of oncoming vehicles.
- Clear vegetation from drainage ditches to promote proper drainage and maintain roadway stability.

LEGEND

▶0-▶	Rear End	
-1	Deer	
	Motorcycle	
\otimes	Other	
► O	Angle	
▶०॑◀	Head On	
↘	Sideswipe - S	ame D
≁	Sideswipe - O	pposi
-►0	Fixed Object i	n Roa

➤ Non-Collision



Table 5.2.	
Site Specific Cost Estimate.	

		Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7	Location 8	Location 9	Location 10	Location 11
	Signage		\$803		\$503							
1	Pavement Markings	\$11,909	\$14,006	\$13,522	\$19,612	\$7,541						<u> </u>
Tier	Signal	\$792	\$792	\$792	\$792							
	Other	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$332	\$166	\$166
	Total	\$12,867	\$15,767	\$14,480	\$21,073	\$7,707	\$166	\$166	\$166	\$332	\$166	\$166
	Signage	\$500	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660
~	Pavement Markings	\$1,016	\$964	\$871	\$554	\$7,541						ļ
ier2	Signal			\$2,600	\$2,600							ļ
F	Other											
	Total	\$1,516	\$1,624	\$4,131	\$3,814	\$8,201	\$660	\$660	\$660	\$660	\$660	\$660
	Signage			\$7,920	\$7,920	\$7,920			\$7,920			<u> </u>
	Pavement Markings					\$832						1
	Signal											
	Other			\$15,000	\$600			\$5,280				
	Mill and Overlay*	\$562,800	\$609,000	\$504,000	\$634,200	\$168,000						
	Install Turn Lane(s)					\$179,000		\$236,000	\$358,000			1
ier 3	Install Acceleration Lane(s)					\$203,000		\$203,000	\$507,500		\$812,000	\$406,000
F	Pave Driveway Apron						\$6,000		\$23,000	\$12,000		
	Roadway Lighting	\$20,000				\$20,000						
	Widen Shoulder & Add Guardrail					\$52,026						
	Widen Shoulder	\$52,034					\$104,068			\$104,068		
	Realign Intersection							\$154,532				
	Total	\$634,834	\$609,000	\$526,920	\$642,720	\$630,778	\$110,068	\$598,812	\$896,420	\$116,068	\$812,000	\$406,000

Note: 1) Systemic improvements from the templates are not included separately in this estimate. They are accounted for in the systemic cost estimate.

2) Right of way and utility relocations are not included in these estimates.

3) Full depth pavement replacement may be necessary, but is not included in the cost.

*Does not include new pavement markings - those are accounted for above in Tier 1 and Tier 2.



Arterial Preservation and Emergency Evacuation

chapter 6

6.1 Introduction

The vision for Route 460 is to provide safe and reliable mobility along the corridor. VDOT's new program, the Arterial Preservation Program, ties directly to that vision. While the need for this project was identified prior to the release of VDOT's program, this section intends to touch on the overarching principals of the program and how they can be tied to Route 460.

Additionally, mobility during emergency situations is key to mobility and safety of the public, especially in coastal areas that are prone to hurricanes and flooding. As part of this study, a qualitative evaluation of Route 460 as a possible evacuation route was conducted. The details and summary are presented later in this section.

6.2 Arterial Preservation

VDOT developed an Arterial Preservation Program to preserve and enhance the mobility and safety along critical transportation corridors within the Commonwealth. The main objective of this program is to establish alternative, innovative transportation solutions and strategies to corridor treatments to increase capacity as a substitute for traditional widening projects. The Route 460 corridor has been identified as a Mobility Preservation Segment (MPS) by VDOT and is pending adoption into VTrans2040 by the Commonwealth Transportation Board (CTB).

A MPS has been defined, by VDOT, as "a segment of arterial roadway outside of an urban area, with a population of 50,000 or more, that serves as a long-distance mobility need where no parallel freeway route exists." The major goal for Route 460, as an MPS, is to minimize traffic delays, especially at access points.

6.3 Route 460 Corridor Preservation

A systemic field review and a traditional site-specific field review were conducted on the Route 460 corridor as part of this study. This review process was used to identify and collect roadway features, right-of-way/clear zone restrictions, roadside observations, traffic control information and intersection design. In addition, existing studies, plans, policies and guidelines were reviewed to provide a greater understanding of the corridor, while assessing safety and operational needs.

Operational analysis was conducted as part of this study. The primary goal is to increase capacity and reduce delay along the mainline, Route 460. Through proposed signal timing and phasing improvements such as adding the flashing yellow arrow signals at select intersection, flow along Route 460 may be increased while delay decreases.

In line with that, a detailed evaluation of the intersection of Prudence Road and Route 460 intersection was evaluated for an innovative intersection design utilizing VDOT's Junction Screening Tool (VJuST). The results of this analysis will be included in the final study.

6.4 Access Management

Access management supports corridor preservations and is key to improvement of mobility and safety along the Route 460 corridor. While access management was not specifically evaluated along the entire Route 460 corridor as part of this study, any new access points should be closely evaluated for the impact to the mainline as future development occurs. VDOT provides guidance on the spacing, design, and control of new access points that should be utilized when making decisions on future access points or evaluating existing access point consolidation.

6.5 Evacuation Route Qualitative Evaluation

Evacuation routes are planned and analyzed for viability during natural or manmade disasters. Routes should be considered based on the roadway's ease of restoration, functional service, and strategic location. Potential problems such as bottlenecks, barriers and scheduled work zones should be identified and analyzed in advance to ensure sufficient egress is provided within the affected areas.

On June 1, 2017, Virginia launched new tiered evacuation zones for the coastal areas throughout Hampton Roads, the Northern Neck, Middle Peninsula and Eastern Shore. These zones are designated letters A through D and provide residents with a better understanding of whether they should evacuate in an emergency based on the nature of the event. This new system has the potential to reduce traffic congestion, promote increased highway safety, and lessen overcrowding at storm shelters throughout Virginia's coastal region.

The study area along the Route 460 corridor resides in Isle of Wight County and the City of Suffolk. Currently, Route 460 westbound operates as a two-lane evacuation route for residents on the southside of Interstate 264. Interstate 64 is the only route with a contra-flow lane reversal plan as stated in the Virginia Hurricane Preparedness Guide. Due to the number of uncontrolled access points and driveways along Route 460, a one-way contra-flow reversal evacuation route is not recommended along this route.

One of the constraints to Route 460 serving as an evacuation route is that it has minimal shoulders and a lack of pull-off areas along the corridor. The lack of space prohibits vehicles from pulling off the roadway and does not allow emergency vehicles access if the roadway becomes congested. Providing a wide shoulder on the westbound direction would provide greater emergency vehicle accessibility. Additionally, providing intermittent pull-off areas would get broken down vehicles out of the road and provide more capacity. Those pull-off areas could also be used during non-emergency times for speed enforcement pulloffs.

Drainage issues have been identified along the Route 460 corridor. Drainage ditches are located directly adjacent to the roadway, potentially creating a flooding hazard during emergency evacuations. Geometric/drainage alternations should be made to reduce pooling and water spread to promote safer travel through the corridor. Drainage improvements, such as vegetation trimming, are proposed as part of the site-specific recommendations.

Long Term Improvements

chapter 7



The objective of this study is to identify small-achievable spot projects for improvements to the Route 460 corridor, from the western limits of the Town of Windsor to approximately 1,500 feet west of the Route 460 and Route 58 interchange. The spot projects will address safety and operational deficiencies while preserving the corridor as a primary arterial and emergency evacuation route. Based on the results of the corridor evaluation and the public comments received, it was clear that long-term substantial changes were needed to truly address safety and traffic flow along the corridor. Three alternative typical sections were evaluated to address the geometric deficiencies along the current roadway alignment. The alternatives are anticipated to reduce the number, and severity, of crashes while increasing mobility along the corridor. Each alternative builds on the previous one, providing additional safety and operational benefits while requiring additional investment for construction. For each alternative, a description of the anticipated improvements, the benefits it will provide, and a conceptual cost, are provided in this section and are shown in Figure 7.1. Details on the planning level costs are provided in Appendix I.

7.1 Alternative 1

This alternative includes the addition of wide shoulders throughout the entire study corridor. Providing shoulders is the lowest cost alternative we evaluated, providing many important safety and operational functions while minimizing right-of-way needs.

- Shoulders provide space for errant vehicles that have left the travel lane, increasing the chance for recovery for run off the road crashes.
- Shoulders provide space for temporary storage of disabled vehicles, reducing accident related lane closures, which contribute to severe congestion, and associated safety problems on high volume roadways.
- Shoulders increase driver comfort, which can improve capacity
- Shoulders accommodate bicyclists, providing them with separation from vehicle traffic and reduce risky passing maneuvers from motor vehicles traveling at higher speeds.
- Shoulders may be used by pedestrians.
- Shoulders help preserve the integrity of the roadway edge.
- Shoulders provide space for enforcement activities.

This alternative provides 8-foot-wide shoulders, along the outside edge of the roadway, consisting of 6-inches of asphalt paving over 10-inches of aggregate base. This alternative does not include any change to the existing lane width, nor does it include milling of the adjacent lane. Therefore, it will have the least amount of impact to the traveling public during construction of all the alternatives. Alternative 1 also has the least improvement to safety and operational efficiencies.

Alternative 1 - Conceptual Cost Estimate

The conceptual cost estimate is adjusted for inflation to construction year 2024, and includes estimated private utility relocation fees, and preliminary engineering

and construction engineering services. This estimate does not include right-ofway costs.

- ▶ Isle of Wight County segment: encompasses an 8,040 foot stretch of Route 460 from Lovers Lane to the City of Suffolk line and is estimated to cost \$6,060,000.
- City of Suffolk segment: encompasses a 25,580 foot stretch of Route 460 from the Suffolk City line to Northfield Drive and is estimated to cost \$25,620,000.

7.2 Alternative 2

This alternative includes the addition of 8-foot-wide shoulders through the corridor, as described in Alternative 1, with the addition of a median barrier and narrow inner shoulder along the edge of the travel lanes. A median barrier provides additional safety and operational benefits over those discussed in Alternative 1.

- Median barriers physically separate opposing traffic, reducing highly destructive and often fatal, head on collisions.
- Median barriers control access at intersections by limiting turning options, improving traffic flow and reducing collisions by allowing certain turning movements only at locations where sight distance is improved, or crossing treatments have been provided.

This alternative provides 8-foot-wide shoulders, along the outside edge of the roadway, consisting of 6-inches of asphalt paving over 10-inches of aggregate base. Ten feet of separation will be provided between each direction of travel, with a 2-foot-wide concrete median barrier in the center. To incorporate this separation and median barrier, the roadway would need to be widened approximately 5 feet in both directions. The affected travel lane area will be constructed with 9-inches of asphalt over 12-inches of aggregate base.

This alternative does not include any change to the existing lane width, nor does it include milling of the adjacent lane.

Alternative 2 - Conceptual Cost Estimate

The conceptual cost estimate is adjusted for inflation to construction year 2024, and includes estimated private utility relocation fees, and preliminary engineering and construction engineering services. This estimate does not include right-ofway costs.

- ▶ Isle of Wight County segment: encompasses an 8,040 foot stretch of Route 460 from Lovers Lane to the City of Suffolk line and is estimated to cost \$11,570,000.
- City of Suffolk segment: encompasses a 25,580 foot stretch of Route 460 from the Suffolk City line to Northfield Drive and is estimated to cost \$41,490,000.

7.3 Alternative 3

This alternative provides complete reconstruction of the roadway, wider travel lanes, a 40-foot depressed median and an 8-foot-wide outside shoulder. In addition to the safety and access management improvements provided in Alternative 2, this option provides some increased operational, safety, aesthetic, and environmental benefits.

This alternative is the most expensive alternative, but it provides the most flexibility to mitigate issues in the future as the corridor grows, and volumes increase

Alternative 3 - Conceptual Cost Estimate

The conceptual cost estimate is adjusted for inflation for construction year 2024, and includes estimated private utility relocation fees and preliminary engineering and construction engineering services. This estimate does not include right-ofway costs.

- \$21,310,000.
- \$62,840,000.

> Depressed median provides a recovery area for errant vehicles leaving the roadway along the inside edge of the traveled way.

Depressed median provides a refuge space for turning vehicles allowing for a two-stage left turn by allowing the driver to focus on one direction of opposing vehicles at a time.

Trees, or other landscaping features, may be provided in the median space.

> The wide median space retains and filters stormwater, reducing water on the roadway and reducing the impact to nearby water ways.

> 12-foot lanes provide additional comfort for drivers, especially truck traffic.

Reconstructed lanes will provide a smooth driving surface.

Wide median widths provide space for future roadway widening, addition of turn lanes, additional lighting, and other treatments requiring additional roadway right-of-way.

▶ Isle of Wight County segment: encompasses an 8,040 foot stretch of Route 460 from Lovers Lane to the City of Suffolk line and is estimated to cost

City of Suffolk segment: encompasses a 25,580 foot stretch of Route 460 from the Suffolk City line to Northfield Drive and is estimated to cost 7



ALTERNATIVE 1



ALTERNATIVE 2



Figure 7.1. Typical Sections.

ALTERNATIVE 3



chapter

Recommendations

8.1 Introduction and Methodology

The goal of the study was to provide a set of recommendations for operational, safety, and arterial preservation and evacuation improvement. In order to achieve that goal, the Route 460 Safety and Operations Study provided a comprehensive evaluation the Route 460 corridor with the purpose of understanding operational and safety conditions, within the context of arterial preservation and evacuation. The outcome of these evaluations is a series of recommended treatments which have proven operational and safety benefits and address existing, short-term, and long-term corridor needs.

8.1.1 Operational Recommendations

The operational analysis included identification and study of specific intersections throughout the study area; including an analysis of existing 2040 No Build and Build conditions. This analysis was comprised of several elements, including the collection of traffic volumes and subsequent operational analysis of both signalized and unsignalized intersections. One signal warrant screening was also conducted. A summary of the recommendation, based on this analysis, are as follows:

- At the intersection of Route 460 and Rob's Drive, reduce delay on the side streets by increase green time for these approaches.
- At the intersection of Route 460 and Kings Fork Road, the southbound approach lane configuration should be changed to provide an exclusive left turn lane and combined through/right turn lane. This provides a dedicated lane to the movement with heavier volumes and signal phasing optimization. Also suggested are the provision of flashing yellow arrows on the Route 460 approaches to provide a safety benefit and phasing optimization for left turning vehicles.
- At the intersection of Route 460 and Providence Road/Lake Prince Drive, implement flashing yellow arrows on the Route 460 approaches to provide a safety benefit and phasing optimization for left turning vehicles.

8.1.2 Safety Recommendations

The safety portion of this study incorporated systemic template application, intersection evaluation, and site specific assessment toward the development of the recommendations. The safety improvements are comprised of a set of tiered recommendations of signs, pavement markings, geometric changes, traffic control techniques and other improvements to enhance safety and operations of the Route 460 corridor. The recommendations were determined through an evaluation of crash history and proactively applying templates of proven safety techniques in combination with site specific modifications with proven safety results.

During the five-year period of 2012-2016, there were 242 crashes. Through the approach presented in this report, the most prevalent and most severe crash types have been comprehensively considered and addressed.

Two of the most common crash types were intersection-type crashes with rear end crashes accounting for 33 percent or 79 reported crashes and angle crashes accounting for 16 percent of all crashes or 39 reported crashes. Improved intersection signage, enhanced roadway delineation, and along with improvements in select locations, such as lighting and dynamic intersection warning improve intersection visibility and expectancy. Signal timing improvements would provide improved vehicular flow and turn lanes would remove slower moving vehicles from the flow of traffic.

Roadway departure crashes were the second most prevalent crash type within the study area representing 26 percent or 63 of the total crashes. Countermeasures such as improved pavement markings, and rumble strips, along with site specific measures, such as lighting and shoulder

8.1.3 Arterial Preservation and Evacuation Recommendations

For the purposes of this report, the existing conditions and potential considerations for arterial preservation and evacuation were reviewed at a high level. These findings have been summarized but no direct recommendations are included in this report. However, VDOT should consider these elements when planning for proposed changes to the corridor.

widening, provide enhanced roadway delineation and warning for drivers.

A high level summary of recommendations costs are presented in Table 8.1. See Appendix H and Appendix J for additional details.

Treatmemt	Cost
Systemic Treatme	ents
Tier 1	\$1,293,492
Tier 2	\$518,817
Tier 3	\$608,284
Total	\$2,420,593
Site Specific Treatr	ments
Tier 1	\$73,056
Tier 2	\$23,246
Tier 3	\$5,983,620
Total	\$6,079,922

Table 8.1. **Recommended Improvements.**

8.2 Conclusion

users.

The City of Suffolk is applying for funding for the implementation of Alternative 2 for the longer term improvements. The implementation of this alternative would further address the safety and operational challenges along the Route 460 corridor.

Safety and operations play an important role in improving mobility along Route 460. This study has identified varying tiers of low-cost improvements that can be implemented along the corridor to provide a safer travel experience to road



CONTENTS

Systemic Templates

Appendix A





Appendix A

NO	TES:
Sig 1	nage Upgraded signs with current MUTCD standards (font, size,
-	retroreflectivity, placement, message, etc.)
0	Fluorescent yellow sheeting on change of Direction Warning signs
0	Street Name sign (D3-1a or D3-1 for local roads) (County responsibility)
3	Larger 12" Street Name sign (D3-1a) (County responsibility)
0	Control sign (R1 Series)
2	Second Control sign (R1 Series) on left if median is present and is greater than 6' in width, with a "Keep Right" sign (R4-7) and an Object Marker (OM3-L) facing opposite direction
3	Larger Control sign (R1 Series)
3	Mountable curb, lane narrowing island with second control sign (see detail)
0	OM3-L object marker and R4-7 "Keep Right" sign at end of mountable curb island
0	Intersecting Route and Directional sign (M1, M3, & M6 Series). Include signs for through movements on primary routes only where through movement is a different route number
0	Advance Intersecting Route and Directional sign (M1, M3, & M5 Series) on primary routes and secondary routes with AADT \geq 2000 vpd
0	Confirmation Route signs (M1 and M3 series) on primary routes
0	Destination/guide sign (D1 series) on primary routes
2	Advance Intersection Lane Control signs (R3-8 Series) on approaches with turn lanes, or "Begin Right Turn Lane" sign (R3-20R) where only a right-turn lane is present
2	Intersection Warning sign (W2 series) on approaches that are not stop-controlled
3	Street Name (W16-8 series) signs on CoSS approaches
2	Stop Ahead sign (W3-1) on stop-controlled approaches
Pav	rement Markings
Ű	Stop bar/yield line (MUICD Section 3B.16)
Ű	6" grooved/in-laid edge line on primary routes
U	4" edge line on secondary routes (see table for application guidance)
0	4 [*] center line pavement markings on secondary routes (see table for application guidance)
U	Solid lane and center line approaching intersection
0	Mini-skip marks delineating turn lanes through the intersection when dual turn lanes are present
0	Mini-skip marks at turn lane when taper length is greater than 100'
2	Lane use pavement markings (MUTCD Section 3B.20)
3	"Stop Ahead" or "Yield Ahead" pavement markings (MUTCD Section 3B.20)
3	Use rumble stripe for 6" markings
Oth 1	If pedestrian accommodations are present, ensure minimum requirements for crossing (6" solid lines offset minimum 6' and placed 4' in advance of the stop bar) and crosswalk warning sign
3	Reflectorized sign posts (MUTCD Section 2A.15)
3	Add transverse rumble strips on stop-controlled approach to CoSS
0	Trim vegetation to provide adequate sight distance
2	Mark obstructions within clear zone (OM1, 2, or 3 series)
0	
5	Remove or provide a barrier for obstructions within clear zone
NO.	Remove or provide a barrier for obstructions within clear zone TE: Signage and pavement marking placement is not to scale. Depending
NO ¹	Remove or provide a barrier for obstructions within clear zone TE: Signage and pavement marking placement is not to scale. Depending on site conditions, signs should share the same post to the extent possible

guidance. Signs should not be placed in the median unless the median is \geq

4' wide and the sign is smaller than the median.

Ĺ

Ł

3

W16-8

Pave-ment Width

 \geq 20 feet

Traffic Volume

≥ 3,000 vpd

< 3.000 vnd

Undi vided Limited Access

Required

Required

Bi-

directional multi-lane

Required

Required



≥ 3,000 vpd May be consid-ered only where < 20 feet Required Required Engineering Study indicates < 3,000 vpd Required Required a need Criteria for Placement of Center Line Markings (Source: Virginia Supplement Chapter Roadway Type Other Non-Local Residential Undivideo Limited Pave-ment Width Bi Traffic Volume directional multi-lane Access

\geq 18 feet	\geq 500 vpd	Required	Required	Required	Recommended	Recommended
	< 500 vpd	Required	Required	Optional (if warranted)	Optional	Recommended
< 18 feet	≥ 500 vpd	Required	Required	May be considered only where Re Engineering Study indicates a need Re		Recommended
	< 500 vpd	Required	Required			Recommended



** Minimum median width of 6' with second control sign. However, if larger control sign used, median must be at least 7' wide.



- 1 Upgraded signs with current MUTCD standards (font, size, retroreflectivity, placement, message, etc.)
- **1** Fluorescent yellow sheeting on changes of Direction Warning signs Control sign (R1 Series)
- Second Control sign (R1 Series) on left, if median is present and is greater than 6' in width, with a "Keep Right" sign (R4-7) and Object Marker (OM3-L) facing opposite direction

Larger Control sign (R1 Series)

1 Street Name sign (D3-1a or D3-1 for local roads) (County responsibility)

Larger 12" Street Name sign (D3-1, 1a) (County responsibility)

- 3 Mountable curb, lane narrowing island with second control sign (see detail)
- OM3-L Object Marker and R4-7 "Keep Right" sign at end of mountable curb island
- 1 Intersecting Route and Directional sign (M1, M3, & M6 Series).
 - Include signs for through movements on primary routes only where through movement is a different route number.
 - Advance Intersecting Route and Directional sign on primary routes (M1, M3, & M5 Series)
 - Confirmation Route signs (M1 and M3 Series) on primary routes
 - Destination/guide sign (D1 Series) on CoSS
 - "Begin Right Turn Lane" sign (R3-20R)
 - Intersection Warning sign (W2 series)

Street Name (W16-8)) signs on CoSS approaches

- 2 Stop Ahead sign (W3-1) on stop controlled approach
- 1 Two-Direction Large Arrow sign at T-intersection (W1-7)
 - Add two OM4-3 Object Markers below the Two Direction Large Arrow (W1-7) sign

Pavement Markings

- **1** Stop bar/yield line (MUTCD Section 3B.16)
 - 6" grooved/in-laid edge line on primary routes
- 4" edge line on secondary routes (see table for application guidance)
- 4" center line pavement markings on secondary routes (see table for application guidance)
- **1** Solid lane and center line approaching intersection
 - Mini-skip marks delineating turn lanes through the intersection when dual turn lanes are present
- 1 Mini-skip marks at turn lane taper when taper length is greater than 100'
 - Lane use pavement markings (MUTCD Section 3B.20)
 - "Stop Ahead" or "Yield Ahead" pavement markings (MUTCD Section 3B.20)
- 3 Use rumble stripe for 6" markings
- 1 If pedestrian accommodations are present, ensure minimum requirements for crossing (6" solid lines offset minimum 6' and placed 4' in advance of the stop bar) and crosswalk warning sign
 - Reflectorized sign posts (MUTCD Section 2A.15)
 - Trim vegetation to provide adequate sight distance Mark obstructions within clear zone (OM1, 2, or 3 series)
 - Remove or provide a barrier for obstructions within clear zone
- 3 Add transverse rumble strips on stop controlled approach to CoSS
- NOTE: Signage and pavement marking placement is not to scale. Depending upon site conditions, signs should share the same post to the extent possible in order to reduce sign clutter. Actual placement will be determined on a site by site basis based on MUTCD and/or VA Supplement design standards and guidance. Signs should not be placed in the median unless the median is $\geq 4'$ wide and the sign is smaller than the



M3-4 M3-2

Cr	Criteria for Placement of Edge Line Markings (Source: Virginia Supplement Chapter										
Γ				Roadway Type							
	Pave- ment Width	Traffic Volume	Undi- vided Bi- Limited direction Access multi-lar		Two-lane Paved Roads with Center Line & without Curb and Gutter	Other Rural Arterials and Collectors	Local Residential	All Other Paved Roadway Segments			
[≥ 20 feet	≥ 3,000 vpd	Required	Required	Required	Recommended	Not	May be			
		< 3,000 vpd	Required	Required	Required	May be	unless primarily serving	only where			
[< 20 feet	≥ 3,000 vpd	Required	Required	May be consid-	only where		Study			
		< 3,000 vpd	Required	Required	Engineering Study indicates a need	Study indicates a need	through trainc	need			

Criteria for Placement of Center Line Markings (Source: Virginia Supplement Chapter 3B))

		Roadway Type					
Pave- ment Width	Traffic Volume	Undivided Limited Access	Bi- directional multi-lane	Other Non-Local Residential	Other Local Residential	Local Residential	Mi
≥ 18 feet	≥ 500 vpd	Required	Required	Required	Recommended	Recommended	Ĭ
	< 500 vpd	Required	Required	Optional (if warranted)	Optional	Recommended	
< 18 feet	≥ 500 vpd	Required	Required	May be considered only where Engineering Study indicates a need Recommended		Recommended]
	< 500 vpd	Required	Required			1	



W3-3

Center St NEXT SIGNAL

J

D3-V2

7





Appendix A

nage	NOTES:					
Upg	raded signs with current MUTCD standards (font, size, retroreflectivity,					
plac	ement, message, etc.)					
Fluo	rescent yellow sheeting on change of Direction Warning signs					
1	Street Name sign (D3-1a or D3-1 for local roads) (County responsibility)					
Ŏ	Two-Direction Large Arrow Warning sign at T-intersection (W1-7)					
0	Intersecting Route and Directional sign (M1, M3, & M6 Series).					
	Include signs for through movements on primary routes only where through movement is a different route number.					
0	Advance Intersecting Route and Directional sign (M1, M3, & M5 Series) on primary routes					
0	Confirmation Route signs (M1& M3 Series) on primary routes					
0	Destination/guide sign (D1 Series) on CoSS					
2	Advance Intersection Lane Control signs (R3-8 Series) on approaches with					
	(R3-20R) where only a right-turn lane is present					
3	Advances Street Name signs (D3-2 & D3-V2)					
2	Add two OM4-3 Object Markers below the Two Direction Large					
a	Signal Ahead warning sign (W3-3) on CoSS					
Ŏ	Signal Ahead warning sign (W3-3) on non-CoSS roads					
2	Street Name (W16-8) signs on CoSS approaches					
2	Intersection Warning sign (W2-4) on approach that does not					
Over	head					
3	Overhead Lane Use signs and Left Turn Regulatory signs					
0	Mast arm mounted 12" Street Name sign (D3-1a or D3-V1 for local roads)					
/emei	nt Markings					
5top 6″ a	rooved/in-laid edge line on primary routes					
4″ e	4" edge line on secondary routes (see table for application guidance)					
4" center line pavement markings on secondary routes (see table for application						
guid	lance)					
turr	a lanes are present					
Min	i-skip marks at turn lane taper when taper length is greater than 100'					
Lane	e use pavement markings (MUTCD Section 3B.20)					
Use	rumble stripe for 6 markings					
Che	ck signal sight distance					
12″	LED signal lenses					
Red	Red and yellow arrow lenses for protected movements					
Sign	al backplates with retroreflective border					
One	Check for proper red clearance and yellow change intervals (VDUI 1E 306.1)					
Prov	vide near side signal heads if minimum signal sight distance is not provided					
Prov	ride actuated signals					
ner						
it pe reau	agestrian accommodations are present, ensure minimum jirements for crossing (6" solid lines offset minimum 6' and					
plac	ed 4' in advance of the stop bar), Pedestrian Warning sign, and					
Righ	nt Turn Yield to Pedestrian signs.					
with	pushbutton activation and appropriate pedestrian coundown signals rval.					
Rest	Restrict parking near intersection					
Refle	Reflectorized sign posts (MUTCD Section 2A.15)					
Tran	sverse rumble strips on approach to CoSS					
Mar	k obstructions within clear zone (OM1, 2, or 3 Series)					
Rem	nove or provide a barrier for obstructions.					
TE: Sig	nage and pavement marking placement is not to scale. Depending upon					
cond uce si	itions, signs should share the same post to the extent possible in order to gn clutter. Actual placement will be determined on a site by site basis based					

Tier 1 Recommendations on MUTCD and/or VA Supplement design standards and guidance. Signs should not **2** Tier 2 Recommendations be placed in the median unless the median is $\geq 4'$ wide and the sign is smaller than the 3 Tier 3 Recommendations median.

Appendix A



1 Upgraded signs with current MUTCD standards (font, size, retroreflectivity, placement, message, etc.)

Fluorescent yellow sheeting on change of Direction Warning signs

- Street Name sign (D3-1a or D3-1 for local roads) County responsibility Intersecting Route and Directional sign (M1, M3, & M6 Series) on primary routes
- "Keep Right" sign for median separated roads (R4-7 or R4-8 Series) on raised medians where it is not readily apparent that traffic is required
- to keep to the right (MUTCD Figure 2B-10)
- Add Object Marker on same post as R4-7 or on separate post closer to road (OM3-L)
- Advance Intersecting Route and Directional sign (M1, M3, & M5 Series) on primary routes and secondary routes with AADT \geq 2000 vpd
- Confirmation Route signs (M1-M3 Series) on primary routes
- Destination/guide sign (D1-1) on primary routes
- Advance Intersection Lane Control signs (R3-8 Series) on approaches with turn lanes, or "Begin Right Turn Lane" sign (R3-20R) where only a right-turn lane is present
- Advance Street Name signs on CoSS (D3-2 & D3-V2)
- Signal Ahead Warning sign (left and right)(W3-3)
- Street Name (W16-8 series) signs on CoSS approaches
- "One Way" and "Do Not Enter" signs per VA Supplement
- "Wrong Way" (R5-1a) signs on divided highway

Overhead Lane Use signs and Left Turn Regulatory signs

Mast arm mounted 12" Street Name sign (D3-1a or D3-V1 for local roads) per TE-379 memorandum

Pavement Markings

- Stop bar/yield line (MUTCD Section 3B.16)
- **1** 6" grooved/in-laid edge line on primary routes
 - 4" edge line on secondary routes (see table for application guidance)
 - 4" center line pavement markings on secondary routes (see table for application guidance)
- Solid lane and center line approaching intersection
- 1 Mini-Skip marks delineating turn lanes through the intersection
 - when dual turn lanes are present
- 1 Mini-Skip marks at turn lane taper when taper length is greater than 100' Lane use pavement markings (MUTCD Section 3B.20)
 - Use rumble stripe for 6" markings
- 1 Check signal sight distance
- 12" LED signal lenses
- Red and yellow arrow lenses for protected movements
- Signal backplates with retroreflective border
- Check for proper red clearance and yellow change intervals (VDOT TE 306.1)
- One signal head per approach (where structural loading permits)
- Provide near side signal heads if minimum signal sight distance is not provided Provide actuated signals
- 1 If pedestrian accommodations are present, ensure minimum requirements for crossing (6" solid lines offset minimum 6' and placed 4' in advance of the stop bar), Pedestrian Warning sign, and Right Turn Yield to Pedestrian signs. 1 If pedestrian phase is present, provide pedestrian countdown signals with
- pushbutton activation and appropriate pedestrian crossing clearance interval. • Restrict parking near intersection
- Reflectorized sign posts
- 3 Transverse rumble strips on approach to CoSS
- 1 Trim vegetation to provide adequate sight distance within clear zone Mark obstructions within clear zone (OM1, 2, or 3 Series)
- 3 Remove, mark, or provide a barrier for obstructions within clear zone NOTE: Signage and pavement marking placement is not to scale. Depending upon
- site conditions, signs should share the same post to the extent possible in order to reduce sign clutter. Actual placement will be determined on a site by site basis based on MUTCD and/or VA Supplement design standards and guidance. Signs should not be placed in the median unless the median is $\geq 4'$ wide and the sign is smaller than the
| Criteria for | riteria for Placement of Edge Line Markings (Source: Virginia Supplement Chapter 3B) | | | | | | | | | | | | | | |
|------------------------|--|-------------------------------------|----------------------------------|--|--|----------------------|---|--|--|--|--|--|--|--|--|
| | | | | Roadv | Roadway Type | | | | | | | | | | |
| Pave-
ment
Width | Traffic
Volume | Undi-
vided
Limited
Access | Bi-
directional
multi-lane | Two-lane
Paved Roads
with Center
Line & without
Curb
and Gutter | Other Rural
Arterials and
Collectors | Local
Residential | All Other
Paved
Roadway
Segments | | | | | | | | |
| \geq 20 feet | \geq 3,000 vpd | Required | Required | Required | Recommended | Not | May be
considered | | | | | | | | |
| | < 3,000 vpd | Required | Required | Required | May be | unless | only where | | | | | | | | |
| < 20 feet | ≥ 3,000 vpd | Required | Required | May be consid- | only where | serving | Study | | | | | | | | |
| | < 3,000 vpd | Required | Required | Engineering
Study indicates
a need | Study
indicates a
need | | need | | | | | | | | |

Criteria for Placement of Center Line Markings (Source: Virginia Supplement Chapter

			Roadway Type											
Pave- ment Width	Traffic Volume	Undivided Limited Access	Bi- directional multi-lane	Other Non-Local Residential	Other Local Residential	Local Residential								
\geq 18 feet	≥ 500 vpd	Required	Required	Required	Recommended	Recommended								
	< 500 vpd	Required	Required	Optional (if warranted)	Optional	Recommended								
< 18 feet	≥ 500 vpd	Required	Required	May be consider	ed only where	Recommended								
	< 500 vpd	Required	Required	Study indica	tes a need	Recommended								

					-
Tier	CoSS Facility Type	AADT	Posted Speed Limit	Lighting	Application
1	All Roadway Facilities	-	≥ 60 MPH	-	SRPMs shall be installed continuously.
1	Two-Lane, Two-Way Roadways	≥ 15,000	-	No roadway lighting	SRPMs shall be installed continuously.
1	Multilane Roadways	≥ 25,000	≥ 45 MPH	No roadway lighting	SRPMs shall be installed continuously.
2	Multilane Roadways	15,000 ≤ AADT < 25,000	45-55 mph	-	SRPMs shall be installed continuously.
3	Two-Lane, Two-Way Roadways (Only if the sections DO NOT have multiple horizontal curves with Posted Speed Limit < 55 MPH)	5,000 ≤ AADT < 15,000			SRPMs shall be installed continuously.
3	Two-Lane, Two-Way Roadways	≥ 15,000		Roadway lighting present	SRPMs shall be installed continuously.
3	Multilane Roadways	≥ 25,000	45-55 mph	Roadway lighting present	SRPMs shall be installed continuously.

Raised Pavement Marker Application (Source: MUTCD VA Supplement Section 3B.11)

Delineator Placement and Spacing (Source Section 3F.04 MUTCD VA Supplement)

Туре	Placement	Spacing								
D-1	On the right of through roadways	300 feet*								
D-1	Interchange ramps	100 feet (except on horizontal curve sections)								
D-2	On acceleration and deceleration lanes	100 feet								
Deline	ators on barrier or guardrail	80 feet (may vary on interchange ramp horizontal curve sections although maximum spacing = 80 feet)								

*Spacing may take MUTCD guidance)



Raised Pavement Markers:



Template 9 - Corridor - Undivided Roadway (3 Tiers)



Appendix A

NO Sigi	TES: nage
0	Upgraded signs with current MUTCD standards (font, size, retroreflectivity, placement, message, etc.)
0	Fluorescent yellow sheeting on change of Direction Warning signs
Pav 1	ement Markings 6" center line pavement markings on primary routes
2	6" grooved-in center line markings on primary routes
0	6" grooved/in-laid edge line (MUTCD Section 3B.01 and 3B.o6) on primary routes
0	Reflective, snowplowable, raised pavement markers (Section 3B.11 MUTCD VA Supplement)(see table for application guidance and template tier)
Oth	er
0	Trim vegetation provide adequate sight distance within clear zone
2	Mark obstructions within clear zone (OM1, 2, or 3 Series)
3	Remove or provide a barrier for obstructions within clear zone
3	Post-mounted reflective delineators (Chapter 3F MUTCD VA Supplement)(see table for application guidance)
0	Reflective delineation of barriers (Chapter 3F MUTCD VA Supplement)
2	If bike route is present install signs and pavement markings (shared lane markings) (Chapter 9 MUTCD VA Supplement)
3	Shoulder rumble strips/stripes (MUTCD Chapter 3J.01) on corridors with a high number of roadway departure crashes per IIM #212.5. (see notes for application details)
2	Center line rumble strips/stripes (Section 3J.01 MUTCD) on corridors with a high number of head-on crashes or crashes involving vehicle crossing the centerline (see notes for application details)

3 Reflectorized sign posts (MUTCD Section 2A.15)

NOTE: Signage and pavement marking placement is not to scale. Actual placement will be determined on a site by site basis based on MUTCD and/or VA Supplement design standards and guidance. Signs should not be placed in the median unless the median is $\geq 4'$ wide and the sign is smaller than the median.

Rumble Strips and Stripes:

If it is determined that rumble strips/stripes should be applied to a corridor, utilize the following application guidance:

- Shoulder rumble strips shall be placed continuously on outside paved shoulders of CoSS where the shoulder has a minimum width of four (4) feet where bicycles are prohibited and eight (8) feet where bicycles are permitted. Rumble strips shall not be placed within limits of bridge drainage aprons or special design shoulder slot inlets.
- Shoulder rumble stripes shall be placed with an intermittent pattern on outside paved shoulders of CoSS where shoulders are at least two (2) feet wide. Rumble stripes shall not be placed in the following locations: within 50' of any intersection, turn lane, acceleration/ deceleration lane, or gore area; bridge drainage aprons; or, special design shoulder slot inlets.
- Center line rumble strips shall not be placed in the following locations: within limits of bridges; on narrow, unmarked road sections without pavement markings; within the limits of center twoway turn lanes; or, in passing zones.

Additional rumble strip/stripe application guidance can be found in the VDOT Road and Bridge Standards. Pavement markings shall be placed in accordance with current MUTCD and/or VA Supplement standards.



S hb

No Passing Zones:

(Source: MUTCD Section 3B.02)

On two-way, two- or three-lane roadways at vertical and horizontal curves and other locations where an engineering study indicates that passing must be prohibited because of inadequate sight distances or other special conditions.

At horizontal or vertical curves where:

- A. The passing sight distance is less than the minimum shown in the following table for the 85th-percentile speed or the posted or statutory speed limit.
- B. The passing sight distance on a <u>vertical curve</u> is the distance at which an object 3.5 feet above the pavement surface can be seen from a point 3.5 feet above the pavement.
- C. the passing sight distance on a <u>horizontal curve</u> is the distance measured along the center line (or right-hand lane line of a three-lane roadway) between two points 3.5 feet above the pavement on a line tangent to the embankment or other obstruction that cuts off the view on the inside of the curve

A short stretch of depressed alignment that might momentarily hide a vehicle should be treated as a no-passing zone when center line striping is provided on a two-lane or three-lane road

85th Percentile or Posted or Statutory Speed Limit	Minimum Passing Sight Distance
25 mph	450 feet
30 mph	500 feet
35 mph	550 feet
40 mph	600 feet
45 mph	700 feet
50 mph	800 feet
55 mph	900 feet
60 mph	1,000 feet
65 mph	1,100 feet
70 mph	1,200 feet

Approximate Spacing for Delineators on

Horizontal Curves (Including Interchange Ramps) (Source Section 3F.04 MUTCD VA Supplement)

Placement	Spacing
Radius of curve = 50 feet	20 feet
Radius of curve = 115 feet	25 feet
Radius of curve = 180 feet	35 feet
Radius of curve = 250 feet	40 feet
Radius of curve = 300 feet	50 feet
Radius of curve = 400 feet	55 feet
Radius of curve = 500 feet	65 feet
Radius of curve = 600 feet	70 feet
Radius of curve = 700 feet	75 feet
Radius of curve = 800 feet	80 feet
Radius of curve $=$ 900 feet	85 feet
Radius of curve $=$ 1,000 feet	90 feet

The following templates should only be applied at curves based on differential of speed limit and advisory speed and ball-bank testing as specified by MUTCD requirements. See MUTCD Tables 2C-5 and 2C-6 along with Section 2C.08. Other measures identified in corridor or segment templates may be applied as

- 1 Upgraded signs with current MUTCD standards (font, size, retroreflectivity, placement, message, etc.)
- 1 Minimize driver distraction in curve by relocating wayfinding/informational signs so they are not placed on the curve.
- Horizontal alignment signs (W1 Series)
 - Larger sized /double Curve Warning signs (arrow or chevrons W1-8,
 - W1-6) with reflectorized (painted or with panel sign posts (MUTCD Section 2A.15)
- **1** Left and Right Advance Curve Warning sign with Advisory Speed Plague (W1 Series with W13-1P)
 - Oversized Left and Right Advance Curve Warning Sign with Advisory Speed plaque (W1 Series with W13-1P)
- Fluorescent yellow sheeting on change in Direction Warning signs **Pavement Markings**
- 3 "SLOW" and "XX mph" pavement markings (MUTCD Section 3B.20)
- Post-mounted delineators except in locations with chevrons (e.g. if chevrons are present on outside of curve, place delineators on inside of curve only) (MUTCD Section 3B.20)
- 3 Shoulder widening (engineering study required to determine exact widths) (3) Reflectorized sign posts (MUTCD Section 2A.15)
- 3 Flashing beacons on top of curve warning signs
- NOTE: Signage and pavement marking placement is not to scale. Depending upon site conditions, signs should share the same post to the extent possible in order to reduce sign clutter. Actual placement will be determined on a site by site basis based on MUTCD and/or VA Supplement design standards and guidance. Signs should not be placed in the median unless the median is $\geq 4'$ wide and the sign is smaller than the median.

Difference Between Speed Limit and Advisory Speed														
5 mph 10 mph 15 mph 20 mph 25 mph or mor														
Recommended	Required	Required	Required	Required										
Recommended	Required	Required	Required	Required										
Optional	Recommended	Required	Required	Required										
Optional	Optional	Recommended	Required	Required										

D. 10 degrees of ball-bank for posted speeds of 50 mph or greater

Typical Spacing of Chevron Alignment Signs on Horizontal Curves: (Source: MUTCD Table 2C-6)

Advisory Speed	Curve Radius	Sign Spacing
15 mph or less	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1,250 feet	160 feet
more than 60 mph	More than 1,250 feet	200 feet
Note: The relationship b hown in the table shou	etween the curve radius a Id not be used to determin	nd the advisory spee

Appendix B

CONTENTS

Citizen Comments

Appendix B

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VDOT, with support from VHB, hosted two public meetings, welcoming questions, comments and thoughts from residents and businesses regarding the Route 460 Safety and Operations Study. The first public meeting took place on Wednesday, October 18, 2017 at Kings Fork Middle School, and the second took place on Thursday, October 19, 2017 at Windsor High School. Both of the meetings were open houses where locals could walk around, look at poster boards with information on the study, and talk to representative areas of concern.

The first public meeting at Kings Fork Middle School had approximately eleven attendees. These attendees were mostly from the surrounding areas of Suffolk and Windsor. The second public meeting at Windsor High School had approximately 17 attendees. These attendees were mostly citizens (from Zuni, Suffolk, Windsor, and Ivor), members of local government, and media personnel.

Local Comments

The overarching opinion of the local community is that Route 460 should be widened. This was mentioned a few times in the comments. The specific locations that were mentioned were #3 (Kings Fork Road), #5 (Prudence Road), #8 (Old Myrtle Road), #11 (1,000' East of Old Suffolk Road), #12 (Lovers Lane) and #13 (Bank Street).

#3 (Kings Fork Road) – Resident mentioned the need for an advance warning sign for Kings Fork Road signal, as there are many vehicles speeding on the approach to the intersection.

#5 (Prudence Road) – Residents have suggested that this intersection is challenging due to the vehicular traffic from the Pruden Center.

#8 (Old Myrtle Road) – Residents have complained that this intersection has numerous pot holes and that the intersection is dangerous.

#11 (1,000' East of Old Suffolk Road) – Residents have suggested that there are pot holes, rough road, and a bad shoulder at this location along Route 460.

#12 (Lovers Lane) – This intersection, along with Windsor Boulevard, was the most referenced intersection in the local comments. Residents have cited that turning onto and off Lovers Lane is dangerous around commute time, as oncoming traffic is heavy and numerous vehicles are speeding.

#13 (Bank Street) – Due to the complex geometry of the intersection, residents have suggested that this intersection have pedestrian signals, for safe crossing of peds and bikes.

Citizen Information Meeting #1 Comments:

With the overall damanges of this road (460), its hard to know where to begin. With no median and no shoulder, it's a "death trap." Given the volume of the traffic and the future getting more traffic, it's just hard to not put every effert into this major artery. The need is so great and the money is short or not there its hard to see how the state can accomplish the goal of making a safe and so much needed road.

Locations 8, 11, 13: Pot Holes

Locations 3, 11, 12, 13: Bad Shoulder, Rough Road, Needs to be widened Locations 8, 11, 13: No Comment

Location 12: Live near Lovers Lane. 460 needs to be wide

460 needs to be upgraded all of the way from Windsor to the 58 interchange. Upgrades needed are wider lanes, median until at least Lake Prince Drive and turn lanes on <u>all</u> roads between Windsor and 59. Narrow lanes and no turn lanes make for an extremely dangerous road give the amount of traffic and especially truck traffic

Location 3: Add an avance warning to the light at Kings Fork Road. Too many people are driving too fast and running the red light. I tend to wait a few seconds and really look before proceding into the intersection.

Appendix B

Citizen Information Meeting #2 Comments:

Location 12: Turning left is difficult coming out of Windsor as traffic gaining speed and oncoming traffic can be heavy and fast as the 45 limit is not observed in time. Turning lane both directions would help.

Location 13: Too many streets entering. Really needs pedestrian lights for safe crossing of persons and the numerous bicycles attempting to cross. Of course, the time to wait for pedestrians backs up traffic as few cars make it through the lights

Would like to see a turn line or 5th lane for turning vehicles

Would like to see a turn lane into Windsor Location 5: A challenging intersection due to Pruden center traffic

Location 8: I drive this often. This is a dangerous intersection.

Location 12: I live on Lovers Lane and always concerned with being rear ended. Also getting onto Lovers Lane at commute time is trying. Appendix B

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Appendix C

CONTENTS

Existing Traffic Counts

Appendix C

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VHB

Two Columbus Center
4500 Main Street, Suite 400
Virginia Beach, VA 23462
p: 757.490.0132

08:00 AM 08:15 AM *** BREAK ***

*** BREAK ***

% Motorcycles

% Light Goods Vehicles Buses

% Single-Unit Trucks

% Articulated Trucks Bicycles on Road

% Bicycles on Road

% Bicycles on Crosswalk Pedestrians

% Pedestrians

0

																File Site Stai Pag	Name : Code : t Date : e No :	US460@ 5/18/20 1	DNorthfie	d Groups Print	ed- Moto	orcycles	- Cars -	· Light G	ioods V	ehicles	- Buses	s - Unit T	rucks -	Articula	ted Truc	:ks - Bicyd	les on R	oad - Bic	ycles on	File Nan Site Coo Start Da Page No Crosswa	ne : US460@Robs le : te : 5/18/2017 o : 1 alk - Pedestrians
Groups Printe	d- Mot	orcycles Northfiel	- Cars d Drive	- Light (Goods US 460	Vehicles (Prude Westh	- Buses n Boulev	ard)	<u>- Frucks</u> N	Articula o Appro	ated Truc ach	cks - Bi U	cycles o S 460 (Pr	n Road uden B	- Bicyo louleva	cles on ard)	Crossw	alk - Peo	lestrians			Rob's I Southb	Drive ound	ľ	JS 460	(Pruder Westbo	n Boulev ound	/ard)	Nans	emond S Academ	Suffolk y nd	US 4	60 (Prude Eastb	en Boule [.] ound	/ard)		
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	left	Thru R	light Pe	eds	eft Th	ru Ric	aht P	eds Fx	du Total	Inclu Total	Int Total	Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left 1	Thru R	ght Pe	eds Lef	t Thru	Right	Peds Ex	clu. Total I	nclu. Total Int. Total
06:30 AM	1	0	2	0	0	113	10	0	0	0	0	0	3 2	D1	0	0	0	330	330	06:30 AM	8	0	0	0	3	105	4	0	0	0	3	0 1	185	0	0	0	309 309
06:45 AM	4	0	0	0	0	138	19	0	0	0	0	0	4 1	94	0	0	0	359	359	06:45 AM	11	0	0	0	1	131	8	0	0	0	0	0 0	197	0	0	0	348 348
Total	5	0	2	0	0	251	29	0	0	0	0	0	7 3	95	0	0	0	689	689	Iotai	19	0	0	0	4	236	12	0	0	0	3	0	382	0	0	0	657 657
07:00 AM 07:15 AM 07:30 AM 07:45 AM	2 1 3 1 7	0 0 0 0	1 1 0 0	0 0 0 0	0 0 0 0	138 138 180 234	7 21 11 11 50	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	2 2 3 2 1 2 1 2 7 9	25 47 11 28	0 0 0 0	0 0 0 0	0 0 0 0	375 411 406 475	375 411 406 475	07:00 AM 07:15 AM 07:30 AM 07:45 AM Total	7 11 9 <u>14</u> 41	0 0 3 16 19	2 0 1 2 5	0 0 0 0	1 9 15 49 74	123 140 149 167 579	10 7 11 10 38	0 0 0 0	0 0 3 3	0 1 3 3 7	0 5 1 14 20	0 0 0 0 0 3 0 5 0 8	218 222 194 189 823	0 0 1 6 7	0 0 0 0	0 0 0 0	361 361 395 395 390 390 478 478 1624 1624
Total	'	0	2	U	0	030	50	0	0	0	0	0	1 3		0	0	0	1007	1007	08.00 AM	4	9	2	0	43	164	22	0	5	3	27	0 12	201	7	0	0	499 499
08:00 AM 08:15 AM ** BREAK ***	2 4	0 0	2 4	0 0	0 0	217 173	10 6	0 0	0 0	0 0	0 0	0 0	2 2 2 2	38 20	0 0	0 0	0 0	471 409	471 409	08:15 AM *** BREAK *** Total	9 13	1	2	0	9 52	159 323	10 32	0	0	0	6 33	0 2	198 399	3 10	0	0	397 397 896 896
Total	6	0	6	0	0	390	16	0	0	0	0	0	4 4	58	0	0	0	880	880	*** BREAK ***																	
** BREAK ***																				04:00 PM	3	0	1	0	3	242	22	0	0	1	5	0 1	209	1	0	0	488 488
04:00 PM 04:15 PM 04:30 PM 04:45 PM	35 16 11 8	0 0 0	15 6 9 10	0 0 0	0 0 0	242 254 249 252	16 15 16 10	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	2 2 1 2 0 2 4 2	37 72 36 37	0 0 0	0 0 0	0 0 0	547 564 551 521	547 564 551 521	04:15 PM 04:30 PM 04:45 PM Total	5 7 7 22	0 2 0 2	0 2 1 4	0 0 0 0	2 5 5 15	244 217 247 950	16 19 20 77	0 0 0 0	1 1 1 3	0 2 2 5	7 7 5 24	0 0 0 1 0 1 0 3	271 225 231 936	0 0 0 1	0 0 0 0	0 0 0 0	546 546 488 488 520 520 2042 2042
Total	70	0	40	0	0	997	57	0	0	0	0	0	7 10	12	0	0	0	2183	2183	05:00 PM	12	0	2	0	4	282	18	0	2	3	13	0 1	240	1	0	0	578 578
05:00 PM 05:15 PM 05:30 PM	25 15 9	0 0 0	1 5 4	0 0 0	0 0 0	297 273 271 260	12 9 4	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	2 2 1 2 1 2	62 73 51	0 0 0	0 0 0	0 0 0	599 576 540	599 576 540	05:15 PM 05:30 PM <u>05:45 PM</u> Total	3 9 4 28	0 1 3 4	2 1 1 6	0 0 0 0	5 4 24 37	250 234 223 989	29 26 19 92	0 0 0 0	2 2 0 6	0 2 0 5	12 5 9 39	0 1 0 1 0 0	246 244 178 908	1 1 4 7	0 0 0 0	0 0 0 0	551 551 530 530 465 465 2124 2124
Total	49	0	11	0	0	1101	35	0	0	0	0	0	69	37	0	0	0	2189	2189	Grand Total	123	35	17	0	182	3077	251	0	17	20	119	0 29	3448	25	0	0	7343 7343
Grand Total	137	0	61	0	0	3429	187	0	0	0	0	0	31 37	63	0	0	0	7608	7608	Apprch % Total %	70.3 <u>1.7</u>	0.5 0.5	9.7 0.2		5.2 2.5	87.7 41.9 23	7.2 3.4 1		10.9 0.2	12.8 7 0.3	6.3 <u>1.6</u>	0.8	98.5	0.7		0	100
Apprch %	69.2	0	30.8		0	94.8	5.2		0	0	0		0.8 99	.2	0		•	100		% Motorcycles	Ő	Ő	Ő	0	Ő	0.7	0.4	0	Ő	õ	Õ	0 0	0.7	Ő	0	Ő	0 0.7
I otal %	1.8	0	0.8		0	45.1	2.5		0	0	0		0.4 49	.5	0		0	100	12	Cars	88	32	14		164	2104	195		13	17	101	27	2435	17		0	0 5207
% Motorcycles	0	0	16	0	0	0.5	0	0	0	0	0	0	0 0	24 16	0	0	0	0	43	% Cars	71.5	91.4	82.4	0	90.1	68.4	77.7	0	76.5	85 8	4.9	0 93.1	70.6	68	0	0	0 70.9
Cars	77	0	33		0	2322	117		0	0	0		18 27	31	0		0	0	5348	Light Goods Vehicles	30	2 57	50	0	13	611 10 0	41	0	4 23 5	3	8 67		103	32	0	0	0 1388
% Cars	56.2	Ō	54.1	0	Ō	67.7	62.6	0	Ō	Ō	0	0 9	8.1 73	.9	0	0	Ō	Ō	70.3	% Light Goods Vehicles Buses	24.4	1	0		4	24	6		0	0	9	0 0.8	13.3	0		0	0 58
Light Goods Vehicles	43	0	23		0	731	56		0	0	0		10 6	21	0		0	0	1484	% Buses	1.6	2.9	Ō	0	2.2	0.8	2.4	0	Ō	0	7.6	0 0	0.3	Ō	0	Ō	0 0.8
% Light Goods Vehicles	31.4	0	37.7	0	0	21.3	29.9	0	0	0	0	0 :	2.3 16	.5	0	0	0	0	19.5	Single-Unit Trucks	3	0	2		1	83	8		0	0	1	(92	0		0	0 190
Buses	0	0	0		0	27	1		0	0	0		0	18	0		0	0	46	% Single-Unit Trucks	2.4	0	11.8	0	0.5	2.7	3.2	0	0	0	0.8	0 0	2.7	0	0	0	0 2.6
% Buses	<u> </u>	0	0	U	0	0.8	0.5	0	0	0	0	0	<u> </u>	.5	0	0	0	0	0.6	Articulated Trucks	0	0	0	0	0	230 75	0	0	0	0	0		· ∠19 I 64	0	0	0	0 449
Single-Unit Trucks	66	0	66	0	0	92 27	0 43	0	0	0	0	0	65 3	4	0	0	0	0	200 27	Bicycles on Road	0	0	0		Ő	2	0		0	0	0		0	0		0	0 2
Articulated Trucks	8	0	0.0	U	0	233			0	0	0		1 2	29	0		0	0	476	% Bicycles on Road	0	0	0	0	0	0.1	0	0	0	0	0	0 0	0	0	0	0	0 0
% Articulated Trucks	5.8	Ő	ő	0	Ő	6.8	2.7	0	ŏ	õ	õ	0	3.2 6	.1	ŏ	0	ŏ	Ő	6.3	Bicycles on Crosswalk	0	0	0		0	0	0		0	0	0	(0	0		0	0 0
Bicycles on Road	0	0	0	-	0	6	0	-	0	0	0	-	0	0	0	-	0	0	6	% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0 0	0	0	0	0	0 0
% Bicycles on Road	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0.1	Pedestrians	0	0	0	0	0	0	0	0	0	0	0			0	0	0	
Bicycles on Crosswalk	0	0	0	_	0	0	0		0	0	0		0	0	0		0	0	0		U	U	U	0	U	U	U	01	U	0	U	U U	. 0	U	v 1	0	0



Two Columbus Center 4500 Main Street, Suite 400 Virginia Beach, VA 23462 p: 757.490.0132

VHB Engineering NC, P.C. Venture I 940 Main Campus Drive, Suite 500 Raleigh, NC 28606 p: 919.829.0328 f: 919.833.0034

																F	File Name	: US460@)KingsFork
																ŝ	Start Date	: 5/18/201	7
																F	Page No	: 1	
Groups Printe	d- Moto	rcycles	s - Cars	- Light	Goods \	Vehicle	s - Buse	es - Unit	Trucks	- Artic	ulated T	rucks	Bicycle	s on R	oad - Bi	on Cross	walk - Peo	lestrians	
	ĸ	ngs Fo	ork Road	3	US 460	(Prude	en Bould	evard)	K	Ings Fo	rk Road	1	US 460	(Prude	en Boule	evard)			
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu Total	Inclu Total	Int Total
06:30 AM	11	1	12	0	1	88	7	0	0	13	8	0	18	164	1	0		324	324
06:45 AM	15	4	6	Ō	1	101	14	Ō	Ō	19	10	Ō	19	167	0	Ō	0	356	356
Total	26	5	18	0	2	189	21	0	0	32	18	0	37	331	1	0	0	680	680
07:00 AM	21	14	14	0	4	99	9	0	1	11	19	0	18	181	0	0	0	391	391
07:15 AM	21	10	11	0	0	117	12	0	0	16	15	0	20	188	0	0	0	410	410
07:30 AM	23	7	10	0	0	113	10	0	1	22	14	0	26	177	0	0	0	403	403
07:45 AM	18	7	13	0	2	97	12	0	0	25	33	0	31	156	0	0	0	394	394
Total	83	38	48	0	6	426	43	0	2	74	81	0	95	702	0	0	0	1598	1598
08:00 AM	31	17	23	0	5	111	9	0	0	38	23	0	26	156	0	0	0	439	439
08:15 AM	20	20	14	0	5	129	16	0	0	20	16	0	21	148	1	0	0	410	410
Total	51	37	37	0	10	240	25	0	0	58	39	0	47	304	1	0	0	849	849
*** BRFAK ***																			
04:00 PM	20	20	30	0	23	185	26	0	1	6	8	0	16	176	0	0	0	511	511
04:15 PM	11	15	22	0	11	197	22	0	1	20	10	0	19	232	0	0	0	560	560
04:30 PM	25	22	30	0	19	190	24	0	1	20	7	0	23	199	0	0	0	560	560
04:45 PM	21	15	21	0	11	199	32	0	3	24	4	0	15	197	1	0	0	543	543
Total	77	72	103	0	64	771	104	0	6	70	29	0	73	804	1	0	0	2174	2174
05:00 PM	23	24	33	0	25	209	36	0	0	25	11	0	22	193	3	0	0	604	604
05:15 PM	24	19	24	0	22	200	29	0	0	40	7	0	19	221	3	0	0	608	608
05:30 PM	16	17	16	0	14	184	36	0	2	38	6	0	24	211	0	0	0	564	564
05:45 PM	17	13	19	0	12	178	30	0	0	36	13	0	20	173	1	0	0	512	512
Total	80	73	92	0	73	771	131	0	2	139	37	0	85	798	7	0	0	2288	2288
Grand Total	317	225	298	0	155	2397	324	0	10	373	204	0	337	2939	10	0	0	7589	7589
Apprch %	37.7	26.8	35.5		5.4	83.3	11.3		1.7	63.5	34.8		10.3	89.4	0.3				
I otal %	4.2	3	3.9		2	31.6	4.3		0.1	4.9	2.7		4.4	38.7	0.1		0	100	
Motorcycles	06	0.4	3	0	26	10	03	0	0	05	0	0	4	20	0	0		0	07
Cars	265	164	232	0	107	1567	243	0	8	272	170	0	265	2151	<u> </u>	0	0	0	5453
% Cars	83.6	72.9	77 9	0	69	65.4	75	0	80	72.9	83.3	0	78.6	73.2	90	0	0	0	71.9
Light Goods Vehicles	44	39	43		41	497	73		2	74	32	Ű	50	448	1		0	0	1344
% Light Goods Vehicles	13.9	17.3	14.4	0	26.5	20.7	22.5	0	20	19.8	15.7	0	14.8	15.2	10	0	0	0	17.7
Buses	1	19	11		1	9	2		0	22	1		12	9	0		0	0	87
% Buses	0.3	8.4	3.7	0	0.6	0.4	0.6	0	0	5.9	0.5	0	3.6	0.3	0	0	0	0	1.1
Single-Unit Trucks	4	2	8	-	2	82	3	_	0	3	1	-	6	80	0	-	0	0	191
% Single-Unit Trucks	1.3	0.9	2.7	0	1.3	3.4	0.9	0	0	0.8	0.5	0	1.8	2.7	0	0	0	0	2.5
Articulated Trucks	1	0	1	~	U	222	2	0	0	0	U	0		231	0	0	0	0	457
% Articulated Trucks	0.3	0	0.3	0	0	9.3	0.0	U	0	0	0	U		1.9	0	0		0	2
% Biovelee on Poed	0	0	0	0	0	 0 1	0	0	0	0	0	0	0	0	0	0	0	0	∠ ∩
Bicycles on Crosswalk	0	<u> </u>	0		0	0	0		0	0	0		0	<u> </u>	0	5	0	0	0
% Bicycles on Crosswalk	õ	õ	õ	0	Õ	Õ	õ	0	Õ	Õ	õ	0	Ő	Õ	õ	0	0	õ	Õ
Pedestrians	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0		0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VHB

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Groups Printe	ed- Moto	orcycles	a - Cars	- Light	Goods '	Vehicle	s - Buse	es - Uni	t Trucks	s - Articı	ulated T	rucks	·Bicycle	es on Ro	oad - Bi	cycles	File Nar Site Coo Start Da Page N on Crossy	me:US46 de: ate:5/16/ o:1 valk-Ped	00@Prince 2017 estrians
	US 258	8 (Princ Southt	e Boule bound	vard)	U	S 460 (\ Boule Westb	Windson vard) ound	r	US 258	8 (Princ Northb	e Boule ound	vard)	U	S 460 (\ Boule Eastb	Vindso vard) ound	r			
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu, Total	Inclu, Total	Int. Total
06:30 AM	31	9	3	0	5	67	7	0	9	39	40	0	2	63	3	0	0	278	278
06:45 AM	22	12	3	0	3	68	10	0	9	31	25	0	5	67	1	0	0	256	256
Total	53	21	6	0	8	135	17	0	18	70	65	0	7	130	4	0	0	534	534
07:00 AM	25	19	1	0	7	64	9	0	10	33	26	0	10	91	6	0	0	301	301
07:15 AM	34	24	6	0	4	63	26	0	13	47	20	0	10	72	3	0	0	322	322
07:30 AM	20	29	4	0	10	62	14	0	12	29	20	0	5	80	2	0	0	287	287
07:45 AM	23	13	0	0	8	72	26	0	8	16	18	0	0	89	8	0	0	281	281
Total	102	85	11	0	29	261	75	0	43	125	84	0	25	332	19	0	0	1191	1191
08:00 AM	17	16	3	0	10	71	33	0	2	28	27	0	0	83	4	0	0	294	294
08:15 AM	25	17	3	0	9	64	23	0	11	29	18	0	5	76	5	0	0	285	285
*** BREAK ***																			
Total	42	33	6	0	19	135	56	0	13	57	45	0	5	159	9	0	0	579	579
*** BREAK ***																			
04:00 PM	32	35	4	0	23	116	25	0	9	16	14	0	3	73	6	0	0	356	356
04:15 PM	25	51	3	0	38	110	26	0	11	17	15	0	6	101	6	0	0	409	409
04:30 PM	19	45	6	0	27	146	34	0	6	18	15	0	5	99	17	0	0	437	437
04:45 PM	30	38	2	0	31	111	28	0	13	14	16	0	5	83	7	0	0	378	378
Total	106	169	15	0	119	483	113	0	39	65	60	0	19	356	36	0	0	1580	1580
05.00 PM	34	38	2	0	37	121	26	0	5	28	16	0	4	83	11	0	0	405	405
05:15 PM	29	35	4	ŏ	26	110	39	õ	8	28	10	ő	6	107	5	Ő	Ő	407	407
05:30 PM	18	21	6	ő	33	116	32	õ	8	25	15	õ	5	70	8	Ő	Ő	357	357
05:45 PM	30	23	7	ő	21	109	36	õ	6	18	22	õ	9	89	5	Ő	Ő	375	375
Total	111	117	19	0	117	456	133	0	27	99	63	0	24	349	29	0	0	1544	1544
Grand Total Apprch %	414 46 2	425 47 4	57 6 4	0	292 13 5	1470 68 2	394 18 3	0	140 16	416 47 7	317 36 3	0	80 5 3	1326 88 2	97 6 5	0	0	5428	5428
Total %	7.6	7.8	11		5.4	27.1	7.3		26	77	5.8		1.5	24.4	1.8		0	100	
Motorcycles	3	4	2		1	9	0		0	4	3		1	9	1		0	0	37
% Motorcycles	0.7	0.9	3.5	0	0.3	0.6	0	0	0	1	0.9	0	1.2	0.7	1	0	0	0	0.7
Cars	340	323	43		225	935	345		79	322	249		52	861	53		0	0	3827
% Cars	82.1	76	75.4	0	77.1	63.6	87.6	0	56.4	77.4	78.5	0	65	64.9	54.6	0	0	0	70.5
Light Goods Vehicles	58	65	8		52	274	34		37	58	52		17	252	21		0	0	928
% Light Goods Vehicles	14	15.3	14	0	17.8	18.6	8.6	0	26.4	13.9	16.4	0	21.2	19	21.6	0	0	0	17.1
Buses	4	6	2		2	4	5		0	7	3		2	3	1		0	0	39
% Buses	1	1.4	3.5	0	0.7	0.3	1.3	0	0	1.7	0.9	0	2.5	0.2	1	0	0	0	0.7
Single-Unit Trucks	8	8	1		9	40	5		5	8	6		1	38	4	-	0	0	133
% Single-Unit Trucks	1.9	1.9	1.8	0	3.1	2.7	1.3	0	3.6	1.9	1.9	0	1.2	2.9	4.1	0	0	0	2.5
Articulated Trucks	1	19	1		3	208	5	~	19	17	4	~	7	163	17	~	0	0	464
% Articulated Trucks	0.2	4.5	1.8	U	1	14.1	1.3	U	13.6	4.1	1.3	0	8.8	12.3	17.5	0	0	0	8.5
Bicycles on Road	U	0	U		0	U	0	~	0	U	U	~	0	U	U	~	U	0	U
% Bicycles on Road	<u> </u>	0	<u> </u>	U	0	<u> </u>	0	U	0	0	0	U	0	0	0	U	U	0	<u> </u>
Bicycles on Crosswalk	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0		0	0	0	0		0	0	0		0	0	0	0
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VHB

Two Columbus Center 4500 Main Street, Suite 400 Virginia Beach, VA 23462 p: 757.490.0132

File Name : US460@Woodlawn

Start Date : 5/18/2017 Page No : 1

Site Code

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Bouleward Bouleward <t< th=""><th></th><th>0</th><th>d Suffol</th><th>k Road</th><th></th><th>U</th><th>S 460 (\</th><th>Vindsor</th><th></th><th></th><th></th><th>Road</th><th></th><th>ົບເ</th><th>S 460 (\</th><th>Vindso</th><th>r</th><th></th><th></th><th></th></t<>		0	d Suffol	k Road		U	S 460 (\	Vindsor				Road		ົບເ	S 460 (\	Vindso	r			
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Bit SAM 0 148 0 0 325 322 0 0 595 595 0 0 0 1 1 2 0 0 2 1 14 0 0 2 132 3 0 2 132 3 0 0 2 132 3 0 0 14 2 0 0 153 0 2 132 3 0 1 144 5 0 0 2 132 3 0 1 144 5 0 0 2 2 132 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	05:15 AM	0	0	0	0	12	41	0	0	2	0	3	0	0	82	4	0	0	144	144
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	06:15 AM	0	0	0	0	7	82	0	0	14	3	48	0	0	144	3	0	0	301	301
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Odd I	06:45 AM	1	0	0	0	16	<u>99</u> 352	0	0	2	0	5	0	2	132	17	0	0	249	249
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	07:00 AM	0	0	1	0	5	103	0	0	4	0	6	0	1	164	5	0	0	289	289
$\begin{array}{c} 0.7.45 \ AM \\ 0 & 0 & 1 & 3 & 0 & 43 \\ \hline 10 \ 10 & 1 & 3 & 0 & 43 \\ \hline 10 \ 392 & 2 & 0 & 11 & 1 & 28 & 0 & 4 & 629 \\ \hline 10 \ 20 & 0 & 0 & 1134 & 1134 \\ \hline 1134 & 1134 \\ \hline 1134 & 0 & 0 & 0 & 0 & 0 & 17 \\ \hline 08500 \ AM \\ 0 & 0 & 0 & 0 & 0 & 0 & 5 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 5 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 5 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 5 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 0 & 289 \\ \hline 09500 \ AM & 0 & 0 & 1 & 0 & 0 & 1 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 08500 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 09515 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 09515 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 09515 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 09515 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 1945 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 1 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1050 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 \\ \hline 1000 \ AM & 0 & 0 \\ \hline 1000 \ AM & 0 \\ \hline 1000 \ AM & 0 \\ \hline 1000 \ AM & 0 \\ $	07:15 AM 07:30 AM	0	0	0	0	12	91 86	1	0	3	0	/	0	1	154 160	6	0		275	275
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02:15 PM 0 0 2 0 6 124 1 0 3 0 5 0 1 113 3 0 0 258 258 02:30 PM 0 0 0 0 4 130 0 0 2 130 0 0 0 268 268 02:45 PM 0 0 3 0 1 0 3 0 4 132 5 0 0 274 274 Total 0 0 8 0 23 476 2 0 13 1 15 0 7 482 10 0 0 1037 1037 03:00 PM 0 0 1 0 6 156 0 0 2 2 7 0 4 119 3 0 0 303 303 03:00 PM 0 0 1 0 6<	02:00 PM	0	0	3	0	1	108	1	0	7	1	7	0	0	107	2	0	0	237	237
02:30 FM 0 0 4 130 0 0 2 130 0 0 0 0 268 268 268 02:45 PM 0 0 3 0 4 132 5 0 0 274 274 Total 0 0 8 0 23 476 2 0 13 1 15 0 7 482 10 0 1037 1037 03:00 PM 0 0 1 0 6 156 0 0 2 2 7 0 4 119 3 0 0 300 300 03:05 PM 0 0 0 6 175 0 0 2 0 3 0 114 3 0 0 303 303 03:05 PM 0 0 1 0 6 201 0 5 0 114 3	02:15 PM	0	0	2	0	6	124	1	0	3	0	5	0	1	113	3	0	0	258	258
Total 0 0 23 476 2 0 13 1 15 0 7 482 10 0 0 1037 1037 03:00 PM 0 0 1 0 6 156 0 0 2 2 7 0 4 119 3 0 0 300 300 03:15 PM 0 0 0 6 175 0 2 0 3 0 0 1033 303 </td <td>02:30 PM 02:45 PM</td> <td>0</td> <td>0</td> <td>0 3</td> <td>0</td> <td>4 12</td> <td>130</td> <td>0</td> <td>0</td> <td>2</td> <td>0</td> <td>0 3</td> <td>0</td> <td>4</td> <td>130</td> <td>0 5</td> <td>0</td> <td>0</td> <td>268</td> <td>268 274</td>	02:30 PM 02:45 PM	0	0	0 3	0	4 12	130	0	0	2	0	0 3	0	4	130	0 5	0	0	268	268 274
03:00 PM 0 0 1 0 6 156 0 0 2 2 7 0 4 119 3 0 0 300	Total	0	0	8	0	23	476	2	0	13	1	15	0	7	482	10	0	0	1037	1037
03:15 PM 0 0 1 0 6 175 0 2 2 7 0 4 119 3 0 0 300		Λ	Λ	1	0	6	156	Ω	0	^	2	7	0	1	110	3	Λ		300	300
03:30 PM 0 0 1 0 6 201 0 0 5 0 4 0 0 132 2 0 0 351 351 03:45 PM 0 0 1 0 10 169 2 0 3 0 0 1 107 3 0 0 296 296 Total 0 0 3 0 12 2 14 0 5 472 11 0 0 1250 1250	03:15 PM	0	0	0	0	6	175	0	0	2	2	3	0	4	114	3	0	0	303	303
<u>U3:45 FM</u> <u>U</u> <u>U</u> <u>1</u> <u>U</u> <u>10</u> <u>169</u> <u>2</u> <u>U</u> <u>3</u> <u>0</u> <u>0</u> <u>1</u> <u>107</u> <u>3</u> <u>0</u> <u>0</u> <u>296</u> <u>296</u> <u>701</u> <u>2</u> <u>0</u> <u>12</u> <u>2</u> <u>14</u> <u>0</u> <u>5</u> <u>472</u> <u>11</u> <u>0</u> <u>0</u> <u>1250</u> <u>1</u>	03:30 PM	0	0	1	0	6	201	0	0	5	0	4	0	0	132	2	0	0	351	351
	03:45 PM	0	0	1	0	10 28	169 701	2	0	12	0	0	0	1	107	11	0	0	296	296

		uestrians
No Approach US 460 (Pruden Boulevard) Woodlawn Drive US 460 (Pruden Boulevard)		
Southbound Westbound Northbound Eastbound		
Start Time Left Thru Right Peds Exclusion Total	Inclu. Total	Int. Total
06:30 AM 0 0 0 0 0 110 0 0 0 2 0 0 162 1 0 0	275	275
06:45 AM 0 0 0 0 0 114 0 0 0 0 0 0 0 186 0 0 0	300	300
Total 0 0 0 0 0 224 0 0 0 2 0 0 348 1 0 0	575	575
	000	000
	309	309
	329	329
	328	328
	200	1246
	1240	1240
08:00 AM 0 0 0 0 1 121 0 0 0 0 1 0 0 146 0 0 0	269	269
08:15 AM 0 0 0 0 0 119 0 0 0 0 0 0 0 171 0 0 0	290	290
*** BREAK ***		
Total 0 0 0 0 1 240 0 0 0 0 1 0 0 317 0 0 0	559	559
*** BREAK ***		
	411	411
	411	411
	431	431
04.35 PM 0 0 0 0 216 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	420	412
Total 0 0 0 0 2 825 0 0 0 1 0 0 845 1 0 0	1674	1674
	107.1	10/1
05:00 PM 0 0 0 0 0 248 0 0 0 0 0 0 0 219 0 0 0	467	467
05:15 PM 0 0 0 0 0 226 0 0 0 1 0 0 235 1 0 0	463	463
05:30 PM 0 0 0 0 1 206 0 0 0 0 0 0 0 207 0 0 0	414	414
05:45 PM 0 0 0 0 0 178 0 0 0 0 0 0 0 174 0 0 0	352	352
Total 0 0 0 0 1 858 0 0 0 1 0 0 1 0 835 1 0 0	1696	1696
	5750	5750
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	5750	5750
Applicit 76 0 0 0 0 0.2 99.6 0 25 0 75 0 99.9 0.1	100	
Motorculas 0 0 0 0 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0	100	
	0	0.8
Cars 0 0 0 4 1810 0 1 0 6 0 2180 2 0	0	4003
% Cars 0 0 0 0 100 69 0 0 50 0 100 0 0 70.1 66.7 0 0	Ō	69.6
Light Goods Vehicles 0 0 0 0 473 0 1 0 0 0 570 0 0	0	1044
% Light Goods Vehicles 0 0 0 18 0 50 0 0 18.3 0 0	0	18.2
Buses 0 0 0 0 18 0 0 0 0 0 20 1 0	0	39
% Buses 0 0 0 0.7 0 0 0 0 0.6 33.3 0 0	0	0.7
Single-Unit Trucks 0 0 0 73 0 0 0 0 96 0 0	0	169
<u>% Single-Unit Trucks</u> 0 0 0 0 0 2.8 0 0 0 0 0 0 0 3.1 0 0 0	0	2.9
Articulated Trucks 0 0 0 232 0 0 0 0 219 0 0	0	451
<u>% Articulated Trucks</u> U U U U U U 0 8.8 U U U U 0 0 0 7 0 0 0	0	/.8
Bicycles on Road U U U U U U U U U U U U 0 0 0 0 0 0 0	0	0
<u>% Bicycles on Road</u> U U U U U U U U U U U U U U U U U U U		
Bicycles on Crosswalk 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0
% Bicycles or Crosswalt 0	0	0
Constraints C <thc< th=""> C <thc< th=""> C <thc< th=""> <thc< <="" td=""><td>0</td><td>0</td></thc<></thc<></thc<></thc<>	0	0

VHB Engineering NC, P.C. Venture I 940 Main Campus Drive, Suite 500 Palaigh NC 28606

Appendix C

VHB Engineering NC, P.C. Venture I 940 Main Campus Drive, Suite 500 Raleigh, NC 28606 p: 919.829.0328 f: 919.833.0034

File Name : US460@Dominion

Site Code : Start Date : 5/16/2017 Page No : 1

Groups Printe	ed- Moto	orcycle	s - Cars	- Light	Goods	Vehicle	es - Buse	es - Uni	it Truck	s - Artic	ulated	Trucks	- Bicycle	es on R	load - B	icycles	on Cross	walk - Pe	destrians
		No An	nroach		U	IS 460 (Windso	r		Domini	on Wav		U	S 460 (Windso	or			
		South	bound			Boule	evard)			North	bound			Boule	evard)				
		South	bound			West	ound			Norun	bound			Easth	bound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu, Total	Inclu, Total	Int. Total
06:30 AM	0	0	0	0	23	83	0	0	0	0	2	0	0	178	22	0	0	308	308
06:45 AM	0	0	0	0	20	86	0	0	2	0	4	0	0	132	22	0	0	266	266
Total	0	0	0	0	43	169	0	0	2	0	6	0	0	310	44	0	0	574	574
07.00 414	0	0	0	0		404	0	0		0		0		474	0	0		000	000
07:00 AM	0	0	0	0	4	104	0	0		0	1	0		1/1	2	0	0	283	283
07:15 AM	0	0	0	0	3	94	0	0		0	0	0	0	163	2	0	0	263	263
07:30 AM	0	0	0	0	3	88	0	0	1	0	0	0	0	169	1	0	0	262	262
07:45 AM	0	0	0	0	1	119	0	0	0	0	0	0	0	162	2	0	0	284	284
Total	0	0	0	0	11	405	0	0	3	0	1	0	0	665	7	0	0	1092	1092
08:00 AM	0	0	0	0	1	98	0	0	1	0	1	0	0	134	2	0	0	237	237
08:15 AM	0	0	0	0	1	80	0	0	0	0	0	0	0	129	0	0	0	210	210
*** BREAK ***																			· · · -
Total	0	0	0	0	2	178	0	0	1	0	1	0	0	263	2	0	0	447	447
*** BREAK ***																			
04:00 PM	0	0	0	0	0	197	0	0	7	0	7	0	0	122	1	0	0	334	334
04:15 PM	0	0	0	0	0	194	0	0	2	0	3	0	0	123	0	0	0	322	322
04:30 PM	0	0	0	0	1	206	0	0	13	0	6	0	0	138	1	0	0	365	365
04:45 PM	0	0	0	0	0	187	0	0	1	0	4	0	0	114	0	0	0	306	306
Total	0	0	0	0	1	784	0	0	23	0	20	0	0	497	2	0	0	1327	1327
05.00 PM	0	0	0	0	0	236	0	0	0	0	4	0	0	122	0	0	0	362	362
05.15 PM	0	0	0	0	0	216	Ō	0	2	0	1	0	0	142	1	0	0	362	362
05:30 PM	Ő	Ő	õ	õ	Ő	215	Ő	Ő	1	Ő	0	Ő	0	117	. 1	Ő	Ő	334	334
05:45 PM	ň	ň	Ő	ő	Ő	143	ñ	ň	0	õ	š	ñ	l õ	135	0	Ő	0	281	281
Total	0	0	0	0	0	810	0	0	3	0	8	0	0	516	2	0	0	1339	1339
Grand Total	0	0	0	0	57	2346	0	0	32	0	36	0	0	2251	57	0	0	4779	4779
Approb %	0	0	0	Ŭ	21	07.6	0	U	17 1	Ő	52.0	0	0	07.5	25	0	Ŭ	4115	4115
Total %	0	0	0		1.7	10 1	0		0.7	0	02.0		0	17.1	1 2		0	100	
Motorcyclos	0	0	0		1.2	12			0.7	0	0.0		0	21	0	-	0	100	33
% Motorcycles	0	0	0	0	0	0.5	0	0	0	0	0	0	0	09	0	0	0	0	0.7
Cars	0	0	0		48	1591	0	0	22	0	33	0	0	1511	49		0	0	3254
% Cars	0	0	0	0	84.2	67.8	0	0	68.8	0	91.7	0	0	67.1	86	0	0	0	68.1
Light Goods Vehicles	0	0	0		5	470	0		5	0	1		0	472	5		0	0	958
% Light Goods Vehicles	0	0	0	0	8.8	20	0	0	15.6	0	2.8	0	0	21	8.8	0	0	0	20
Buses	0	0	0		0	12	0		0	0	0		0	8	0		0	0	20
% Buses	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.4	0	0	0	0	0.4
Single-Unit Trucks	0	0	0		2	49	0	0	0	0	2	•	0	63	0	0	0	0	116
% Single-Unit Trucks	0	0	0	0	3.5	2.1		0	0	0	5.6	0	0	2.8	0	0	0	0	2.4
Articulated Trucks	0	0	0	0	35	212	0	0	156	0	0	0		1/6	53	0	0	0	398
Riovelos on Road	0	0			0.0	0		0	10.0			0		1.0	0.0		0	0	0.0
Bicycles off Road	0	0	0	0	0	0	0	0		0	0	٥		0	0	0	0	0	0
% Bicycles on Road	0	0			0	0	0	0		0	0	0		0		0	0	0	
Bicycles on Crosswalk	0	0	0	0	0	0	0	0		0	0	Δ		0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0
10 Feuesuidiis	0	0	0	0	U	U	0	0	0	0	0	0	1 0	0	0	0	0	0	0



Appendix D

CONTENTS

Operational Analysis Outputs

Table D.1.Level of Service Results Summary.

ID	Intersection Name	Control	Exis	ting	2040 N	o-Build	2040	Build
			AM	РМ	АМ	РМ	AM	РМ
1	U.S. 460/Pruden Boulevard & Northfield Drive	Signalized	A (SB-C)	B (SB-D)	A (SB-C)	B (SB-D)	A (SB-C)	B (SB-D)
2	U.S. 460/Pruden Boulevard & Rob's Drive	Signalized	B (SB-D)	B (SB-D)	C (SB-D)	B (SB-D)	C (SB-D)	A (SB-D)
3	U.S. 460/Pruden Boulevard & Kings Fork Road	Signalized	C (SB-F)	C (SB-E)	D (SB-F)	E (SB-F)	D (NB-F)	E (NB-F)
4	U.S.4 60/Pruden Boulevard & Providence Road/Lake Prince Drive	Signalized	B (SB-C)	B (NB-C)	B (SB-D)	C (NB-E)	B (SB-C)	C (NB-D)
5	U.S. 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	(NB-B)	(NB-B)	(NB-B)	(NB-B)	(NB-B)	(NB-B)
6	U.S. 460/Windsor Boulevard & Old Suffolk Rd	Unsignalized	(SB-C)	(NB-C)	(NB-D)	(NB-F)	(NB-D)	(NB-F)
7	U.S. 460/Windsor Boulevard & Dominion Way	Signalized	A (NB-C)	A (NB-C)	A (NB-C)	A (NB-C)	A (NB-C)	A (NB-C)

Legend: X - Overall Level of Service, (XX-X) - Worst Approach-Worst Approach Level of Service

Table D.2.Detailed Level of Service Results Summary.

ID	Intersection and Approach	Control	Exis	ting	2040 N	o-Build	2040	Build
			АМ	РМ	АМ	РМ	АМ	РМ
			Α	В	Α	В	Α	В
	U.S. 460/Pruden Boulevard & Northfield Drive	Signalized	(2.2	(10.4	(3.2	(15.3	(3.2	(12.2
1			sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)
1	Eastbound		A-0.7	A-8.8	A-0.9	B-11.4	A-1.1	A-4.1
	Westbound		A-3	A-8.1	A-4.9	B-16.2	A-4.9	B-16.2
	Southbound		C-33.2	D-40.5	C-33.8	D-40.8	C-33.8	D-40.8
			В	В	C	В	С	Α
	U.S. 460/Pruden Boulevard & Rob's Drive	Signalized	(16.9	(10	(22.1	(13.4	(25.2	(8.9
			sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)
2	Eastbound		B-13.5	B-13.8	B-18.7	C-20.4	C-26.1	B-12.6
	Westbound		B-16.5	A-4	C-23.3	A-5.8	C-23.4	A-3.4
	Northbound		B-14.4	C-20	B-15.2	C-21.5	B-14.7	C-21.3
	Southbound		D-46.3	D-52.6	D-47.6	D-53.2	D-45.6	D-53.4
		c: I: I	C	C (DA F	D	E	D	E
	0.5. 460/Pruden Boulevard & Kings Fork Road	Signalized	(33.8	(34.5	(44.5	(55.6	(39	(55.6
2	Fastbound		P 16 7		C 21.0		D 25 2	D 52 6
3	Westbound		B-10.7 B-13.7	C-28.9	B-13.2	E-50.8	C-27.9	D-54.3
	Northbound		D-13.7	C-28.5	D-13.2	D 52 0	C-21.5	D-34.3
	Southbound		D-41.9	D-44.3	D-49.5	D-33.9	C 25 0	D 42.0
-	Southbound		F-110.1	E-04.1 R	F-212 B	r-102.9	C-23.9 B	D-42.9
	U.S. 460/Pruden Boulevard&Providence	Signalized	(14.2	(18.6	(18.6	(24.2	(17.8	(22.2
	Road/Lake Prince Drive	olghalized	sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)
4	Eastbound		B-14.1	C-20.1	B-19.4	C-24.3	B-18.5	C-23
	Westbound		B-10.6	B-13.1	B-12.7	B-16.7	B-11.8	B-14.3
	Northbound		B-16.8	C-31.2	C-24.8	E-58.1	C-24.4	D-54.9
	Southbound		C-24.5	C-29.7	D-35.1	D-47.7	C-34.5	D-45.9
							Α	Α
	U.S. 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	-	-	-	-	(0.1	(0
э							sec/veh)	sec/veh)
	Northbound		B-11.1	B-11.6	B-13.3	B-14.3	B-13.3	B-14.3
							Α	Α
	U.S. 460/Windsor Boulevard & Old Suffolk Rd	Unsignalized	-	-	-	-	(5.2	(5
6							sec/veh)	sec/veh)
	Northbound		C-18.1	C-23.7	D-29.5	F-51.7	D-29.5	F-51.7
	Southbound		C-18.8	B-11.7	D-27.8	B-13	D-27.8	B-13
			A	A	A	Α	A	Α
1	U.S. 460/Windsor Boulevard & Dominion Way	Signalized	(4.4	(4.6	(5.3	(4.9	(5.3	(4.9
7			sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)	sec/veh)
1 [′]	Lastbound		A-5.5	A-4.2	A-6.9	A-4.6	A-6.9	A-4.6
	Westbound		A-1.6	A-3	A-1.7	A-3.5	A-1.7	A-3.5
	Northbound		C-28.5	C-30.5	C-27.5	C-30.2	C-27.5	C-30.2

		Construct	Exis	ting	2040 N	o-Build	2040	Build
טו	Intersection Name	Control	АМ	РМ	AM	РМ	AM	РМ
1	U.S. 460/Pruden Boulevard & Northfield Drive	Signalized	2.2	10.4	3.2	15.3	3.2	12.2
2	U.S. 460/Pruden Boulevard & Rob's Drive	Signalized	16.9	10	22.1	13.4	25.2	8.9
3	U.S. 460/Pruden Boulevard & Kings Fork Road	Signalized	33.8	34.5	44.5	55.6	39	55.6
4	U.S. 460/Pruden Boulevard&Providence Road/Lake	Signalized	14.2	18.6	18.6	24.2	17.8	22.2
	Prince Drive							
5	U.S. 460/Pruden Boulevard/Woodlawn Drive	Unsignalized	0.1	0.1	0.1	0	0.1	0
6	U.S. 460/Windsor Boulevard & Old Suffolk Rd	Unsignalized	3.6	2.7	5.2	5	5.2	5
7	U.S. 460/Windsor Boulevard & Dominion Way	Signalized	4.4	4.6	5.3	4.9	5.3	4.9

Existing AM

<u>1: US 460/Pruden</u>	Bouleva	ard & N	Vorthfie	eld Driv	/e			Baseline
	۶	-	4	+	•	1	~	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
Lane Configurations	۲		ф.	- † †	1	ሻ	1	
Traffic Volume (vph)	7	924	0	769	53	7	3	
Future Volume (vph)	7	924	0	769	53	7	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	305		125		195	0	155	
Storage Lanes	1		1		1	1	1	
Taper Length (ft)	190		200			0		
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Frt					0.850		0.850	
Flt Protected	0.950					0.950		
Satd. Flow (prot)	1770	3539	1863	3539	1583	1770	1583	
Flt Permitted	0.261					0.950		
Satd. Flow (perm)	486	3539	1863	3539	1583	1770	1583	
Right Turn on Red					Yes		Yes	
Satd. Flow (RTOR)					84		8	
Link Speed (mph)		55		55		25		
Link Distance (ft)		537		2299		1306		
Travel Time (s)		6.7		28.5		35.6		
Peak Hour Factor	0.58	0.94	0.92	0.82	0.63	0.58	0.38	
Adj. Flow (vph)	12	983	0	938	84	12	8	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	12	983	0	938	84	12	8	
Turn Type	pm+pt	NA	pm+pt	NA	Prot	Prot	Prot	
Protected Phases	1	6	5	2	2	7	4	
Permitted Phases	6		2					
Detector Phase	1	6	5	2	2	7	4	
Switch Phase								
Minimum Initial (s)	5.0	15.0	5.0	15.0	15.0	7.0	7.0	
Minimum Split (s)	13.3	23.3	9.5	34.9	34.9	14.4	14.4	
Total Split (s)	20.0	48.0	20.0	48.0	48.0	22.0	22.0	
Total Split (%)	22.2%	53.3%	22.2%	53.3%	53.3%	24.4%	24.4%	
Maximum Green (s)	11.7	39.7	15.5	40.1	40.1	14.6	14.6	
Yellow Time (s)	4.8	4.8	3.5	4.8	4.8	4.0	4.0	
All-Red Time (s)	3.5	3.5	1.0	3.1	3.1	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	8.3	8.3	4.5	7.9	7.9	7.4	7.4	
Lead/Lag	Lead	Lag	Lead	Lag	Lag			
Lead-Lag Optimize?		5		J	5			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	
Walk Time (s)				7.0	7.0			
Flash Dont Walk (s)				20.0	20.0			
Pedestrian Calls (#/hr)				0	0			
Act Effct Green (s)	78.7	85.4		82.6	82.6	7.1	7.1	
Actuated g/C Ratio	0.87	0.95		0.92	0.92	0.08	0.08	
v/c Ratio	0.02	0.29		0.29	0.06	0.09	0.06	
Control Delay	1.1	0.7		3.1	1.5	40.0	23.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay	1.1	0.7		3,1	1.5	40.0	23.0	

1: US 460/Pruden I	Bouleva	ird & N	lorthfie	ld Driv	'e			Baseline
	∢	-	F	+	•	1	~	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
LOS	А	А		А	А	D	С	
Approach Delay		0.7		3.0		33.2		
Approach LOS		Α		Α		С		
Queue Length 50th (ft)	0	0		0	0	6	0	
Queue Length 95th (ft)	m2	52		165	6	15	3	
Internal Link Dist (ft)		457		2219		1226		
Turn Bay Length (ft)	305				195		155	
Base Capacity (vph)	592	3357		3248	1460	287	263	
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	0.02	0.29		0.29	0.06	0.04	0.03	
Intersection Summary								
Area Type:	Other							
Cycle Length: 90								
Actuated Cycle Length: 90								
Offset: 68 (76%), Reference	ed to phase	2:WBTU	and 6:EB	TL, Start	of Green			
Natural Cycle: 65								
Control Type: Actuated-Coo	ordinated							
Maximum v/c Ratio: 0.29								
Intersection Signal Delay: 2.	.2			In	tersection	n LOS: A		
Intersection Capacity Utiliza	tion 44.5%			IC	U Level o	of Service	A	
Analysis Period (min) 15								

Analysis Period (min) 15 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: US 460/Pruden Boulevard & Northfield Drive

▶ _{Ø1}	Ø2 (R)	√ Ø4
20 s	48 s	22 s
₽ Ø5	■	▶ _{Ø7}
20 s	48 s	22 s

Synchro 9 Report Existing AM.syn Synchro 9 Report Existing AM.syn

Appendix D

Baseline

1: US 460/Pruden Boulevard & Northfield Drive

HCM 2010 cannot analyze U-Turning movements.

2: US460/Pruden Boulevard & Rob's Drive

	٦	-	\mathbf{i}	1	-	•	1	Ť	1	1	Ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	≜1 }-		٦	^	*		र्भ	1		4	
Traffic Volume (vph)	22	782	17	116	639	53	8	9	48	36	29	5
Future Volume (vph)	22	782	17	116	639	53	8	9	48	36	29	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	400		175	0		50	0		0
Storage Lanes	1		0	1		1	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995				0.850			0.850		0.992	
Flt Protected	0.950			0.950				0.970			0.979	
Satd. Flow (prot)	1770	3522	0	1770	3539	1583	0	1807	1583	0	1809	0
Flt Permitted	0.950			0.950				0.775			0.844	
Satd. Flow (perm)	1770	3522	0	1770	3539	1583	0	1444	1583	0	1560	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				112			120		3	
Link Speed (mph)		35			35			25			30	
Link Distance (ft)		2499			463			411			171	
Travel Time (s)		48.7			9.0			11.2			3.9	
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Adj. Flow (vph)	48	806	28	197	666	88	20	12	109	56	64	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	834	0	197	666	88	0	32	109	0	128	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8		8	4		
Detector Phase	1	6		5	2	2	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0	5.0	7.0	7.0	
Minimum Split (s)	11.1	21.8		11.1	21.8	21.8	11.1	11.1	11.1	13.1	13.1	
Total Split (s)	24.0	45.0		22.0	43.0	43.0	23.0	23.0	23.0	23.0	23.0	
Total Split (%)	26.7%	50.0%		24.4%	47.8%	47.8%	25.6%	25.6%	25.6%	25.6%	25.6%	
Maximum Green (s)	17.9	38.2		15.9	36.2	36.2	16.9	16.9	16.9	16.9	16.9	
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.1	6.8		6.1	6.8	6.8		6.1	6.1		6.1	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None	None	None	None	
Act Effct Green (s)	7.9	44.8		13.9	55.6	55.6		12.3	12.3		12.3	
Actuated g/C Ratio	0.09	0.50		0.15	0.62	0.62		0.14	0.14		0.14	
v/c Ratio	0.31	0.48		0.72	0.30	0.09		0.16	0.34		0.59	
Control Delay	43.1	11.8		53.0	7.8	1.0		34.4	8.5		46.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Total Delay	43.1	11.8		53.0	7.8	1.0		34.4	8.5		46.3	
LOS	D	В		D	А	А		С	А		D	
Approach Delay		13.5			16.5			14.4			46.3	
Approach LOS		В			В			В			D	

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Baseline

2: US460/Pruden Boulevard & Rob's Drive Baseline														
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Queue Length 50th (ft)	25	193		106	100	0		16	0		68			
Queue Length 95th (ft)	m27	m118		85	149	8		33	0		54			
Internal Link Dist (ft)		2419			383			331			91			
Turn Bay Length (ft)	250			400		175			50					
Base Capacity (vph)	352	1755		312	2187	1021		271	394		295			
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	0.14	0.48		0.63	0.30	0.09		0.12	0.28		0.43			
Intersection Summary														
Area Type:	Other													
Cycle Length: 90														
Actuated Cycle Length: 90														
Offset: 25 (28%), Reference	ed to phase	2:WBT a	nd 6:EBT,	Start of	Green									
Natural Cycle: 60														
Control Type: Actuated-Co	ordinated													
Maximum v/c Ratio: 0.72														
Intersection Signal Delay:	16.9			In	tersectior	n LOS: B								
Intersection Capacity Utiliz	ation 54.9%			IC	CU Level o	of Service	A							
Analysis Period (min) 15														
m Volume for 95th percentile queue is metered by upstream signal.														
Selite and Decess 2: USAR0/Deuden Deuleurard 9 Dates Drive														
	3400/1710081		α α κου ε	DIIVE										

▶ _{Ø1}	● Ø2 (R)	₩Ø4
24 s	43 s	23 s
√ Ø5	₩ ₩ Ø6 (R)	↓ Ø8
22 s	45 s	23 s

	۶	-	\mathbf{r}	1	+	•	1	Ť	1	1	ţ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	A1⊅		ľ	<u></u>	1		ŧ	1		\$	
Traffic Volume (veh/h)	22	782	17	116	639	53	8	9	48	36	29	5
Future Volume (veh/h)	22	782	17	116	639	53	8	9	48	36	29	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	48	806	28	197	666	88	20	12	109	56	64	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	0	1	0
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	69	1912	66	234	2269	1015	154	78	173	120	98	11
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.08	1.00	1.00	0.13	0.64	0.64	0.11	0.11	0.11	0.11	0.11	0.11
Ln Grp Delay, s/veh	52.3	1.3	1.2	52.4	7.5	6.3	36.6	0.0	42.1	40.9	0.0	0.0
Ln Grp LOS	D	A	A	D	A	A	D		D	D		
Approach Vol, veh/h		882			951			141			128	
Approach Delay, s/veh		4.0			16.7			40.9			40.9	
Approach LOS		A			В			D			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		8.0	2.0	4.0		7.0			
Phs Duration (G+Y+Rc), s		9.6	64.5		15.9	18.0	56.1		15.9			
Change Period (Y+Rc), s		6.1	6.8		6.1	6.1	6.8		6.1			
Max Green (Gmax), s		17.9	36.2		16.9	15.9	38.2		16.9			
Max Allow Headway (MAH), s		3.8	5.1		4.9	3.8	5.1		4.9			
Max Q Clear (g_c+11), s		4.4	9.5		9.1	11.8	2.0		7.9			
Green Ext Time (g_e), s		0.1	11.7		0.7	0.2	13.1		0.8			
Prob of Pris Call (p_c)		0.70	0.00		1.00	0.99	1.00		1.00			
Prod of Max Out (p_x)		0.00	0.20		0.25	0.74	0.16		0.15			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			570	1774			819			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		896		3490		717			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		98		121		1583			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Prot)			L+T+R	(Prot)			L+T			
		、				. /						

Synchro 9 Report Existing AM.syn

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ľ	† 1>		ľ	- † †	1		ŧ	1		¢	
Traffic Volume (veh/h)	22	782	17	116	639	53	8	9	48	36	29	5
Future Volume (veh/h)	22	782	17	116	639	53	8	9	48	36	29	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	48	806	28	197	666	88	20	12	109	56	64	8
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	0	1	0
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	e Yes			Yes			Yes			Yes		
Cap, veh/h	69	1912	66	234	2269	1015	154	78	173	120	98	11
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.08	1.00	1.00	0.13	0.64	0.64	0.11	0.11	0.11	0.11	0.11	0.11
Ln Grp Delay, s/veh	52.3	1.3	1.2	52.4	7.5	6.3	36.6	0.0	42.1	40.9	0.0	0.0
Ln Grp LOS	D	A	A	D	A	A	D		D	D	400	
Approach Vol, ven/h		882			951			141			128	
Approach Delay, s/ven		4.0			16.7			40.9			40.9	
Approach LOS		A			В			D			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		8.0	2.0	4.0		7.0			
Phs Duration (G+Y+Rc), s		9.6	64.5		15.9	18.0	56.1		15.9			
Change Period (Y+Rc), s		6.1	6.8		6.1	6.1	6.8		6.1			
Max Green (Gmax), s		17.9	36.2		16.9	15.9	38.2		16.9			
Max Allow Headway (MAH), s		3.8	5.1		4.9	3.8	5.1		4.9			
Max Q Clear (g_c+l1), s		4.4	9.5		9.1	11.8	2.0		7.9			
Green Ext Time (g_e), s		0.1	11./		0.7	0.2	13.1		0.8			
Prob of Phs Call (p_c)		0.70	1.00		1.00	0.99	1.00		1.00			
Prob of Max Out (p_x)		0.00	0.28		0.25	0.74	0.16		0.15			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			570	1774			819			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		896		3490		717			
Right-Turn Movement Data												
Assigned Mymt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		98		121		1583			
Left Lane Group Data												
Assigned Mymt		1	0	0	7	5	0	0	3			_
ane Assignment		(Prot)	5	5	I +T+R	(Prot)	5	J	I+T			
		(1101)			2.1.1.	(100)			L.,			

2: US460/Pruden Boulevard & Rob's Drive

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	48	0	0	128	197	0	0	32	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1564	1774	0	0	1536	
Q Serve Time (g_s), s	2.4	0.0	0.0	5.6	9.8	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	2.4	0.0	0.0	7.1	9.8	0.0	0.0	1.5	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1291	0	0	0	1349	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	1495	
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	9.8	0.0	0.0	0.0	9.8	
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	8.4	0.0	0.0	0.0	2.7	
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	0.0	0.0	1.4	0.0	0.0	0.0	1.2	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.4	0.0	0.0	0.0	1.2	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.44	1.00	0.00	0.00	0.62	
Lane Grp Cap (c), veh/h	69	0	0	228	234	0	0	233	
V/C Ratio (X)	0.70	0.00	0.00	0.56	0.84	0.00	0.00	0.14	
Avail Cap (c a), veh/h	353	0	0	349	313	0	0	349	
Upstream Filter (I)	0.94	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	41.0	0.0	0.0	38.8	38.2	0.0	0.0	36.3	
Incr Delay (d2), s/veh	11.3	0.0	0.0	2.2	14.3	0.0	0.0	0.3	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	52.3	0.0	0.0	40.9	52.4	0.0	0.0	36.6	
1st-Term Q (Q1) veh/ln	11	0.0	0.0	3.1	4.8	0.0	0.0	0.7	
2nd-Term Q (Q2), veh/ln	0.2	0.0	0.0	0.1	0.9	0.0	0.0	0.0	
3rd-Term Q (Q3) veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1 00	0.00	0.00	1 00	1 00	0.00	0.00	1 00	
%ile Back of Q (50%) veh/ln	14	0.0	0.0	3.2	57	0.0	0.0	0.7	
%ile Storage Batio (BO%)	0.14	0.00	0.00	0.75	0.36	0.00	0.00	0.05	
Initial Q (Qb) veh	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) O (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat O (Os) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Can (cs) veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Initial O Clear Time (tc) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	8	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	666	0	0	0	409	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2269	0	0	0	970	0	0	
V/C Ratio (X)	0.00	0.29	0.00	0.00	0.00	0.42	0.00	0.00	
Avail Cap (c_a), veh/h	0	2269	0	0	0	970	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.94	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	1.3	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d) s/veh	0.0	7.5	0.0	0.0	0.0	1.3	0.0	0.0	

2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/In	0.0	3.7	0.0	0.0	0.0	0.3	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R				T+R		R
Lanes in Grp	0	1	0	0	0	1	0	1
Grp Vol (v), veh/h	0	88	0	0	0	425	0	109
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1841	0	1583
Q Serve Time (g_s), s	0.0	1.9	0.0	0.0	0.0	0.0	0.0	5.9
Cycle Q Clear Time (g_c), s	0.0	1.9	0.0	0.0	0.0	0.0	0.0	5.9
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.06	0.00	0.07	0.00	1.00
Lane Grp Cap (c), veh/h	0	1015	0	0	0	1009	0	173
V/C Ratio (X)	0.00	0.09	0.00	0.00	0.00	0.42	0.00	0.63
Avail Cap (c_a), veh/h	0	1015	0	0	0	1009	0	297
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.94	0.00	1.00
Unitorm Delay (d1), s/veh	0.0	6.1	0.0	0.0	0.0	0.0	0.0	38.4
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	1.2	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
Control Delay (d), s/ven	0.0	6.3	0.0	0.0	0.0	1.2	0.0	42.1
ist-ierm Q (Q1), veh/in	0.0	8.0	0.0	0.0	0.0	0.0	0.0	2.6
2na-Term Q (Q2), veh/in	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2
Situ- Ferriri Q (QS), Ven/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%) vob/s	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Storage Patie (PO%)	0.0	0.9	0.0	0.0	0.0	0.3	0.0	2.0
Initial O (Ob) wob	0.00	0.13	0.00	0.00	0.00	0.00	0.00	1.41
Final (Residual) ((Ap) yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds) s/yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Ω (Ω s) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial O Clear Time (tc) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary		14.5						
HCM 2010 Ctrl Delay		14.5						
TUM 2010 LUS		В						

Synchro 9 Report Existing AM.syn Synchro 9 Report Existing AM.syn

Baseline

Total Delay LOS Approach Delay Approach LOS

2: US460/Pruden Boulevard & Rob's Drive

Appendix D

3: US460/Pruden	Bouleva	rd & Ki	ings F	ork Rd							I	Baseline
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	A⊅		1	<u></u>	1		\$			ب ا	1
Traffic Volume (vph)	103	677	0	7	438	43	1	101	85	93	41	57
Future Volume (vph)	103	677	0	7	438	43	1	101	85	93	41	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	165		0	250		145	0		0	0		50
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	80			0			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.938				0.850
Flt Protected	0.950			0.950				0.999			0.969	
Satd. Flow (prot)	1770	3539	0	1770	3539	1583	0	1746	0	0	1805	1583
Flt Permitted	0.950			0.950				0.995			0.427	
Satd. Flow (perm)	1770	3539	0	1770	3539	1583	0	1739	0	0	795	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						125		42				125
Link Speed (mph)		55			35			45			45	
Link Distance (ft)		2858			2499			2180			1010	
Travel Time (s)		35.4			48.7			33.0			15.3	
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Adj. Flow (vph)	124	752	0	20	466	48	4	151	131	124	68	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	752	0	20	466	48	0	286	0	0	192	92
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8			4		4
Detector Phase	1	6		5	2	2	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	11.0	21.8		11.5	21.8	21.8	13.8	13.8		13.8	13.8	13.8
Total Split (s)	20.0	45.0		20.0	45.0	45.0	25.0	25.0		25.0	25.0	25.0
Total Split (%)	22.2%	50.0%		22.2%	50.0%	50.0%	27.8%	27.8%		27.8%	27.8%	27.8%
Maximum Green (s)	14.0	38.2		13.5	38.2	38.2	18.2	18.2		18.2	18.2	18.2
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.8	4.8		4.8	4.8	4.8
All-Red Time (s)	2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	6.0	6.8		6.5	6.8	6.8		6.8			6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	None
Act Effct Green (s)	11.2	52.5		6.6	41.0	41.0		18.2			18.2	18.2
Actuated g/C Ratio	0.12	0.58		0.07	0.46	0.46		0.20			0.20	0.20
v/c Ratio	0.57	0.36		0.16	0.29	0.06		0.74			1.20	0.22
Control Delay	46.9	11.7		56.9	12.9	3.2		41.9			169.8	4.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	46.9	11.7		56.9	12.9	3.2		41.9			169.8	4.1
LUS	D	В		E	B	A		D			F	A
Approach Delay		16.7			13.7			41.9			116.1	
Approach LOS		В			В			D			F	

Synchro 9 Report

Existing AM.syn

3: US460/Pruden Boulevard & Kings Fork Rd Baselin													
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Queue Length 50th (ft)	67	90		8	100	3		131			~133	0	
Queue Length 95th (ft)	109	187		14	151	17		147			#145	0	
Internal Link Dist (ft)		2778			2419			2100			930		
Turn Bay Length (ft)	165			250		145						50	
Base Capacity (vph)	275	2065		265	1613	789		385			160	419	
Starvation Cap Reductn	0	0		0	0	0		0			0	0	
Spillback Cap Reductn	0	0		0	0	0		0			0	0	
Storage Cap Reductn	0	0		0	0	0		0			0	0	
Reduced v/c Ratio	0.45	0.36		0.08	0.29	0.06		0.74			1.20	0.22	
Intersection Summary													
Area Type:	Other												
Cycle Length: 90													
Actuated Cycle Length: 90													
Offset: 86 (96%), Reference	ed to phase	2:WBT ar	nd 6:EBT	Start of (Green								
Natural Cycle: 55													
Control Type: Actuated-Co	ordinated												
Maximum v/c Ratio: 1.20													
Intersection Signal Delay: 3	33.8			In	tersectior	LOS: C							
Intersection Capacity Utiliz	ation 63.2%			IC	U Level o	of Service	В						
Analysis Period (min) 15													
 Volume exceeds capacity, queue is theoretically infinite. 													
Queue shown is maximum after two cycles.													
# 95th percentile volume	exceeds cap	pacity, que	eue may l	be longer.									
Queue shown is maximum after two cycles.													

Splits and Phases: 3: US460/Pruden Boulevard & Kings Fork Rd

✓ _{Ø1}	42 (R)	∲ ø4
20 s	45 s	25 s
√ Ø5	•Ø6 (R)	1 Ø8
20 s	45 s	25 s

Movement	EBL	ERI	EBK	WBL	WRI	WBR	NBL	INR I	NRK	SBL	SBI	SBR
Lane Configurations	2	≜ 1,		7	^	1		\$			÷.	1
Traffic Volume (veh/h)	103	677	0	7	438	43	1	101	85	93	41	57
Future Volume (veh/h)	103	677	0	7	438	43	1	101	85	93	41	57
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	124	752	0	20	466	48	4	151	131	124	68	92
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	156	1956	0	39	1741	779	41	134	113	135	48	320
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
Prop Arrive On Green	0.09	0.55	0.00	0.02	0.49	0.49	0.20	0.20	0.20	0.20	0.20	0.20
Ln Grp Delay, s/veh	47.3	11.9	0.0	53.4	13.7	12.1	87.0	0.0	0.0	119.8	0.0	30.9
Ln Grp LOS	D	В		D	В	В	F			F		С
Approach Vol, veh/h		876			534			286			284	
Approach Delay, s/veh		16.9			15.1			87.0			91.0	
Approach LOS		В			В			F			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		7.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		13.9	51.1		25.0	8.5	56.5		25.0			
Change Period (Y+Rc), s		6.0	6.8		6.8	6.5	6.8		6.8			
Max Green (Gmax), s		14.0	38.2		18.2	13.5	38.2		18.2			
Max Allow Headway (MAH), s		3.6	4.8		5.0	3.8	4.8		5.0			
Max Q Clear (g_c+l1), s		8.2	8.9		20.2	3.0	12.9		20.2			
Green Ext Time (g_e), s		0.1	8.9		0.0	0.0	8.5		0.0			
Prob of Phs Call (p_c)		0.95	1.00		1.00	0.39	1.00		1.00			
Prob of Max Out (p_x)		0.11	0.08		1.00	0.00	0.12		1.00			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			340	1774			0			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		238		3632		660			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		1583		0		558			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Prot)			L+T	(Prot)			L+T+R			
-												

3: US460/Pruden Boulevard & Kings Fork Rd

Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Perm LT Sat Flow (s_l), veh/h/ln Shared LT Sat Flow (s_sh), veh/h/ln Perm LT Eff Green (g_p), s Perm LT Q Serve Time (g_ps), s Perm LT Q Serve Time (g_ps), s Time to First Blk (g_f), s Serve Time pre Blk (g_fs), s Prop LT Inside Lane (P_L) Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d), s/veh 1st-Term Q (Q1), veh/ln 2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/ln %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h

Middle Lane Group Data Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d), s/veh 1st-Term Q (Q1), veh/In

Synchro 9 Report Existing AM.syn Synchro 9 Report Existing AM.syn 3: US460/Pruden Boulevard & Kings Fork Rd

Baseline

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SBR

D-6 | ROUTE 460 SAFETY AND OPERATIONS STUDY

1	0	0	1	1	0	0	1	
124	0	0	192	20	0	0	286	
1774	0	0	577	1774	0	0	1219	
6.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	
6.2	0.0	0.0	18.2	1.0	0.0	0.0	18.2	
0	0	0	1115	0	0	0	1246	
0	0	0	541	0	0	0	0	
0.0	0.0	0.0	18.2	0.0	0.0	0.0	18.2	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.5	0.0	0.0	0.0	12.9	
0.0	0.0	0.0	0.5	0.0	0.0	0.0	12.9	
1.00	0.00	0.00	0.65	1.00	0.00	0.00	0.01	
156	0	0	183	39	0	0	287	
0.79	0.00	0.00	1.05	0.52	0.00	0.00	1.00	
276	0	0	183	266	0	0	287	
0.79	0.00	0.00	1.00	0.96	0.00	0.00	1.00	
40.2	0.0	0.0	38.8	43.5	0.0	0.0	34.9	
7.1	0.0	0.0	80.9	9.8	0.0	0.0	52.1	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
47.3	0.0	0.0	119.8	53.4	0.0	0.0	87.0	
3.0	0.0	0.0	4.5	0.5	0.0	0.0	7.1	
0.5	0.0	0.0	4.1	0.1	0.0	0.0	4.2	
1.00	0.0	0.0	1.00	1.00	0.0	0.0	1.00	
1.00	0.00	0.00	1.00	1.00	0.00	0.00	11.00	
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.12	
0.51	0.00	0.00	0.23	0.00	0.00	0.00	0.13	
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	2	0	4	0	6	0	8	
	Т				Т			
0	2	0	0	0	2	0	0	
0	466	0	0	0	752	0	0	
0	1770	0	0	0	1770	0	0	
0.0	6.9	0.0	0.0	0.0	10.9	0.0	0.0	
0.0	6.9	0.0	0.0	0.0	10.9	0.0	0.0	
0	1/41	0	0	0	1956	0	0	
0.00	0.27	0.00	0.00	0.00	0.38	0.00	0.00	
0 00	1/41	0	0	0 00	1956	0	0 00	
0.00	0.96	0.00	0.00	0.00	0.79	0.00	0.00	
0.0	13.4	0.0	0.0	0.0	11.4	0.0	0.0	
0.0	0.4	0.0	0.0	0.0	0.5	0.0	0.0	
0.0	12.7	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	13.7	0.0	0.0	0.0	F 2	0.0	0.0	
0.0	3.4	0.0	0.0	0.0	5.2	0.0	0.0	

3: US460/Pruden Boulevard & Kings Fork Rd											
2nd-Term Q (Q2), veh/In	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0			
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00			
%ile Back of Q (50%), veh/ln	0.0	3.5	0.0	0.0	0.0	5.3	0.0	0.0			
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.00			
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0			
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Right Lane Group Data											
Assigned Mvmt	0	12	0	14	0	16	0	18			
Lane Assignment		R		R							
Lanes in Grp	0	1	0	1	0	0	0	0			
Grp Vol (v), veh/h	0	48	0	92	0	0	0	0			
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0			
Q Serve Time (g_s), s	0.0	1.4	0.0	4.4	0.0	0.0	0.0	0.0			
Cycle Q Clear Time (g_c), s	0.0	1.4	0.0	4.4	0.0	0.0	0.0	0.0			
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.46			
Lane Grp Cap (c), veh/h	0	779	0	320	0	0	0	0			
V/C Ratio (X)	0.00	0.06	0.00	0.29	0.00	0.00	0.00	0.00			
Avail Cap (c a), veh/h	0	779	0	320	0	0	0	0			
Upstream Filter (I)	0.00	0.96	0.00	1.00	0.00	0.00	0.00	0.00			
Uniform Delay (d1), s/veh	0.0	12.0	0.0	30.4	0.0	0.0	0.0	0.0			
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.0			
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Control Delay (d), s/veh	0.0	12.1	0.0	30.9	0.0	0.0	0.0	0.0			
1st-Term Q (Q1), veh/ln	0.0	0.6	0.0	1.9	0.0	0.0	0.0	0.0			
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile Back of Q Factor (f B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00			
%ile Back of Q (50%), veh/ln	0.0	0.7	0.0	2.0	0.0	0.0	0.0	0.0			
%ile Storage Ratio (RQ%)	0.00	0.12	0.00	1.01	0.00	0.00	0.00	0.00			
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0			
Initial O Clear Time (tc) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Interception Summer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
		07.0		_	_	_					
HCM 2010 Ctrl Delay		37.2									
HGM 2010 LOS		U									

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		-	•	1	•			T	1	¥	¥	*
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	↑ 1≽		- ሽ	- † †	1		4			4	
Traffic Volume (vph)	6	694	51	4	434	52	39	22	13	105	31	4
Future Volume (vph)	6	694	51	4	434	52	39	22	13	105	31	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		110	0		0	0		0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (ft)	160			150			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986				0.850		0.966			0.992	
Flt Protected	0.950			0.950				0.977			0.968	
Satd. Flow (prot)	1770	3490	0	1770	3539	1583	0	1758	0	0	1789	0
Flt Permitted	0.950			0.950				0.796			0.732	
Satd. Flow (perm)	1770	3490	0	1770	3539	1583	0	1432	0	0	1353	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				128		17			3	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		471			2858			1931			2337	
Travel Time (s)		5.8			35.4			29.3			35.4	
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Adj. Flow (vph)	12	754	76	12	488	88	52	32	28	128	52	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	830	0	12	488	88	0	112	0	0	192	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8			4		
Detector Phase	1	6		5	2	2	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	11.8	21.8		11.8	21.8	21.8	13.3	13.3		13.8	13.8	
Total Split (s)	18.0	46.0		18.0	46.0	46.0	26.0	26.0		26.0	26.0	
Total Split (%)	20.0%	51.1%		20.0%	51.1%	51.1%	28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	11.2	39.2		11.2	39.2	39.2	19.7	19.7		19.2	19.2	
Yellow Time (s)	4.8	4.8		4.8	4.8	4.8	4.8	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8	6.8		6.3			6.8	
Lead/Lag	Lead	Lao		Lead	Lag	Lag						
Lead-Lag Optimize?						3						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Minimum Gap (s)	0.2	3.5		0.2	3.5	3.5	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Recall Mode	None	Min		None	Min	Min	None	None		None	None	
Act Effct Green (s)	6.3	19.8		6.3	19.8	19.8		13.0			12.4	
Actuated g/C Ratio	0.13	0 41		0 13	0.41	0 41		0 27			0.26	
v/c Ratio	0.05	0.58		0.05	0.34	0.12		0.28			0.55	
Control Delay	25.8	14.0		25.8	11.8	1.8		16.8			24.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Delay	25.8	14.0		25.8	11.8	1.8		16.8			24.5	
	20.0	17.0		20.0	11.0	1.0		10.0			27.0	

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

4: Providence Ro

Lane Group LOS Approach Delay Approach LOS Queue Length 50th (ft) Queue Length 95th (ft) Internal Link Dist (ft) Ture Ray Length (ft) Turn Bay Length (ft) Base Capacity (vph) Starvation Cap Reductn Spillback Cap Reductn Storage Cap Reductn Reduced v/c Ratio

Intersection Summary

 Intersection Summary

 Area Type:
 Other

 Cycle Length: 90
 Actuated Cycle Length: 48.6

 Natural Cycle:
 60

 Control Type:
 Actuated-Uncoordinated

 Maximum v/c Ratio:
 0.58

 Intersection Signal Delay:
 14.2

 Intersection Capacity Utilization 43.2%
 Analysis Period (min)
 Analysis Period (min) 15

Splits and Phases:	4:
<u>∕</u> ∕ _{Ø1}	
18 s	
√ Ø5	
18 s	

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Appendix D

bad/Lake Prince Drive & US460/Pruden Boulevard Baseli													
	۶	+	*	4	ł	•	<	1	1	*	ţ	4	
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
	С	В		С	В	А		В			С		
		14.1			10.6			16.8			24.5		
		В			В			В			С		
	3	75		3	40	0		18			38		
	12	216		8	120	0		57			88		
		391			2778			1851			2257		
	220			200		110							
	439	2960		439	2999	1361		634			577		
	0	0		0	0	0		0			0		
	0	0		0	0	0		0			0		
	0	0		0	0	0		0			0		
	0.03	0.28		0.03	0.16	0.06		0.18			0.33		
Oth	ner												
48.6													
Uncoor	dinated												
3													
y: 14.2				In	tersectior								
ilizatior	1 43.2%			IC	U Level o	of Service	А						

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

4 Ø2	₽ 04	
46 s	26 s	
→ Ø6	1 ø8	
46 s	26 s	

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

Baseline

	≯	-	$\mathbf{\hat{z}}$	4	+	×	1	Ť	1	1	ţ	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2			1	<u></u>	1		\$			\$	
Traffic Volume (veh/h)	6	694	51	4	434	52	39	22	13	105	31	4
Future Volume (veh/h)	6	694	51	4	434	52	39	22	13	105	31	4
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	12	754	76	12	488	88	52	32	28	128	52	12
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	27	1295	130	27	1412	631	207	120	73	290	86	17
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
Prop Arrive On Green	0.02	0.40	0.40	0.02	0.40	0.40	0.17	0.17	0.17	0.17	0.17	0.17
Ln Grp Delay, s/veh	34.8	12.4	12.4	34.8	10.5	9.5	18.4	0.0	0.0	20.0	0.0	0.0
Ln Grp LOS	С	В	В	С	В	А	В			В		
Approach Vol, veh/h		842			588			112			192	
Approach Delay, s/veh		12.7			10.8			18.4			20.0	
Approach LOS		В			В			В			В	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		8.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		7.6	26.5		15.3	7.6	26.5		15.3			
Change Period (Y+Rc), s		6.8	6.8		6.8	6.8	6.8		* 6.8			
Max Green (Gmax), s		11.2	39.2		19.2	11.2	39.2		* 20			
Max Allow Headway (MAH), s		3.6	4.7		5.0	3.6	4.7		5.0			
Max Q Clear (g_c+l1), s		2.3	6.7		7.4	2.3	11.0		4.7			
Green Ext Time (g_e), s		0.0	9.0		1.2	0.0	8.7		1.3			
Prob of Phs Call (p_c)		0.15	1.00		0.98	0.15	1.00		0.98			
Prob of Max Out (p_x)		0.00	0.08		0.06	0.00	0.12		0.02			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			978	1774			581			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		498		3247		695			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		98		327		425			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Prot)			L+T+R	(Prot)			L+T+R			

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Baseline

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	12	0	0	192	12	0	0	112	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1574	1774	0	0	1701	
Q Serve Time (g_s), s	0.3	0.0	0.0	2.7	0.3	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.3	0.0	0.0	5.4	0.3	0.0	0.0	2.7	
Perm LT Sat Flow (s I), veh/h/ln	0	0	0	1364	0	0	0	1359	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1803	0	0	0	1820	
Perm LT Eff Green (g p), s	0.0	0.0	0.0	8.5	0.0	0.0	0.0	8.5	
Perm LT Serve Time (q u), s	0.0	0.0	0.0	5.8	0.0	0.0	0.0	3.1	
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	2.1	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	2.1	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.67	1.00	0.00	0.00	0.46	
Lane Grp Cap (c), veh/h	27	0	0	393	27	0	0	400	
V/C Ratio (X)	0.44	0.00	0.00	0.49	0.44	0.00	0.00	0.28	
Avail Cap (c_a), veh/h	403	0	0	711	403	0	0	744	
Jpstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	24.1	0.0	0.0	19.0	24.1	0.0	0.0	18.0	
ncr Delay (d2), s/veh	10.8	0.0	0.0	0.9	10.8	0.0	0.0	0.4	
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	34.8	0.0	0.0	20.0	34.8	0.0	0.0	18.4	
1st-Term Q (Q1), veh/In	0.2	0.0	0.0	2.5	0.2	0.0	0.0	1.3	
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
%ile Back of Q (50%), veh/In	0.2	0.0	0.0	2.6	0.2	0.0	0.0	1.4	
%ile Storage Ratio (RQ%)	0.03	0.00	0.00	0.03	0.03	0.00	0.00	0.02	
nitial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	8	
ane Assignment		Т				Т			
anes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	488	0	0	0	411	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	4.7	0.0	0.0	0.0	9.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	4.7	0.0	0.0	0.0	9.0	0.0	0.0	
_ane Grp Cap (c), veh/h	0	1412	0	0	0	706	0	0	
V/C Ratio (X)	0.00	0.35	0.00	0.00	0.00	0.58	0.00	0.00	
Avail Cap (c_a), veh/h	0	2814	0	0	0	1407	0	0	
Jpstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Jniform Delay (d1), s/veh	0.0	10.3	0.0	0.0	0.0	11.6	0.0	0.0	
ncr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.8	0.0	0.0	
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	10.5	0.0	0.0	0.0	12.4	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	2.3	0.0	0.0	0.0	4.3	0.0	0.0	

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2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/In	0.0	2.3	0.0	0.0	0.0	4.5	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.00	0.00	0.30	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									1
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment		R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	88	0	0	0	419	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1805	0	0	
Q Serve Time (g_s), s	0.0	1.7	0.0	0.0	0.0	9.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	1.7	0.0	0.0	0.0	9.0	0.0	0.0	
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.06	0.00	0.18	0.00	0.25	
Lane Grp Cap (c), veh/h	0	631	0	0	0	720	0	0	
V/C Ratio (X)	0.00	0.14	0.00	0.00	0.00	0.58	0.00	0.00	
Avail Cap (c_a), veh/h	0	1259	0	0	0	1435	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	9.4	0.0	0.0	0.0	11.6	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.8	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	9.5	0.0	0.0	0.0	12.4	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	0.8	0.0	0.0	0.0	4.4	0.0	0.0	
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	0.8	0.0	0.0	0.0	4.6	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.18	0.00	0.00	0.00	0.30	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		13.2							
HCM 2010 LOS		В							

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

Synchro 9 Report Existing AM.syn

Baseline

5: Woodlawn Dr &	Baseline						
	-	\mathbf{F}	4	+	•	۲	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	≜ †⊅			^		1	
Traffic Volume (vph)	772	0	0	492	0	2	
Future Volume (vph)	772	0	0	492	0	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt						0.865	
Flt Protected							
Satd. Flow (prot)	3539	0	0	3539	0	1611	
Flt Permitted							
Satd. Flow (perm)	3539	0	0	3539	0	1611	
Link Speed (mph)	55			55	25		
Link Distance (ft)	1965			471	1166		
Travel Time (s)	24.4			5.8	31.8		
Peak Hour Factor	0.96	0.92	0.92	0.95	0.25	0.25	
Adj. Flow (vph)	804	0	0	518	0	8	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	804	0	0	518	0	8	
Sign Control	Free			Free	Stop		
Intersection Summary							

ICU Level of Service A

Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 31.3% Analysis Period (min) 15

5: Woodlawn Dr & US460/Pruden Boulevard

Baseline

Intersection						
nt Delay, s/veh	0.1					
Movement	EDT	EDD	\//DI		NDI	
		EDR	VVDL		INDĹ	
Lane Conligurations	1P	^	^	100	0	Ľ
raπic voi, ven/n	772	0	0	492	0	2
Future Vol, veh/h	112	0	0	492	0	2
Jonflicting Peas, #/nr	- 0	- 0	- 0	- 0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
/eh in Median Storagi	e,#0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	92	92	95	25	25
Heavy Vehicles, %	2	2	2	2	2	2
Nvmt Flow	804	0	0	518	0	8
Maior/Minor	Maior1		Maior2	1	/linor1	
Conflicting Flow All	0	0	-			402
Stage 1	-	-	-	-	-	-
Stage 2			-			
Critical Hdwy	_	-	_	_	-	6 94
Critical Hdwy Sto 1	-	-	-		-	-
Critical Hdwy Sto 2	_	-	_	_	-	-
Follow-up Hdwy	-	-	-		-	3.32
Pot Cap-1 Maneuver	-	-	٥	-	0	598
Stage 1	-		0		0	-
Stage 2		-	0	-	0	-
Platoon blocked %			0		5	
Mov Can-1 Maneuver			-	-	-	598
Mov Cap-2 Maneuver			_		_	-
Stane 1		-	-	-	-	-
Stage 2					_	
Oldgo 2						
Approach	FR		W/R		NR	
HCM Control Delay	0		0		11 1	
HCM LOS	0		0		R	
					J	
Minor Lane/Major Mur	nt	NRI n1	ERT	ERP	W/RT	
Capacity (yob/b)	in	500	LDI	LDR	VVDI	
		0.010	-	-	-	
HOW Cantral Dalaw (a	`	0.013	-	-	-	
HOW CONTROL Delay (S)	- 11.1 P	-	-	-	
HOW LARE LUS		B	-		-	
HUIVI 95th %tile Q(veh	1)	0	-	-	-	

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Synchro 9 Report Existing AM.syn

Appendix D

Suffolk Rd & US 460/Windsor Boulevard Basel													
	۶	+	\rightarrow	∢	+	•	•	1	1	1	Ŧ	4	
D	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
gurations		- † †	1	۳.	^ î>			ب	1		\$		
ime (vph)	3	611	16	19	393	0	23	3	66	1	0	1	
ume (vph)	3	611	16	19	393	0	23	3	66	1	0	1	
(vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
ngth (ft)	0		340	400		0	0		300	0		0	
nes	0		1	1		0	0		1	0		0	
jth (ft)	25			125			25			25			
actor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
			0.850						0.850		0.932		
ed		0.999		0.950				0.960			0.976		
(prot)	0	3536	1583	1770	3539	0	0	1788	1583	0	1694	0	
ed		0.999		0.950				0.960			0.976		
(perm)	0	3536	1583	1770	3539	0	0	1788	1583	0	1694	0	
(mph)		55			55			45			45		
ce (ft)		3402			5235			2230			2290		
e (s)		42.2			64.9			33.8			34.7		
Factor	0.38	0.89	0.80	0.68	0.90	0.92	0.41	0.25	0.34	0.25	0.92	0.25	
/ph)	8	687	20	28	437	0	56	12	194	4	0	4	
ne Traffic (%)													
o Flow (vph)	0	695	20	28	437	0	0	68	194	0	8	0	
bl		Free			Free			Stop			Stop		
n Summary													
(Other												
be: Unsignalized													
Capacity Utilization 34.4%				IC	U Level o	of Service	A						
eriod (min) 15													

6: Old Suffolk Rd

6: Old Suffolk Rd & US 460/Windsor Boulevard Baseline	7: Dominion Way	& US 460	0/Winc	lsor Bo	oulevar	ď		Baseline	7: Dominion Way & US 4
		-	\mathbf{i}	1	←	1	1		→
tersection	Lane Group	EBT	EBR	WBL	WBT	NBL	NBR		Lane Group EBT
nt Delay, s/veh 3.6	Lane Configurations	* *	1	۲.	^	5	1		Queue Length 50th (ft) 54
	Traffic Volume (vph)	644	48	50	367	4	7		Queue Length 95th (ft) 133
Overlient EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR	Future Volume (vph)	644	48	50	367	4	7		Internal Link Dist (ft) 629
ane configurations TT r T F d r d	Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		Turn Bay Length (ft)
rathic Vol, veh/h 3 611 16 19 393 0 23 3 66 1 0 1	Storage Length (ft)		180	325		0	0		Base Capacity (vph) 2660
uture Vol, veh/h 3 611 16 19 393 0 23 3 66 1 0 1	Storage Lanes		1	1		1	1		Starvation Cap Reductn 0
Conflicting Peds, #/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Taper Length (ft)			225		25			Spillback Cap Reductn 0
sign Control Free Free Free Free Free Free Stop Stop Stop Stop	Lane Util Factor	0.95	1 00	1 00	0.95	1 00	1 00		Storage Cap Reductn 0
RT Channelized None None None	Ert	0.00	0.850		0.00		0.850		Reduced v/c Ratio 0.27
storage Length 340 400 300	Elt Protected		0.000	0.950		0 950	0.000		
/eh in Median Storage, # - 0 0 0 0 -	Satd Flow (prot)	3530	1583	1770	3530	1770	1583		Intersection Summary
Grade, % - 0 0 0 0 0 -	Elt Permitted	0000	1000	0 371	0000	0.950	1000		Area Type: Other
Peak Hour Factor 38 89 80 68 90 92 41 25 34 25 92 25	Satd Flow (perm)	3530	1583	601	3530	1770	1583		Cycle Length: 94
Heavy Vehicles, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Bight Turp on Dod	3339	Vee	091	3339	1770	Vee		Actuated Cycle Length: 94
Mvmt Flow 8 687 20 28 437 0 56 12 194 4 0 4	Setd Flow (DTOD)		07				16		Offset: 73 (78%), Referenced to phase
	Salu. Flow (RTOR)	55	07			05	10		Natural Cycle: 50
Maine Maine Maine Maine	Link Speed (mpn)	20			00	20			Control Type: Actuated-Coordinated
	Link Distance (ft)	709			3402	1205			Maximum v/c Ratio: 0.27
Conflicting Flow All 437 0 0 687 0 0 976 1195 343 858 1195 218	Travel Time (s)	8.8			42.2	32.9			Intersection Signal Delay: 4.4
Stage 1 702 702 - 493 493 -	Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44		Intersection Canacity Itilization 45.7%
Stage 2 274 493 - 365 702 -	Adj. Flow (vph)	/16	87	93	41/	8	16		Analysis Period (min) 15
Critical Hdwy 4.14 4.14 7.54 6.54 6.94 7.54 6.54 6.94	Shared Lane Traffic (%)								
Critical Hdwy Stg 1 6.54 5.54 - 6.54 5.54 -	Lane Group Flow (vph)	716	87	93	417	8	16		Splits and Phases: 7: Dominion Way
Critical Hdwy Stg 2 6.54 5.54 - 6.54 -	Turn Type	NA	Perm	D.P+P	NA	Prot	Prot		Splits and Filases. 7. Dominion way
-ollow-up Hdwy 2.22 2.22 3.52 4.02 3.32 3.52 4.02 3.32	Protected Phases	2		1	6	4	4		🖌 Ø1 🕴 🕂 🛛
Pot Cap-1 Maneuver 1119 903 206 185 653 251 185 786	Permitted Phases		2	2					21 s 47 s
Stage 1 395 439 - 526 545 -	Detector Phase	2	2	1	6	4	4		←
Stage 2 709 545 - 627 439 -	Switch Phase								Ø6 (R) 💗
Platoon blocked, %	Minimum Initial (s)	15.0	15.0	7.0	15.0	5.0	5.0		68 s
Mov Cap-1 Maneuver 1119 903 198 177 653 162 177 786	Minimum Split (s)	21.5	21.5	16.0	21.5	11.0	11.0		
Mov Cap-2 Maneuver 198 177 162 177 -	Total Split (s)	47.0	47.0	21.0	68.0	26.0	26.0		
Stage 1	Total Split (%)	50.0%	50.0%	22.3%	72.3%	27.7%	27.7%		
Stage 2	Maximum Green (s)	40.5	40.5	12.0	61.5	20.0	20.0		
	Yellow Time (s)	5.5	5.5	5.0	5.5	3.0	3.0		
	All-Red Time (s)	1.0	1.0	4.0	1.0	3.0	3.0		
Approach EB WB NB SB	Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		
HCM Control Delay, s 0.1 0.5 18.1 18.8	Total Lost Time (s)	6.5	6.5	9.0	6.5	6.0	6.0		
HCM LOS C C	Lead/Lag	Lag	Lag	Lead					
	Lead-Lag Optimize?	209	209	2000					
	Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		
WIND LANEWAY OF WORLD ALL AND A A A A A A A A A A A A A A A A A A	Recall Mode	C-Min	C-Min	None	C-Min	None	None		
Capacity (ven/n) 194 653 1119 - 903 - 269	Act Effet Green (s)	70.7	70.7	72.7	86.3	61	6.1		
HCM Lane V/C Ratio 0.351 0.297 0.007 0.031 0.03	Actuated a/C Patio	0.75	0.75	0.77	00.0	0.06	0.06		
HCM Control Delay (s) 33.3 12.8 8.2 9.1 18.8	v/c Patio	0.75	0.73	0.17	0.52	0.00	0.00		
HCM Lane LOS D B A A C	Control Dolov	0.27	1.0	2.13	1.13	12.07	21.6		
HCM 95th %tile Q(veh) 1.5 1.2 0 0.1 0.1		0.9	1.9	2.9	1.3	42.2	21.0		
		0.0	0.0	0.0	0.0	10.0	0.0		
		5.9	1.9	2.9	1.3	42.2	21.0		
	LUS	A	A	A	A	0	C		
	Approach Delay	5.5			1.0	28.5			
	Approach LOS	A			A	C			

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US 460/Windsor Boulevard

\mathbf{r}	4	+	1	1
EBR	WBL	WBT	NBL	NBR
0	2	0	5	0
3	12	32	11	5
		3322	1125	
180	325			
1211	700	3248	376	349
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0.07	0.13	0.13	0.02	0.05

ed to phase 2:EBWB and 6:WBT, Start of Green

	Intersection LOS: A
)	ICU Level of Service A

minion Way & US 460/Windsor Boulevard

🕶 🕶 @2 (R)	1 Ø4	
47 s	26 s	

Synchro 9 Report Existing AM.syn

Baseline

7: Dominion Way & US 460/Windsor Boulevard

Baseline

	-	$\mathbf{\hat{z}}$	4	+	1	1				
Movement	EBT	EBR	WBL	WBT	NBL	NBR				
Lane Configurations	**	1	5	44	5	1				
Traffic Volume (veh/h)	644	48	50	367	4	7				
Future Volume (veh/h)	644	48	50	367	4	7				
Number	2	12	1	6	7	14				
Initial Q. veh	0	0	0	0	0	0				
Ped-Bike Adj (A pbT)		1.00	1.00		1.00	1.00				
Parking Bus Adi	1.00	1.00	1.00	1.00	1.00	1.00				
Adi Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863				
Adj Flow Rate, veh/h	716	87	93	417	8	16				
Adi No. of Lanes	2	1	1	2	1	1				
Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44				
Percent Heavy Veh. %	2	2	2	2	2	2				
Opposing Right Turn Influence			Yes		Yes					
Cap, veh/h	2402	1074	600	2981	44	39				
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				
Prop Arrive On Green	0.68	0.68	0.07	0.84	0.02	0.02				
Ln Grp Delay, s/veh	6.4	5.3	3.4	1.4	46.9	51.8				
Ln Grp LOS	А	Α	А	А	D	D				
Approach Vol, veh/h	803			510	24					
Approach Delay, s/veh	6.3			1.8	50.2					
Approach LOS	А			А	D					
Timer:		1	2	3	4	5	6	7	8	
Assigned Phs		1	2		4		6			
Case No		1.2	7.0		9.0		4.0			
Phs Duration (G+Y+Rc), s		15.4	70.3		8.3		85.7			
Change Period (Y+Rc), s		9.0	6.5		6.0		6.5			
Max Green (Gmax), s		12.0	40.5		20.0		61.5			
Max Allow Headway (MAH), s		3.6	4.7		4.0		4.7			
Max Q Clear (q c+l1), s		3.2	9.7		2.9		4.0			
Green Ext Time (g e), s		0.1	7.9		0.0		8.6			
Prob of Phs Call (p c)		0.91	1.00		0.47		1.00			
Prob of Max Out (p_x)		0.00	0.04		0.00		0.00			
Left-Turn Movement Data										
Assigned Mymt		1	5		7					
Mvmt Sat Flow, veh/h		1774	0		1774					
Through Movement Data										
Assigned Mymt			2		4		6			
Mvmt Sat Flow, veh/h			3632		0		3632			
Right-Turn Movement Data										
Assigned Mvmt			12		14		16			
Mvmt Sat Flow, veh/h			1583		1583		0			
Left Lane Group Data										
Assigned Mvmt		1	5	0	7	0	0	0	0	
Lane Assignment		(Pr/Pm)	5	Ĵ	·	Ĵ	v	Ť	v	

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Lanes in Grp	1	0	0	1	0	0	0	0	
Grp Vol (v), veh/h	93	0	0	8	0	0	0	0	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1774	0	0	0	0	
Q Serve Time (g_s), s	1.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	1.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	
Perm LT Sat Flow (s_l), veh/h/ln	675	0	0	1774	0	0	0	0	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0	
Perm LT Eff Green (g_p), s	65.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Serve Time (g_u), s	56.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Q Serve Time (g_ps), s	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	63.8	0.0	0.0	0.0	0.0	0.0	0.0	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Lane Grp Cap (c), veh/h	600	0	0	44	0	0	0	0	
V/C Ratio (X)	0.15	0.00	0.00	0.18	0.00	0.00	0.00	0.00	
Avail Cap (c a), veh/h	706	0	0	377	0	0	0	0	
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Uniform Delay (d1), s/veh	3.3	0.0	0.0	44.9	0.0	0.0	0.0	0.0	
Incr Delay (d2), s/veh	0.1	0.0	0.0	2.0	0.0	0.0	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	3.4	0.0	0.0	46.9	0.0	0.0	0.0	0.0	
1st-Term Q (Q1), veh/ln	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
%ile Back of Q (50%), veh/ln	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	
%ile Storage Ratio (RQ%)	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data				<u> </u>				-	
Assigned Mvmt	0	2	0	4	0	6	0	0	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	2	0	0	
Grp Vol (v), veh/h	0	716	0	0	0	417	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	7.7	0.0	0.0	0.0	2.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	7.7	0.0	0.0	0.0	2.0	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2402	0	0	0	2981	0	0	
V/C Ratio (X)	0.00	0.30	0.00	0.00	0.00	0.14	0.00	0.00	
Avail Cap (c_a), veh/h	0	2402	0	0	0	2981	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	6.1	0.0	0.0	0.0	1.3	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	6.4	0.0	0.0	0.0	1.4	0.0	0.0	
1st-Term Q (Q1), veh/ln	0.0	3.7	0.0	0.0	0.0	0.9	0.0	0.0	

7: Dominion Way & US 460/Windsor Boulevard

Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h

Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS

Synchro 9 Report

Existing AM.syn

Baseline

2nd-Term Q (Q2), veh/In 3rd-Term Q (Q3), veh/In %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/In %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h

Initial Q Clear Time (tc), h Right Lane Group Data Assigned Mvmt

Lane Assignment

Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Prot RT Sat Flow (s_R), veh/h/ln Prot RT Eff Green (g_R), s Prop RT Outside Lane (P_R) Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh

Control Delay (d), s/veh

1st-Term Q (Q1), veh/In

2nd-Term Q (Q2), veh/In

3rd-Term Q (Q3), veh/In

%ile Back of Q Factor (f_B%)

%ile Back of Q (50%), veh/ln

%ile Storage Ratio (RQ%)

Appendix D

7: Dominion Way & US 460/Windsor Boulevard

5.4 Α

> Synchro 9 Report Existing AM.syn

Baseline

Existing PM

	٠	-	-	+	•	1	1			٠		5	-	•	1	1
	_	-	•	-			•			-	-	•	-		*	*
ane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	Lane Group		EBL	EBT	WBU	WBT	WBR	SBL	SE
ane Configurations	ሻ	- † †	a d	- † †	7	ሻ	1	LOS		A	A		A	A	E	
Fraffic Volume (vph)	7	1038	0	1071	47	59	25	Approach Delay			8.8		8.1		40.5	
Future Volume (vph)	7	1038	0	1071	47	59	25	Approach LOS			А		А		D	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	Queue Length 50th	(ft)	2	253		158	1	70	
Storage Length (ft)	305		125		195	0	155	Queue Length 95th	(ft)	7	269		313	8	75	
Storage Lanes	1		1		1	1	1	Internal Link Dist (ft)		457		2219		1226	
Taper Length (ft)	190		200			0		Turn Bay Length (ft)	305				195		1
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	Base Capacity (vph)	344	2663		2584	1175	251	2
Frt					0.850		0.850	Starvation Cap Red	uctn	0	0		0	0	0	
Flt Protected	0.950					0.950		Spillback Cap Redu	ctn	0	0		0	0	0	
Satd Flow (prot)	1770	3539	1863	3539	1583	1770	1583	Storage Can Reduc	tn	0	0		0	0	0	
Elt Permitted	0 152	0000	1000	0000	1000	0.950	1000	Reduced v/c Ratio		0.03	0.41		0.51	0.06	0.41	0
Satd Flow (perm)	283	3530	1863	3539	1583	1770	1583			0.00	0.71		0.01	0.00	0.71	0.
Right Turn on Red	200	0000	1000	0000	Vac	1110	Yee	Intersection Summa	ary							
Sold Flow (PTOP)					71		66	Area Type:	Ot	ther						
Salu. FIOW (RTOR)		FF			/1	05	00	Cycle Length: 110								
Link Speed (mpn)		50		55		25		Actuated Cycle Len	ath: 110							
Link Distance (ft)		537		2299		1306		Offset: 61 (55%) R	eferenced	to phase	2·WBTU	and 6.EB	TI Start	of Green		
Travel Time (s)		6.7		28.5		35.6		Natural Cycle: 65			2		, otart			
Peak Hour Factor	0.58	0.94	0.92	0.82	0.63	0.58	0.38	Control Type: Actua	ted_Coord	inated						
Adj. Flow (vph)	12	1104	0	1306	75	102	66	Maximum v/c Ratio	0.55	matou						
Shared Lane Traffic (%)								Intersection Signal I	. 0.00 Delav: 10 /	1			In	toreaction		
Lane Group Flow (vph)	12	1104	0	1306	75	102	66	Intersection Orginal I	beldy. 10.4	n 10 00/			10		f Convior	
Turn Type	pm+pt	NA	pm+pt	NA	Prot	Prot	Prot	Analysis Deried (mi	ly Utilizatio	11 40.2 %			10	U Level C	Service	A
Protected Phases	1	6	5	2	2	7	4	Analysis Penou (min	1) 15							
Permitted Phases	6		2					Calita and Dhasses	4.110.46	0/Davida	Deuleur	السما ۹ م				
Detector Phase	1	6	5	2	2	7	4	Spins and Phases:	1:0540	bu/Pruder	1 Bouleva		mela Driv	e		
Switch Phase								× 01	- b	12 (P)						
Minimum Initial (s)	5.0	15.0	5.0	15.0	15.0	7.0	7.0	18 5	69 s	2 (1)						
Minimum Split (s)	13.3	23.3	9.5	34.9	34.9	14.4	14.4	-								
Total Split (s)	18.0	69.0	18.0	69.0	69.0	23.0	23.0	₩25	- - e	06 (R)						
Total Split (%)	16.4%	62.7%	16.4%	62.7%	62.7%	20.9%	20.9%	18 s	69 s							
Maximum Green (s)	97	60.7	13.5	61.1	61 1	15.6	15.6									
Yellow Time (s)	4.8	4.8	3.5	4.8	4.8	4.0	4.0									
All-Red Time (s)	3.5	3.5	1.0	3.1	3.1	3.4	3.4									
Lost Time Adjust (s)	0.0	0.0	0.0	0.1	0.0	0.4	0.0									
Total Lost Time (s)	83	83	1.5	7.0	7.0	7.4	7.4									
	Lood	0.0	Lood	1.3	1.0	1.4	1.4									
Leau/Lay	Leau	Lay	Leau	Lay	Lay											
Lead-Lay Optimize?	20	2.0	2.0	2.0	2.0	20	3.0									
Venicle Extension (S)	3.U	3.U	3.U	3.U	3.U	3.U	J.U Non-									
	INOTIE	C-IVIII)	NOLIG	U-IVIIN		None	None									
waik Time (s)				1.0	1.0											
Flash Dont Walk (s)				20.0	20.0											
Pedestrian Calls (#/hr)				0	0											
Act Effct Green (s)	82.8	82.8		80.3	80.3	11.5	11.5									
Actuated g/C Ratio	0.75	0.75		0.73	0.73	0.10	0.10									
v/c Ratio	0.04	0.41		0.51	0.06	0.55	0.29									
Control Delay	4.3	8.9		8.4	2.2	57.5	14.1									
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0									
Total Delay	43	89		84	22	57.5	14 1									

US 460 Corridor Safety Study 1: US 460/Pruden Boulevard & Northfield Drive

HCM 2010 cannot analyze U-Turning movements.

VHB

Synchro 9 Report Existing PM.syn

VHB

Synchro 9 Report Existing PM.syn

Existing PM

VHB

US 460 Corridor Sa 2: US460/Pruden B	ifety St ouleva	udy rd & Ro	ob's D	rive							Existin	g PM
	٦	-	\mathbf{F}	4	-	•	1	Ť	۲	1	ţ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۳	↑ ĵ≽		ሻ	<u></u>	1		र्भ	1		\$	
Traffic Volume (vph)	4	961	3	18	1013	93	7	7	35	31	1	6
Future Volume (vph)	4	961	3	18	1013	93	7	7	35	31	1	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	400		175	0		50	0		0
Storage Lanes	1		0	1		1	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850			0.850		0.977	
Flt Protected	0.950			0.950				0.968			0.962	
Satd. Flow (prot)	1770	3536	0	1770	3539	1583	0	1803	1583	0	1751	0
Flt Permitted	0.950			0.950				0.821			0.751	
Satd. Flow (perm)	1770	3536	0	1770	3539	1583	0	1529	1583	0	1367	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				147			98		8	
Link Speed (mph)		35			35			25			30	
Link Distance (ft)		2499			463			411			171	
Travel Time (s)		48.7			9.0			11.2			3.9	
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Adj. Flow (vph)	9	991	5	31	1055	155	18	9	80	48	2	10
Shared Lane Traffic (%)			•									
Lane Group Flow (vph)	9	996	0	31	1055	155	0	27	80	0	60	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2	0	•	8	0		4	
Permitted Phases		0		-	•	2	8	•	8	4		
Detector Phase	1	6		5	2	2	8	8	8	4	4	
Switch Phase	F 0	15.0		5.0	15.0	15.0	F 0	F 0	F 0	7.0	7.0	
Minimum Initial (S)	5.0	15.0		5.0	15.0	15.0	5.0	5.0	5.0	12.1	12.1	
Minimum Split (s)	11.1	21.8		11.1	21.8	21.8	11.1	11.1	11.1	13.1	13.1	
Total Split (S)	21.0	0Z.U		21.0	0Z.U	02.U	27.0	21.0	21.0	21.0	27.0	
Total Split (%)	14.0	50.4%		14.0	50.4%	50.4%	24.5%	24.5%	24.5%	24.5%	24.5%	
Vollow Time (c)	14.9	1.2		14.9	1.2	1.2	20.9	20.9	20.9	20.9	20.9	
All Pod Time (s)	4.0	4.0		4.0	4.0	4.0	2.0	2.0	2.0	4.1	4.1	
Lost Time Adjust (s)	2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Total Lost Time (s)	6.1	6.8		6.1	6.8	6.8		6.1	6.1		6.1	
Lead/Lag	l.u	0.0		l.u	0.0	0.0		0.1	0.1		0.1	
Lead-Lag Ontimize?	Loud	Lug		Loud	Lug	Lug						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None	None	None	None	
Act Effet Green (s)	6.2	82.4		7.5	88.5	88.5	Nono	9.6	9.6	Hono	9.9	
Actuated g/C Ratio	0.06	0.75		0.07	0.80	0.80		0.09	0.09		0.09	
v/c Ratio	0.09	0.38		0.26	0.37	0.00		0.20	0.35		0.46	
Control Delay	36.5	13.6		62.3	2.8	0.5		48.5	10.4		52.6	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Total Delay	36.5	13.6		62.3	2.8	0.5		48.5	10.4		52.6	
LOS	D	B		E	A	A		D	В		D	
Approach Delav	-	13.8		-	4.0			20.0	_		52.6	
Approach LOS		В			А			С			D	

VHB

Synchro 9 Report

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

	٦	-	\mathbf{r}	•	-	•	1	1	1	1	Ŧ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	6	203		23	32	0		18	0		35	
Queue Length 95th (ft)	m11	m244		36	90	1		37	0		34	
Internal Link Dist (ft)		2419			383			331			91	
Turn Bay Length (ft)	250			400		175			50			
Base Capacity (vph)	239	2649		239	2847	1302		290	380		266	
Starvation Cap Reductn	0	0		0	0	0		0	0		0	
Spillback Cap Reductn	0	0		0	0	0		0	0		0	
Storage Cap Reductn	0	0		0	0	0		0	0		0	
Reduced v/c Ratio	0.04	0.38		0.13	0.37	0.12		0.09	0.21		0.23	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 11	0											
Offset: 0 (0%), Referenced	d to phase 2:	WBT and	6:EBT, S	tart of Gr	een							
Natural Cycle: 55												
Control Type: Actuated-Co	oordinated											
Maximum v/c Ratio: 0.46												
Intersection Signal Delay:	10.0			In	tersectior	ILOS: B						
Intersection Capacity Utiliz	zation 52.5%			IC	U Level o	of Service	A					
Analysis Period (min) 15												
m Volume for 95th perce	entile queue i	s metered	l by upstr	eam signa	al.							

Splits and Phases: 2: US460/Pruden Boulevard & Rob's Drive

▶ Ø1	 Ø2 (R)	₩ø4
21 s	62 s	27 s
√ Ø5	•Ø6 (R)	108 V
21 s	62 s	27 s

Existing PM

Movement Lane Configurations Traffic Volume (veh/h) Future Volume (veh/h) Number Initial Q, veh Ped-Bike Adj (A_pbT) Parking Bus Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Peak Hour Pactor Percent Heavy Veh, % Opposing Right Turn Inf Cap, veh/h HCM Platoon Ratio Prop Arrive On Green Ln Grp LOS Approach Vol, veh/h Approach Delay, s/veh Approach LOS

Timer: Assigned Phs Case No Phs Duration (G+Y+Rc Change Period (Y+Rc), Max Green (Gmax), s Max Green (Gmax), s Max Allow Headway (M Max Q Clear (g_c+11), s Green Ext Time (g_e), s Prob of Phs Call (p_c) Prob of Max Out (p_x)

Left-Turn Movement Da

Assigned Mvmt Mvmt Sat Flow, veh/h

Through Movement Date Assigned Mvmt Mvmt Sat Flow, veh/h

Right-Turn Movement Assigned Mvmt Mvmt Sat Flow, veh/h

Left Lane Group Data Assigned Mvmt Lane Assignment

VHB

Synchro 9 Report Existing PM.syn

Existing PM.syn

VHB

Appendix D

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	٦.	≜ ⊅⊳			<u></u>	1		- କ	1			
	4	961	3	18	1013	93	7	7	35	31	1	6
	4	961	3	18	1013	93	7	7	35	31	1	6
	1	6	16	5	2	12	3	8	18	/	4	14
	1 00	0	1 00	1.00	0	1.00	1 00	0	1 00	1.00	0	1 00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1863	1863	1900	1863	1863	1863	1900	1863	1863	1900	1863	1900
	9	991	5	31	1055	155	18	9	80	48	2	10
	1	2	0	1	2	1	0	1	1	0	1	0
	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
	2	2	2	2	2	2	2	2	2	2	2	2
nfluence	Yes			Yes			Yes			Yes		
	19	2620	13	49	2628	1176	127	53	117	124	10	15
	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.02	1.00	1.00	0.03	0.74	0.74	0.07	0.07	0.07	0.07	0.07	0.07
	66.5	0.7	0.6	65.3	5.7	4.3	48.3	0.0	56.6	51.8	0.0	0.0
	E	A	A	E	A	A	D		E	D		
		1005			1241			107			60	
1		1.2			7.0			54.5			51.8	
		А			А			D			D	
		1	2	3	4	5	6	7	8			
		1	2		4	5	6		8			
		2.0	3.0		8.0	2.0	4.0		7.0			
c), s		7.3	88.5		14.2	9.2	86.6		14.2			
, S		6.1	6.8		6.1	6.1	6.8		6.1			
4411)		14.9	55.Z		20.9	14.9	55.2		20.9			
/IAH), S		3.0 2.6	5.0		4.0	3.0	5.U 2.0		4.0			
з с		0.0	22.2		0.5	0.0	25.0		0.5			
3		0.0	1 00		0.0	0.61	1 00		0.0			
		0.00	0.39		0.00	0.00	0.28		0.00			
- 4 -												
ata					7	-			2			
		1			/	1774			3			
		1774			880	1774			980			
ata												
			2		4		6		8			
			3539		129		3611		717			
Data												
			12		14		16		18			
			1583		202		18		1583			
		1	0	0	7	5	0	0	2			
		(Prot)	U	U	/ I +T+R	(Prot)	U	U	1+T			
		(1101)			2.1.1	(1101)			L.1			

Synchro 9 Report

Existing PM.syn

Existing PM

2: US460/Pruden Boulevard	uy 1 & Ro	b's Dr	ive					EX	2: US460/Pruden Boulevard & Rob's Drive	Existing Pivi US
anes in Grp	1	0	0	1	1	0	0	1	2nd-Term Q (Q2), veh/ln 0.0 0.2 0.0 0.0 0.0 0.2 0.0 0.0	
irp Vol (v), veh/h	9	0	0	60	31	0	0	27	3rd-Term Q (Q3), veh/ln 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	
rp Sat Flow (s), veh/h/ln	1774	0	0	1212	1774	0	0	1697	%ile Back of Q Factor (f_B%) 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00	
Serve Time (g_s), s	0.6	0.0	0.0	4.1	1.9	0.0	0.0	0.0	%ile Back of Q (50%), veh/ln 0.0 6.0 0.0 0.0 0.0 0.2 0.0 0.0	
ycle Q Clear Time (g_c), s	0.6	0.0	0.0	5.6	1.9	0.0	0.0	1.5	%ile Storage Ratio (RQ%) 0.00 0.38 0.00 0.00 0.00 0.00 0.00 0.00	Fu
erm LT Sat Flow (s_l), veh/h/ln	0	0	0	1329	0	0	0	1424	Initial Q (Qb), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Ide
hared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	1755	Final (Residual) Q (Qe), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Sta
erm LT Eff Green (g_p), s	0.0	0.0	0.0	8.1	0.0	0.0	0.0	8.1	Sat Delay (ds), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Sta
erm LT Serve Time (g_u), s	0.0	0.0	0.0	6.6	0.0	0.0	0.0	2.5	Sat Q (Qs), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	la
erm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	Sat Cap (cs), veh/h 0 0 0 0 0 0 0 0 0	La
ime to First Blk (g_f), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	Initial Q Clear Time (tc), h 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Frt
erve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.0	Dickt Lang Crown Date	Fit
rop LT Inside Lane (P_L)	1.00	0.00	0.00	0.80	1.00	0.00	0.00	0.67		Sa
ane Grp Cap (c), veh/h	19	0	0	148	49	0	0	180	Assigned Mvmt 0 12 0 14 0 16 0 18	Fit
/C Ratio (X)	0.46	0.00	0.00	0.40	0.63	0.00	0.00	0.15	Lane Assignment R I+R R	Sa
vail Cap (c a), veh/h	240	0	0	306	240	0	0	357	Lanes in Grp 0 1 0 0 0 1 0 1	Rig
lostream Filter (I)	0.79	0.00	0.00	1.00	1.00	0.00	0.00	1.00	Grp Vol (v), veh/h 0 155 0 0 0 510 0 80	Sa
niform Delay (d1), s/veh	53.5	0.0	0.0	50.1	52.9	0.0	0.0	47.9	Grp Sat Flow (s), veh/h/ln 0 1583 0 0 0 1860 0 1583	Lin
ncr Delay (d2) s/veh	13.1	0.0	0.0	1.8	12.4	0.0	0.0	0.4	Q Serve Time (g_s), s 0.0 3.1 0.0 0.0 0.0 0.0 0.0 5.4	Lin
nitial Q Delay (d3) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Cycle Q Clear Time (g_c), s 0.0 3.1 0.0 0.0 0.0 0.0 5.4	Tra
control Delay (d) s/veh	66.5	0.0	0.0	51.8	65.3	0.0	0.0	48.3	Prot RT Sat Flow (s_R), veh/h/ln 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Pe
st-Term Ω (Ω 1) veh/ln	03	0.0	0.0	1.8	0.0	0.0	0.0	0.8	Prot RT Eff Green (g_R), s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Ad
nd-Term Q (Q2) veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	Prop RT Outside Lane (P_R) 0.00 1.00 0.00 0.17 0.00 0.01 0.00 1.00	Sh
rd-Term Ω (Q2), veh/ln	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	Lane Gro Cap (c), veh/h 0 1176 0 0 0 1349 0 117	La
Le Back of O Eactor (f. B%)	1.00	0.0	0.0	1.00	1.00	0.0	0.0	1.00	V/C Ratio (X) 0.00 0.13 0.00 0.00 0.38 0.00 0.68	Tu
the Back of $O(50\%)$ yeb/lp	0.3	0.00	0.00	1.00	1.00	0.00	0.00	0.8	Avail Cap (c a) veh/h 0 1176 0 0 0 1349 0 301	Pr
Lile Storage Patio (PO%)	0.03	0.0	0.0	0.43	0.07	0.0	0.0	0.0		Pe
sitial Q (Qb) yeb	0.03	0.00	0.00	0.43	0.07	0.00	0.00	0.00	Uniform Delay (d1) s/yeb 0.0 4.0 0.0 0.0 0.0 0.0 4.97	De
indi Q (QD), ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Incr Delay (d2) s/veh 0.0 0.2 0.0 0.0 0.0 0.6 0.0 69	Sv
at Delay (da), alvab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Mi
at Delay (ds), s/ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Control Delay (d) siven 0.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Mi
at Q (QS), ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1et Torm (01) vehille 0.0 1.3 0.0 0.0 0.0 0.0 0.0 2.4	To
at Cap (cs), ven/n	0	0	0	0	0	0	0	0		To
litial Q Clear Time (tc), n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		10
liddle Lane Group Data									Sid-rem Q (QS), Verian 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Ve
ssigned Mymt	0	2	0	4	0	6	0	8	- %ile Back of Q F20(0) (LB%) 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0.00 1.00 0	
ane Assignment		T				T			%ile Back of Q (30%), Ven/in 0.0 1.4 0.0 0.0 0.0 0.2 0.0 2.6	All
anes in Gro	0	2	0	0	0	. 1	0	0	%ile storage Ratio (RQ%) 0.00 0.20 0.00 0.00 0.00 0.00 1.32	
irp Vol (v), veh/h	0	1055	0	0	0	486	0	0	Initial Q (QD), ven 0.0	10
in Sat Flow (s) veh/h/ln	0	1770	0	0	0	1770	0	0	Finial (Kesidual) Q (Qe), ven U.U U.U U.U U.U U.U U.U U.U U.U U.U U.	Le
) Serve Time (q, s) s	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Delay (ds), siven 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Le
$(g_0), g_0$	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	sat Q (Qs), ven 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Ve
ane $Grn Can (c)$ veh/h	0.0	2628	0.0	0.0	0.0	1284	0.0	0.0	Sat Cap (cs), ven/n 0 0 0 0 0 0 0 0 0	Re
/C Ratio (X)	0.00	0.40	0 00	0.00	0.00	0.38	0.00	0.00	Initial Q Clear Time (tc), h 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Ac
x_{aii} (x_{aii}) x_{aii} (x_{aii}) x_{aii}	0.00	2628	0.00	0.00	0.00	128/	0.00	0.00	Intersection Summary	Ac
lostroom Filter (I)	0.00	1.00	0 00	0.00	0.00	0.70	0.00	0.00	HCM 2010 CHI Delay 7.9	v/c
policani riller (l)	0.00	1.00 E 0	0.00	0.00	0.00	0.79	0.00	0.00	HCM 2010 CIT Delay 7.0	Co
por Dolov (d2), shoch	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0		Qu
itial O Dalay (d2), s/ven	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0		То
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		LC
ontrol Delay (d), s/veh	0.0	5./	0.0	0.0	0.0	0.7	0.0	0.0		Ap
st-rerm Q (Q1), ven/in	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0		Ap

Existing PM

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

0.950 1770 0.950 1770

20.0%

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EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
٦	A		٦	- † †	1		4			र्भ	7
80	822	7	72	792	133	5	127	28	84	75	94
80	822	7	72	792	133	5	127	28	84	75	94
1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
165		0	250		145	0		0	0		50
1		0	1		1	0		0	0		1
80	0.05	0.05	0	0.05	4.00	25	4.00	1.00	25	1.00	4.00
1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.050	0.999		0.050		0.850		0.977			0.077	0.850
1770	2526	0	1770	2520	1500	0	1012	0	0	1020	1500
0.050	3550	0	0.050	3039	1505	0	0.059	0	0	0.571	1000
1770	3536	0	1770	3530	1583	0	1743	0	0	1064	1583
1110	0000	Yes	1110	0000	Yes	0	1740	Yes	0	1004	Yes
	1	100			134		9	100			102
	55			35	101		45			45	102
	2858			2499			2180			1010	
	35.4			48.7			33.0			15.3	
0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
96	913	8	206	843	148	20	190	43	112	125	152
96	921	0	206	843	148	0	253	0	0	237	152
Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
1	6		5	2			8			4	
			_		2	8			4		4
1	6		5	2	2	8	8		4	4	4
5.0	45.0		5.0	45.0	45.0	7.0	7.0		7.0	7.0	7.0
5.0	15.0		5.0	15.0	15.0	12.0	12.0		12.0	12.0	12.0
22.0	21.0		11.5	21.0	21.0	13.0	13.0		13.0	13.0	13.0
20.0%	50.0%		22.0	50.0%	50.0%	20 1%	20.1%		20.1%	20.1%	20.1%
16.0	49.2		15.5	49.2	49.2	25.1%	25.1%		25.170	25.170	25.1%
4.0	43.2		4.0	43.2	43.2	4.8	4.8		4.8	4.8	4.8
2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	2.0
0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
6.0	6.8		6.5	6.8	6.8		6.8			6.8	6.8
Lead	Lag		Lead	Lag	Lag						
	Ŭ			, in the second s	, in the second s						
3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
None	C-Min		None	C-Min	C-Min	None	None		None	None	None
11.3	49.7		15.0	56.5	56.5		25.2			25.2	25.2
0.10	0.45		0.14	0.51	0.51		0.23			0.23	0.23
0.53	0.58		0.85	0.46	0.17		0.62			0.98	0.34
56.8	24.2		69.0	22.8	7.7		44.5			95.2	15.5
0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
56.8	24.2		69.0	22.8	1.1		44.5			95.2	15.5
E	07.0		E	0	A		D			F	В
	21.3			28.9			44.5			04.1	
	U			U			U			E	

US 460 Corridor S	afety Stu Boulevar	udy d & Ki	nae Er	ork Rd						E	Existinę	g PM
<u></u>		-	>	A K KG	+	٠	1	†	1	4	ţ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	65	248		143	187	5		156			167	28
Queue Length 95th (ft)	105	314		64	361	95		169			160	37
Internal Link Dist (ft)		2778			2419			2100			930	
Turn Bay Length (ft)	165			250		145						50
Base Capacity (vph)	257	1599		249	1818	878		406			243	441
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	0.37	0.58		0.83	0.46	0.17		0.62			0.98	0.34
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110)											
Offset: 93 (85%), Reference	ed to phase	2:WBT ar	nd 6:EBT	, Start of (Green							
Natural Cycle: 65												
Control Type: Actuated-Co	ordinated											
Maximum v/c Ratio: 0.98												
Intersection Signal Delay: 3	34.5			In	tersectior	LOS: C						
Intersection Capacity Utiliza	ation 66.8%			IC	CU Level o	of Service	С					
Analysis Period (min) 15												

Splits and Phases: 3: US460/Pruden Boulevard & Kings Fork Rd

✓ Ø1	Ø2 (R)	₩ 04
22 s	56 s	32 s
Ø5	🚽 🛶 🛛 🖉 6 (R)	↑ Ø8
22 s	56 s	32 s

	≯	→	\mathbf{r}	4	+	×	1	1	1	1	¥	~
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	1	A1⊅		٦	† †	1		\$			र्स	7
Traffic Volume (veh/h)	80	822	7	72	792	133	5	127	28	84	75	94
Future Volume (veh/h)	80	822	7	72	792	133	5	127	28	84	75	94
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, veh	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	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	96	913	8	206	843	148	20	190	43	112	125	152
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	122	1639	14	235	1855	830	35	156	32	111	87	363
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
Prop Arrive On Green	0.07	0.46	0.46	0.13	0.52	0.52	0.23	0.23	0.23	0.23	0.23	0.23
Ln Grp Delay, s/veh	58.1	23.8	23.7	72.2	17.1	14.2	140.0	0.0	0.0	170.6	0.0	36.9
Ln Grp LOS	E	С	С	E	В	В	F			F		0
Approach Vol, veh/h		1017			1197			253			389	
Approach Delay, s/veh		27.0			26.2			140.0			118.4	
Approach LOS		С			С			F			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		7.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		13.5	64.5		32.0	21.1	56.9		32.0			
Change Period (Y+Rc), s		6.0	6.8		6.8	6.5	6.8		6.8			
Max Green (Gmax), s		16.0	49.2		25.2	15.5	49.2		25.2			
Max Allow Headway (MAH), s		3.6	4.8		4.8	3.8	4.8		4.8			
Max Q Clear (g_c+l1), s		7.9	18.4		27.2	14.5	22.4		27.2			
Green Ext Time (g_e), s		0.1	14.6		0.0	0.1	13.6		0.0			
Prob of Phs Call (p_c)		0.95	1.00		1.00	1.00	1.00		1.00			
Prob of Max Out (p_x)		0.01	0.32		1.00	1.00	0.38		1.00			
Left-Turn Movement Data		<u> </u>							<u> </u>			
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			276	1774			0			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		381		3595		680			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mumt Sat Flow, Joh/h			1583		1583		32		139			
www.satriow, ven/m												
Left Lane Group Data												
Left Lane Group Data Assigned Mvmt		1	0	0	7	5	0	0	3			

US 460 Corridor Safety Study

3: US460/Pruden Boulevard & Kings Fork Rd

Existing PM

Existing PM.syn

VHB

Synchro 9 Report Existing PM.syn

VHB

Appendix D

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	96	0	0	237	206	0	0	253	
Grp Sat Flow (s), veh/h/ln	1774	0	0	656	1774	0	0	819	
Q Serve Time (g_s), s	5.9	0.0	0.0	0.0	12.5	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	5.9	0.0	0.0	25.2	12.5	0.0	0.0	25.2	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1166	0	0	0	1120	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	607	0	0	0	0	
Perm LT Eff Green (q p), s	0.0	0.0	0.0	25.2	0.0	0.0	0.0	25.2	
Perm LT Serve Time (q u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Q Serve Time (g ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time to First Blk (g f), s	0.0	0.0	0.0	1.0	0.0	0.0	0.0	11.4	
Serve Time pre Blk (g fs), s	0.0	0.0	0.0	1.0	0.0	0.0	0.0	11.4	
Prop LT Inside Lane (P L)	1.00	0.00	0.00	0.47	1.00	0.00	0.00	0.08	
Lane Gro Cap (c), veh/h	122	0	0	199	235	0	0	223	
V/C Ratio (X)	0.79	0.00	0.00	1.19	0.88	0.00	0.00	1.14	
Avail Cap (c, a), veh/h	258	0	0	199	250	0	0	223	
Upstream Filter (I)	0.69	0.00	0.00	1.00	0.94	0.00	0.00	1.00	
Uniform Delay (d1) s/veh	50.4	0.0	0.0	44.8	46.8	0.0	0.0	38.6	
Incr Delay (d2) s/yeh	77	0.0	0.0	125.8	25.4	0.0	0.0	101.4	
Initial Q Delay (d3) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d) s/veh	58 1	0.0	0.0	170.6	72.2	0.0	0.0	140.0	
1st-Term O (O1) veh/ln	2.9	0.0	0.0	6.0	6.1	0.0	0.0	67	
2nd-Term $O(O2)$ veh/ln	0.3	0.0	0.0	6.9	17	0.0	0.0	6.3	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of O Factor (f. B%)	1 00	0.00	0.00	1 00	1 00	0.00	0.00	1 00	
%ile Back of Q (50%), veh/ln	3.1	0.0	0.0	13.0	7.8	0.00	0.00	13.0	
%ile Storage Batio (BO%)	0.48	0.00	0.00	0.35	0.79	0.00	0.00	0.16	
Initial Q (Qb) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe) veh	0.0	0.0	0.0	9.6	0.0	0.0	0.0	7.5	
Sat Delay (ds) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat O (Os) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Initial O Clear Time (tc) h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	
	0.0	5.0	5.0	3.0	5.0	5.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	8	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	843	0	0	0	449	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	16.4	0.0	0.0	0.0	20.4	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	16.4	0.0	0.0	0.0	20.4	0.0	0.0	
Lane Grp Cap (c), veh/h	0	1855	0	0	0	807	0	0	
V/C Ratio (X)	0.00	0.45	0.00	0.00	0.00	0.56	0.00	0.00	
Avail Cap (c_a), veh/h	0	1855	0	0	0	807	0	0	
Upstream Filter (I)	0.00	0.94	0.00	0.00	0.00	0.69	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	16.3	0.0	0.0	0.0	21.8	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.0	0.0	1.9	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	17.1	0.0	0.0	0.0	23.8	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	8.0	0.0	0.0	0.0	9.9	0.0	0.0	

Synchro 9 Report

Existing PM.syn

Existing PM

: US460/Pruden Boulev	/ard & Ki	ngs Fo	ork Rd						
	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	
d-Term Ω (Q2), veh/in	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.0	
Back of O Factor (f. B%)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	1.00	
Back of $O(50\%)$ veh/ln	0.00	8.2	0.00	0.0	0.00	10.3	0.00	0.0	
Storage Batio (BO%)	0.0	0.2	0.0	0.00	0.0	0.09	0.0	0.0	
Q (Qh) veh	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(Residual) Q (Qe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
elav (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
p (cs), veh/h	0	0	0	0	0	0	0	0	
Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ane Group Data									
ned Mvmt	0	12	0	14	0	16	0	18	
Assignment		R		R		T+R			
in Grp	0	1	0	1	0	1	0	0	
ol (v), veh/h	0	148	0	152	0	472	0	0	
at Flow (s), veh/h/ln	0	1583	0	1583	0	1857	0	0	
e Time (g_s), s	0.0	5.4	0.0	9.0	0.0	20.4	0.0	0.0	
Q Clear Time (g_c), s	0.0	5.4	0.0	9.0	0.0	20.4	0.0	0.0	
Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
T Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.02	0.00	0.17	
irp Cap (c), veh/h	0	830	0	363	0	846	0	0	
atio (X)	0.00	0.18	0.00	0.42	0.00	0.56	0.00	0.00	
ap (c_a), veh/h	0	830	0	363	0	846	0	0	
am Filter (I)	0.00	0.94	0.00	1.00	0.00	0.69	0.00	0.00	
ı Delay (d1), s/veh	0.0	13.7	0.0	36.2	0.0	21.8	0.0	0.0	
elay (d2), s/veh	0.0	0.4	0.0	0.8	0.0	1.8	0.0	0.0	
≀Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Delay (d), s/veh	0.0	14.2	0.0	36.9	0.0	23.7	0.0	0.0	
m Q (Q1), veh/ln	0.0	2.3	0.0	3.9	0.0	10.3	0.0	0.0	
rm Q (Q2), veh/ln	0.0	0.1	0.0	0.1	0.0	0.4	0.0	0.0	
n Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ack of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
ack of Q (50%), veh/In	0.0	2.4	0.0	4.0	0.0	10.8	0.0	0.0	
orage Ratio (RQ%)	0.00	0.43	0.00	2.03	0.00	0.10	0.00	0.00	
Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
esidual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Js), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ap (cs), ven/n	0	0	0	U	0	0	0	0	
u Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ction Summary		40.4							
U10 Ctrl Delay		49.1							
TIULUS		D							

EBT * * * 20 820 820 1900 0.95 0.991 3507 3507 10 55	EBR 40 40 1900 0 0 0.95 0 0	WBL 177 177 1900 200 1 150 1.00 0.950 0.777	★ WBT ↑↑ 798 798 1900 0.95	WBR 7 92 92 1900 110 1 1 00	NBL 89 89 1900 0 0	NBT NBT 34 34 34 1900	NBR 10 10 1900 0	SBL 62 62 1900	↓ SBT \$ 56 56 56 1000	SBR
EBT \$20 \$20 1900 0.95 0.991 3507 3507 10 55	EBR 40 40 1900 0 0 0.95 0	WBL 17 1900 200 1 150 1.00	WBT * 798 798 1900 0.95	WBR 92 92 1900 110 1	NBL 89 1900 0 0	NBT	NBR 10 10 1900 0	SBL 62 62 1900	SBT 56 56	SBR
 ♣1→ 820 820 1900 0.95 0.991 3507 3507 10 	40 40 1900 0 0 0.95	17 17 1900 200 1 150 1.00 0.950	↑↑ 798 798 1900	7 92 92 1900 110 1	89 89 1900 0 0	4 34 34 1900	10 10 1900 0	62 62 1900	56 56	7
820 820 1900 0.95 0.991 3507 3507	40 40 1900 0 0 0.95 0	17 17 1900 200 1 150 1.00 0.950	798 798 1900	92 92 1900 110 1	89 89 1900 0 0	34 34 1900	10 10 1900 0	62 62 1900	56 56	7
820 1900 0.95 0.991 3507 3507	40 1900 0 0 0.95	17 1900 200 1 150 1.00	798 1900 0.95	92 1900 110 1	89 1900 0 25	34 1900	10 1900 0	62 1900	56	
1900 0.95 0.991 3507 3507	1900 0 0.95 0	1900 200 1 150 1.00	1900 0.95	1900 110 1	1900 0 0	1900	1900 0	1900	4000	7
0.95 0.991 3507 3507 10	0 0 0.95 0	200 1 150 1.00 0.950	0.95	110 1	0		0	^	1900	1900
0.95 0.991 3507 3507 10	0 0.95 0	1 150 1.00 0.950	0.95	1	0 25			U		0
0.95 0.991 3507 3507 10	0.95	150 1.00 0.950	0.95	1.00	25		0	0		0
0.95 0.991 3507 3507 10	0.95	1.00 0.950	0.95	1.00	20			25		
0.991 3507 3507 10	0	0.950		1.00	1.00	1.00	1.00	1.00	1.00	1.00
3507 3507 10	0	0.950		0.850		0.984			0.985	
3507 3507 10	0	4770				0.970			0.980	
3507 10	0	1//0	3539	1583	0	1778	0	0	1798	0
3507 10	0	0.950			-	0 718			0.807	
10		1770	3539	1583	0	1316	0	0	1481	0
10	Yes			Yes	Ű		Yes	Ű		Yes
55	100			129		5	100		5	100
55			55	125		45			45	
471			2858			1031			2337	
58			2000			20.3			35.4	
0.02	0.67	0.33	0.80	0.50	0.75	0.60	0.46	0.82	0.60	0.33
0.92	60	0.00	0.03	156	110	0.09	0.40	0.02	0.00	0.00
091	00	52	097	100	119	49	22	70	93	21
051	٥	50	007	150	٥	100	٥	٥	100	0
901	U	Dref	097	Derm	Derm	190	U	Derm	190	0
NA C		PIOL	NA 0	Perm	Perm	NA		Perm	NA 4	
0		Э	2	2	Q	0		4	4	
6		5	2	2	0	0		4	4	
0		Э	2	2	0	0		4	4	
15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	
15.0		5.0	15.0	15.0	12.2	12.2		12.0	12.0	
21.0		11.0	21.0	21.0	13.3	13.3		13.0	13.0	
67.0		10.0	67.0	67.0	27.0	27.0		27.0	27.0	
0.9%		14.5%	60.9%	60.9%	24.5%	24.5%		24.5%	24.5%	
60.2		9.2	60.2	60.2	20.7	20.7		20.2	20.2	
4.8		4.8	4.8	4.8	4.8	4.8		4.8	4.8	
2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0	
0.0		0.0	0.0	0.0		0.0			0.0	
6.8		6.8	6.8	6.8		6.3			6.8	
Lag		Lead	Lag	Lag						
3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
3.5		0.2	3.5	3.5	0.2	0.2		0.2	0.2	
20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Min		None	Min	Min	None	None		None	None	
26.9		7.8	32.3	32.3		17.5			16.9	
0.41		0.12	0.49	0.49		0.26			0.25	
0.67		0.25	0.52	0.19		0.54			0.50	
19.9		36.2	13.3	4.1		31.2			29.7	
0.0		0.0	0.0	0.0		0.0			0.0	
19.9		36.2	13.3	4.1		31.2			20.7	
	6 15.0 21.8 67.0 0.9% 60.2 4.8 2.0 0.0 6.8 Lag 3.0 3.5 20.0 20.0 Win 26.9 0.41 0.67 19.9 0.0 19.9	6 15.0 21.8 67.0 0.9% 60.2 4.8 2.0 0.0 6.8 Lag 3.0 3.5 20.0 20.0 20.0 20.0 Min 26.9 0.41 0.67 19.9 0.0 19.9	6 5 15.0 5.0 21.8 11.8 67.0 16.0 0.9% 14.5% 60.2 9.2 4.8 4.8 2.0 2.0 0.0 0.0 6.8 6.8 Lag Lead 3.0 3.0 20.0 0.0 0.0 0.0 20.0 0.0 26.9 7.8 0.41 0.12 0.67 0.25 19.9 36.2 0.0 0.0 19.9 36.2	6 5 2 6 5 2 15.0 5.0 15.0 21.8 11.8 21.8 67.0 16.0 67.0 0.9% 14.5% 60.9% 60.2 9.2 60.2 2.0 2.0 2.0 0.0 0.0 0.0 0.8 6.8 6.8 Lag Lead Lag 3.0 3.0 3.0 3.5 0.2 3.5 2.0 0.0 0.0 2.0 2.0 2.0 0.0 0.0 2.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 20.0 0.0 20.0 20.0 0.0 20.0 20.0 0.0 20.0 26.9 7.8 32.3 0.41 0.12 0.49 0.67 0.25	6 5 2 2 6 5 2 2 15.0 5.0 15.0 15.0 21.8 11.8 21.8 21.8 67.0 16.0 67.0 67.0 0.9% 14.5% 60.9% 60.9% 60.2 9.2 60.2 60.2 2.0 2.0 2.0 2.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6.8 6.8 6.8 6.8 6.8 Lag Lead Lag Lag Lag 3.0 3.0 3.0 3.0 3.0 3.5 0.2 3.5 3.5 20.0 20.0 20.0 2.0 0.0 2.0 20.0 20.0 20.0 20.0 2.0 0.0 2.0 2.0 20.0 20.0 20.0 20.0 20.0 20.0 20.0	2 8 6 5 2 2 8 15.0 5.0 15.0 15.0 7.0 21.8 11.8 21.8 21.8 13.3 67.0 16.0 67.0 27.0 0.9% 14.5% 60.9% 60.9% 24.5% 60.2 9.2 60.2 60.2 20.7 4.8 4.8 4.8 4.8 4.8 2.0 2.0 2.0 1.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 6.8 6.8 6.8 6.8 1.5 0.2 3.0 3.0 3.0 3.0 3.0 3.0 3.5 0.2 3.5 3.5 0.2 20.0 0.0 20.0 0.0 20.0 20.0 0.0 20.0 0.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	2 2 8 6 5 2 2 8 8 15.0 5.0 15.0 15.0 7.0 7.0 21.8 11.8 21.8 21.8 13.3 13.3 67.0 16.0 67.0 67.0 27.0 27.0 0.9% 14.5% 60.9% 60.9% 24.5% 24.5% 60.2 9.2 60.2 60.2 20.7 20.7 4.8 4.8 4.8 4.8 4.8 4.8 2.0 2.0 2.0 1.5 1.5 0.0 0.0 0.0 0.0 0.0 6.8 6.8 6.8 6.3 1.4 1.ag Lead Lag Lag 2.0 2.0 20.0 0.0 20.0 2.0 0.0 0.0 3.5 0.2 3.5 3.5 0.2 0.2 20.0 0.0 20.0 0.0 0.0	15.0 15.0 15.0 15.0 15.0 7.0 7.0 21.8 11.8 21.8 21.8 13.3 13.3 67.0 7.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 20.7 20.7 4.8 2.0 2.0 2.0 1.5 1.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 2.2 2.0 2.0 2.0 2.0 2.0 2.0 2.0	2 8 4 6 5 2 2 8 8 4 15.0 5.0 15.0 15.0 7.0 7.0 7.0 21.8 11.8 21.8 21.8 13.3 13.3 13.8 67.0 16.0 67.0 27.0 27.0 27.0 0.9% 14.5% 60.9% 24.5% 24.5% 24.5% 60.2 9.2 60.2 60.2 20.7 20.7 20.2 4.8 4.8 4.8 4.8 4.8 4.8 4.8 4.8 2.0 2.0 2.0 1.5 1.5 2.0 0.0	2 8 4 6 5 2 2 8 8 4 6 5 2 2 8 8 4 4 15.0 5.0 15.0 15.0 7.0 7.0 7.0 7.0 21.8 11.8 21.8 21.8 13.3 13.3 13.8 13.8 67.0 16.0 67.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 22.0 20.2 4.8 4.

US 460 Corridor Safety Study 4: Providence Road/Lake Princ

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l ane Group	FBI	FBT	FBR	WBI	WBT	WBR	NBI	NBT	NBR	SBI	SBT	SBR
LOS	D	B		D	B	A		C			C	0.5.1
Approach Delay		20.1			13.1			31.2			29.7	
Approach LOS		С			В			С			С	
Queue Length 50th (ft)	6	190		23	114	5		73			73	
Queue Length 95th (ft)	14	271		22	239	13		114			95	
Internal Link Dist (ft)		391			2778			1851			2257	
Turn Bay Length (ft)	220			200		110						
Base Capacity (vph)	269	2987		269	3013	1367		454			498	
Starvation Cap Reductn	0	0		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	0.05	0.32		0.19	0.30	0.11		0.42			0.38	

Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Leng	gth: 66.3		
Natural Cycle: 60	-		
Control Type: Actua	ted-Uncoordinated		
Maximum v/c Ratio:	0.67		
Intersection Signal I	Delay: 18.6	Intersection LOS: B	
Intersection Capacit	y Utilization 45.3%	ICU Level of Service A	
Analysis Period (mir	n) 15		

Splits and Pr	nases:	 Providence Ro
		4 [▲] Ø2
16 s		67 s
√ ø5		→ Ø6
16 s		67 s

Synchro 9 Report Existing PM.syn

eport Existing PM.syn

VHB

D-16 | ROUTE 460 SAFETY AND OPERATIONS STUDY

VHB

Existing PM

,			
Prince	Drive &	US460/Pruden Boulevard	

e Road/Lake Prince Drive & US460/Pruden Boulevard

	27 s
	1 Ø8
	27 s

US 460 Corridor Safety Study	Existing PM
4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard	-

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۳.	↑ ĵ≽		<u>۲</u>	- † †	1		4			4	
Traffic Volume (veh/h)	7	820	40	17	798	92	89	34	10	62	56	7
Future Volume (veh/h)	7	820	40	17	798	92	89	34	10	62	56	7
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	14	891	60	52	897	156	119	49	22	76	93	21
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	30	1591	107	82	1776	795	234	80	30	170	163	32
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
Prop Arrive On Green	0.02	0.47	0.47	0.05	0.50	0.50	0.17	0.17	0.17	0.17	0.17	0.17
Ln Grp Delay, s/veh	42.7	13.1	13.1	38.7	11.2	9.2	27.3	0.0	0.0	26.6	0.0	0.0
Ln Grp LOS	D	В	В	D	В	А	С			С		
Approach Vol, veh/h		965			1105			190			190	
Approach Delay, s/veh		13.5			12.2			27.3			26.6	
Approach LOS		В			В			С			С	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		8.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		7.9	40.1		18.3	9.9	38.1		18.3			
Change Period (Y+Rc), s		6.8	6.8		6.8	6.8	6.8		* 6.8			
Max Green (Gmax), s		9.2	60.2		20.2	9.2	60.2		* 21			
Max Allow Headway (MAH), s		3.6	4.7		5.1	3.6	4.7		5.1			
Max Q Clear (g_c+l1), s		2.5	13.2		8.8	3.9	14.6		10.0			
Green Ext Time (g_e), s		0.0	16.9		1.5	0.0	16.7		1.5			
Prob of Phs Call (p_c)		0.23	1.00		1.00	0.62	1.00		1.00			
Prob of Max Out (p_x)		0.00	0.15		0.11	0.10	0.16		0.14			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			542	1774			841			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		942		3366		460			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		184		227		170			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Prot)			L+T+R	(Prot)			L+T+R			

Lanes in Grp Grp Vol (v), veh/h 0 1 1 1 0 0 190 52 190 14 0 0 0 Grp Sat Flow (s), veh/h/ln 0 1668 1774 1472 1774 0 0 0 0.5 0.0 0.0 0.0 1.9 0.0 0.0 1.2 Q Serve Time (g_s), s 0.0 Cycle Q Clear Time (g_c), s 0.5 0.0 6.8 1.9 0.0 0.0 8.0 Perm LT Sat Flow (s_l), veh/h/In 0 1350 0 1299 Shared LT Sat Flow (s_sh), veh/h/ln 1670 0 0 0 0 1463 Perm LT Eff Green (g_p), s 0.0 0.0 0.0 11.5 0.0 0.0 0.0 11.5 Perm LT Serve Time (g_u), s 0.0 0.0 0.0 3.5 0.0 0.0 0.0 4.6 Perm LT Q Serve Time (g_ps), s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.2 Time to First Blk (g_f), s 0.0 0.0 2.0 0.0 0.0 0.0 0.0 0.8 Serve Time pre Blk (g_fs), s 0.0 0.0 0.0 2.0 0.0 0.0 0.0 0.8 Prop LT Inside Lane (P_L) 1.00 0.00 0.00 0.40 1.00 0.00 0.00 0.63 Lane Grp Cap (c), veh/h 30 0 0 365 82 0 0 343 V/C Ratio (X) 0.46 0.00 0.00 0.52 0.63 0.00 0.00 0.55 Avail Cap (c_a), veh/h 246 0 0 572 246 0 0 541 1.00 1.00 0.00 0.00 1.00 0.00 0.00 Upstream Filter (I) 1.00 Uniform Delay (d1), s/veh 32.3 0.0 0.0 25.4 31.0 0.0 0.0 25.9 Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh 10.50.00.01.27.70.00.00.00.00.0 0.0 0.0 14 0.0 0.0 0.0 Control Delay (d), s/veh 42.7 0.0 0.0 26.6 38.7 0.0 0.0 27.3 1st-Term Q (Q1), veh/In 0.3 0.0 0.0 3.2 0.9 0.0 0.0 3.3 2nd-Term Q (Q2), veh/In 0.1 0.0 0.0 0.1 0.2 0.0 0.0 0.1 3rd-Term Q (Q3), veh/In 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 %ile Back of Q Factor (f_B%) 1.00 0.00 0.00 1.00 1.00 0.00 0.00 1.00 %ile Back of Q (50%), veh/In 0.3 0.0 0.0 3.3 1.1 0.0 0.0 3.4 0.00 0.04 0.14 0.00 %ile Storage Ratio (RQ%) 0.04 0.00 0.00 0.05 Initial Q (Qb), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Final (Residual) Q (Qe), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

US 460 Corridor Safety Study

Sat Delay (ds), s/veh

VHB

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

Sat Q (Qs), veh 0.0 0.0 0.0 0.0 Sat Cap (cs), veh/h 0 0 0 0 0 0 0 0 0.0 0.0 0.0 0.0 0.0 Initial Q Clear Time (tc), h 0.0 0.0 0.0 Middle Lane Group Data Assigned Mvmt 0 2 0 4 0 6 0 8 Lane Assignment Lanes in Grp 0 2 0 0 0 0 Grp Vol (v), veh/h 0 897 468 0 0 0 0 0 Grp Sat Flow (s), veh/h/ln 1770 0 1770 0 0 Q Serve Time (g_s), s 0.0 11.2 0.0 0.0 0.0 12.6 0.0 0.0 Cycle Q Clear Time (g_c), s 11.2 0.0 12.6 0.0 0.0 0.0 0.0 0.0 0 1776 Lane Grp Cap (c), veh/h 0 0 0 836 0 0 0.00 0.00 0.00 0.56 V/C Ratio (X) 0.00 0.50 0.00 0.00 0 3215 Avail Cap (c_a), veh/h 0 0 0 1607 0 0 0.00 0.00 0.00 0.00 0.00 Upstream Filter (I) 0.00 1.00 1 00 Uniform Delay (d1), s/veh 0.0 11.0 0.0 0.0 0.0 12.5 0.0 0.0 Incr Delay (d2), s/veh 0.0 0.2 0.0 0.0 0.0 0.6 0.0 0.0 Initial Q Delay (d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 0.0 11.2 0.0 0.0 0.0 13.1 0.0 0.0 1st-Term Q (Q1), veh/In 0.0 5.4 0.0 0.0 0.0 6.1 0.0 0.0

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VHB

Synchro 9 Report Existing PM.syn Synchro 9 Report Existing PM.syn

Existing PM

%ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h

Notes

VHB

Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS

Appendix D

US 460 Corridor Safety Study

2nd-Term Q (Q2), veh/In

3rd-Term Q (Q3), veh/In

%ile Back of Q Factor (f B%)

%ile Back of Q (50%), veh/In

Final (Residual) Q (Qe), veh

Sat Delay (ds), s/veh

Sat Cap (cs), veh/h

Initial Q Clear Time (tc), h

Right Lane Group Data

Grp Sat Flow (s), veh/h/ln

Q Serve Time (g_s), s

Sat Q (Qs), veh

Assigned Mvmt

Lanes in Grp

Lane Assignment

Grp Vol (v), veh/h

%ile Storage Ratio (RQ%) Initial Q (Qb), veh

4: Providence Road/Lake Prince Drive & US46	60/Pruden Boulevard

0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
0.0	5.4	0.0	0.0	0.0	6.3	0.0	0.0	
0.00	0.05	0.00	0.00	0.00	0.41	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	0	0	0	0	0	0	0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	10	0	14	0	10	0	10	
U	IZ P	U	14	U	10 T+D	U	10	
0	- К 1	0	0	0	1+1	0	0	
0	156	0	0	0	102	0	0	
0	150	0	0	0	400	0	0	
0.0	3.6	0	0.0	0.0	1023	0.0	0.0	
0.0	3.0	0.0	0.0	0.0	12.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	0.11	0.00	0.12	0.00	0.12	
0 00	795	0	0	0	861	0	0	
0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	
0 00	1430	0 00	0 00	0 00	1 00	0 00	0 00	
0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
0.0	9.1	0.0	0.0	0.0	12.5	0.0	0.0	
0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	9.2	0.0	0.0	0.0	13.1	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	
0.0	1.00	0.0	1.00	0.0	1.00	0.0	1.00	
0.00	1.00	0.00	0.0	0.00	6.4	0.00	0.0	
0.0	0.37	0.0	0.0	0.0	0.4	0.0	0.0	
0.00	0.57	0.00	0.00	0.00	0.42	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

15.0 В

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

0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Synchro 9 Report Existing PM.syn

Existing PM

US 460 Corridor Saf 5: Woodlawn Dr & U	ety Stu S460/I	ıdy Pruder	n Boule	evard			Existing PM
	+	*	4	+	•	*	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	۴Þ			<u></u>		1	
Traffic Volume (vph)	864	1	0	897	0	2	
Future Volume (vph)	864	1	0	897	0	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt						0.865	
Flt Protected							
Satd. Flow (prot)	3539	0	0	3539	0	1611	
Flt Permitted							
Satd. Flow (perm)	3539	0	0	3539	0	1611	
Link Speed (mph)	55			55	25		
Link Distance (ft)	1965			471	1166		
Travel Time (s)	24.4			5.8	31.8		
Peak Hour Factor	0.96	0.92	0.92	0.95	0.25	0.25	
Adj. Flow (vph)	900	1	0	944	0	8	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	901	0	0	944	0	8	
Sign Control	Free			Free	Stop		
Intersection Summary							
Area Type: Of	ther						
Control Type: Unsignalized							
Intersection Capacity Utilization	on 33.9%			IC	U Level	of Service A	N Contraction of the second
Analysis Period (min) 15							

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard

Intersection Int Delay, s/veh 0.1 Movement EBT EBR WBL WBT NBL NBF Lane Configurations **≜**î∌ 11 Traffic Vol, veh/h 864 1 0 897 0 2 864 1 0 897 Future Vol, veh/h 0 2 Conflicting Peds, #/hr 0 0 0 0 0 0 Sign Control Free Free Free Free Stop Stop
 AT Channelized
 None
 None
 None

 Storage Length
 0

 Veh in Median Storage, #
 0
 0
 0
 Grade, % 0 -0 0
 Peak Hour Factor
 96
 92
 92
 95
 25
 25

 Heavy Vehicles, %
 2
 2
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 Major/Minor Major1 Major2 Minor1
 Conflicting Flow All
 0
 0
 451

 Stage 1
 451
 - - - - 6.94 Stage 2 Critical Hdwy Follow-up Hdwy - - - - - - - - - - - - - - 3.32 Pot Cap-1 Maneuver - - 0 - 0 556 - - 0 - 0 -- - 0 - 0 -Stage 1 Stage 2 Platoon blocked, % - --Mov Cap-1 Maneuver - - - - - - 556 Mov Cap-2 Maneuver - - - - - - -Stage 1 - - - - -Stage 2 EB WB NB Approach HCM Control Delay, s 0 0 11.6 HCM LOS В Minor Lane/Major Mvmt NBLn1 EBT EBR WBT Capacity (veh/h) 556 - - -HCM Lane V/C Ratio 0.014 --HCM Control Delay (s) 11.6 - - -
 HCM Lane LOS
 B

 HCM 95th %tile Q(veh)
 0

US 460 Corridor Safety Study

Existing PM

	الحر	-	\mathbf{i}	1	+	•	1	1	1	1	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			1	٦	≜ †₽			र्भ	1		4	
Traffic Volume (vph)	1	466	39	55	821	3	19	2	38	0	0	3
Future Volume (vph)	1	466	39	55	821	3	19	2	38	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		340	400		0	0		300	0		0
Storage Lanes	0		1	1		0	0		1	0		0
Taper Length (ft)	25			125			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850		0.865	
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	3539	1583	1770	3539	0	0	1786	1583	0	1611	0
Flt Permitted				0.950				0.959				
Satd. Flow (perm)	0	3539	1583	1770	3539	0	0	1786	1583	0	1611	0
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		3402			5235			2230			2290	
Travel Time (s)		42.2			64.9			33.8			34.7	
Peak Hour Factor	0.38	0.89	0.80	0.68	0.90	0.92	0.41	0.25	0.34	0.25	0.92	0.25
Adj. Flow (vph)	3	524	49	81	912	3	46	8	112	0	0	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	527	49	81	915	0	0	54	112	0	12	0
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalize	d											

Intersection Capacity Utilization 53.5% Analysis Period (min) 15

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VHB

Synchro 9 Report Existing PM.syn

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Existing PM

6: Old Suffolk Rd & US 460/Windsor Boulevard

ICU Level of Service A

US 460 Corridor Safety Study Existing PM <u>6</u>: Old Suffolk Rd & US 460/Windsor Boulevard

Intersection													
Int Delay, s/veh	2.7												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		- 11	1	٦	^			- 4	1		4		
Traffic Vol, veh/h	1	466	39	55	821	3	19	2	38	0	0	3	
Future Vol, veh/h	1	466	39	55	821	3	19	2	38	0	0	3	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	340	400	-	-	-	-	300	-	-	-	
Veh in Median Storage,	# -	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	38	89	80	68	90	92	41	25	34	25	92	25	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	3	524	49	81	912	3	46	8	112	0	0	12	

Major/Minor	Major1		Ν	Major2		1	Minor1			Minor2			
Conflicting Flow All	915	0	0	524	0	0	1147	1606	262	1347	1605	458	
Stage 1	-	-	-	-	-	-	529	529	-	1076	1076	-	
Stage 2	-	-	-	-	-	-	618	1077	-	271	529	-	
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-	
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32	
Pot Cap-1 Maneuver	741	-	-	1039	-	-	154	104	737	110	104	550	
Stage 1	-	-	-	-	-	-	501	525	-	234	294	-	
Stage 2	-	-	-	-	-	-	443	293	-	712	525	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	741	-	-	1039	-	-	141	95	737	82	95	550	
Mov Cap-2 Maneuver	-	-	-	-	-	-	141	95	-	82	95	-	
Stage 1	-	-	-	-	-	-	498	522	-	233	271	-	
Stage 2	-	-	-	-	-	-	400	270	-	591	522	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	0			0.7			23.7			11.7			
HCM LOS							С			В			
Minor Lane/Major Mvm	nt	NBLn1 N	BLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)		132	737	741	-	-	1039	-	-	550			

and Lanor Hajor minit		1000110							002	
Capacity (veh/h)	132	737	741	-	-	1039	-	-	550	
HCM Lane V/C Ratio	0.412	0.152	0.004	-	-	0.078	-	-	0.022	
HCM Control Delay (s)	50.2	10.8	9.9	-	-	8.8	-	-	11.7	
HCM Lane LOS	F	В	Α	-	-	Α	-	-	В	
HCM 95th %tile Q(veh)	18	0.5	0	-	-	0.3	-	-	01	

VHB

Synchro 9 Report Existing PM.syn

ι	US 460 Corridor Safety Study
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7: Dominion Way & US 460/Windsor Boulevard

		\mathbf{r}	4	-	1	1
Lane Group	FRT	FRD	W/RI	W/RT	NRI	NRD
Lane Configurations			WDL		NDL	
	TT	ŗ	Ĵ	TT	10	17
Tranic Volume (vpn)	516	2	1	845	16	15
Future Volume (vpn)	516	2	1	845	16	15
Ideal Flow (vphpi)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		200	330		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			200		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	1770	3539	1770	1583
Flt Permitted			0.436		0.950	
Satd, Flow (perm)	3539	1583	812	3539	1770	1583
Right Turn on Red		Yes	0.2			Yes
Satd Flow (RTOR)		/				3/1
Link Speed (mph)	55	4		55	25	54
Link Opeeu (Inph)	200			3402	1005	
	109			3402	1200	
Traver Time (s)	8.8	0.55	0.54	42.2	32.9	0.11
Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44
Adj. Flow (vph)	573	4	2	960	32	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	573	4	2	960	32	34
Turn Type	NA	Perm	D.P+P	NA	Prot	Prot
Protected Phases	2		1	6	4	4
Permitted Phases		2	2			
Detector Phase	2	2	1	6	4	4
Switch Phase	_	_		-		
Minimum Initial (c)	15.0	15.0	70	15.0	5.0	5.0
Minimum Split (s)	21.5	21.5	16.0	21.5	11.5	11.5
Total Split (a)	47.0	47.0	21.0	21.5	26.0	26.0
	47.0	47.0	21.0	70.00/	20.0	20.0
Total Split (%)	50.0%	00.0%	22.3%	12.3%	21.1%	21.1%
Maximum Green (s)	40.5	40.5	12.0	61.5	20.0	20.0
Yellow Time (s)	5.5	5.5	5.0	5.5	3.0	3.0
All-Red Time (s)	1.0	1.0	4.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	9.0	6.5	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	. 3	. 5				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gan (s)	3.5	3.5	0.2	3.5	0.2	0.0
Time Refore Reduce (c)	25.0	25.0	0.2	25.0	0.2	0.2
Time To Poduce (s)	20.0	20.0	0.0	20.0	0.0	0.0
Time TO Reduce (S)	0.0	0.0	U.U	C Min	U.U	U.U
Recall Mode	C-IVIIN	C-IVIIN	INONE	C-IVIIN	NONE	INONE
Act Effect Green (s)	/4.7	/4.7	/2.3	//.9	1.2	1.2
Actuated g/C Ratio	0.79	0.79	0.77	0.83	0.08	0.08
v/c Ratio	0.20	0.00	0.00	0.33	0.24	0.22
Control Delay	4.2	4.0	3.0	3.0	44.4	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.2	4.0	3.0	3.0	44.4	17.4

VHB

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Lane Group LOS

Existing PM

Approach Delay Approach LOS Queue Length 50th (ft) Queue Length 95th (ft) Internal Link Dist (ft) Turn Bay Length (ft) Base Capacity (ph) Starvation Cap Reducth Spillback Cap Reducth Storage Cap Reducth Reduced v/c Ratio

Intersection Summary

Area Type: Cycle Length: 94 Actuated Cycle Length Offset: 0 (0%), Refere Natural Cycle: 50 Control Type: Actuater Maximum v/c Ratio: 0. Intersection Signal De Intersection Capacity I Analysis Period (min)

Splits and Phases:

🕈 Ø1	
21 s	
+	
Ø6 (R)	
68 s	

Appendix D

Existing PM

/ay &	ay & US 460/Windsor Boulevard													
	→	\mathbf{F}	4	ł	≺	1								
	EBT	EBR	WBL	WBT	NBL	NBR								
	А	А	А	А	D	В								
	4.2			3.0	30.5									
	А			А	С									
t)	34	0	0	65	18	0								
t)	108	2	1	95	25	4								
	629			3322	1125									
		200	330											
	2811	1258	755	2931	376	363								
ctn	0	0	0	0	0	0								
tn	0	0	0	0	0	0								
1	0	0	0	0	0	0								
	0.20	0.00	0.00	0.33	0.09	0.09								
/														
(Other													
h: 94														
enced t	o phase 2:E	EBWB and	d 6:WBT,	Start of C	Green									
ed-Cool	rdinated													
.33														
elay: 4.	6			Int	tersection	LOS: A								
Utilizat	ion 37.9%			IC	U Level o	f Service A								
15														
7: Don	ninion Way	& US 460)/Windsor	Bouleva	rd									
	- 6 02	2 (R)						Ø4						
	47 s							26 s						

1: Dominion vvay & C	15 460	vvind	ISOF BC	ouleva	ra					 7: Dominion way & US 460/windsor Boulevard									
		~		+	•	*				 Lanes in Grp	1	0	0	1	0	0	0	0	
	-	•	Ŧ		7	r				Grp Vol (v), veh/h	2	0	0	32	0	0	0	0	
Vovement	FBT	FBR	WBI	WBT	NBI	NBR				Grp Sat Flow (s), veh/h/ln	1774	0	0	1774	0	0	0	0	
ane Configurations	**	1	*	**	K	1				Q Serve Time (q s), s	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	
Ine Configurations	516	2	1	845	16	15				Cycle Q Clear Time (g c), s	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	
Future Volume (veh/h)	516	2	1	845	16	15				Perm LT Sat Flow (s_l), veh/h/ln	833	0	0	1774	0	0	0	0	
	210	12	1	6	7	1/				Shared I T Sat Flow (s, sh) veh/h/in	0	0	0	0	0	0	0	0	
nitial O yeb	2	0	0	0	0	0				Perm I T Eff Green (g, n) s	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Dod Piko Adi (AliphT)	0	1 00	1.00	0	1 00	1.00				Perm LT Serve Time (q, μ) s	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Parking Rus Adi	1.00	1.00	1.00	1.00	1.00	1.00				Perm LT \cap Serve Time (q_ns) s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
di Sat Elow, voh/h/lp	1963	1863	1863	1863	1963	1963				Time to First Blk (g_f) s	0.0	68.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj Sat Flow, Ven/h/h	572	1003	1003	060	20	24				Serve Time pre Blk (q fs) s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj No. of Longo	5/3	4	2	900	32	34				Pron I T Inside I ane (P I)	1 00	0.0	0.0	1 00	0.0	0.0	0.0	0.0	
Adj No. of Lanes	2	0.55	0.54	2 0 00	0.50	0.44					640	0.00	0.00	70	0.00	0.00	0.00	0.00	
	0.90	0.55	0.04	0.00	0.50	0.44				V/C Potio (X)	042	0 00	0 00	0 / 1	0.00	0 00	0.00	0.00	
Percent Heavy Ven, %	2	2	Z	2	Z	2				V/C Ralio (X)	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	
Opposing Right Turn Influence	0500	4440	Yes	0044	Yes	00				Avail Cap (C_a), ven/m	1.00	0 00	0 00	3//	0 00	0 00	0 00	0 00	
Jap, ven/n	2562	1140	642	2914	/8	69				Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				Uniform Delay (d1), s/ven	3.2	0.0	0.0	43.8	0.0	0.0	0.0	0.0	
Prop Arrive On Green	0.72	0.72	0.00	0.82	0.04	0.04				Incr Delay (d2), s/ven	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	
In Grp Delay, s/veh	4.5	3.6	3.2	2.3	47.3	49.2				 Initial Q Delay (d3), s/ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
n Grp LOS	A	A	A	A	D	D				Control Delay (d), s/veh	3.2	0.0	0.0	47.3	0.0	0.0	0.0	0.0	
Approach Vol, veh/h	5//			962	66					 1st-Term Q (Q1), veh/In	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	
Approach Delay, s/veh	4.5			2.3	48.3					2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
Approach LOS	A			A	D					3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Timer:		1	2	3	4	5	6	7	8	%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
Assigned Phs		1	2	-	4	•	6	-	-	%ile Back of Q (50%), veh/In	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	
Case No		12	70		90		4.0			%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
Phs Duration (G+Y+Rc) s		9.4	74.5		10.1		83.9			Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change Period (V+Rc) s		0.4	6.5		6.0		6.5			Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max Green (Gmax) s		12.0	40.5		20.0		61.5			Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max Allow Headway (MAH) s		3.6	40.5		20.0		17			Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max Allow Headway (IMAH), 3		2.0	7.0		4.0		8.2			Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Proop Ext Time (g_0+11), S		2.0	11.7		4.0		12.0			Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Drob of Dbs Call (p. o)		0.0	1.0		0.1		12.9			Middle Lane Group Data									
Prob of Max Out (p_c)		0.05	0.11		0.02		0.02			Assigned Mymt	0	2	0	1	0	6	0	0	
TOD OF MAX OUL (P_X)		0.00	0.11		0.00		0.02				0	2 T	0	4	0	т	0	U	
eft-Turn Movement Data											٥	2	٥	0	0	2	٥	٥	
Assigned Mymt		1	5		7					Canes III GIP	0	572	0	0	0	2	0	0	
Nymt Sat Flow, yeh/h		1774	0		1774					GIP VOI (V), Veli/II	0	1770	0	0	0	1770	0	0	
			-							Grp Sat Flow (s), ven/n/in	0	1//0	0	0	0	1//0	0	0	
hrough Movement Data										Q Serve Time (g_s), s	0.0	5.0	0.0	0.0	0.0	6.2	0.0	0.0	
Assigned Mvmt			2		4		6			Cycle Q Clear Time (g_c), s	0.0	5.0	0.0	0.0	0.0	0.2	0.0	0.0	
//www.weithww.weithwww.weithwww.weithwww.weithww.weithww.weithww.weithww.weithww.weithww.weithww.weithww.weith			3632		0		3632			Lane Grp Cap (c), ven/n	0 00	2562	0	0 00	0	2914	0	0	
Right-Turn Movement Data										V/C Ratio (X)	0.00	0.22	0.00	0.00	0.00	0.33	0.00	0.00	
Agint Full Wovement Data			10		14		16			Avail Cap (c_a), veh/h	0	2562	0	0	0	2914	0	0	
Assigned WVIIIt			1502		14		10			Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
vivinit odt Flow, ven/n			1203		1003		U			Uniform Delay (d1), s/veh	0.0	4.3	0.0	0.0	0.0	2.0	0.0	0.0	
eft Lane Group Data										Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	
Assigned Mymt		1	5	0	7	0	0	0	0	Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ane Assignment	(Pr/Pm)	2							Control Delay (d), s/veh	0.0	4.5	0.0	0.0	0.0	2.3	0.0	0.0	
		/								1st-Term Q (Q1), veh/In	0.0	2.4	0.0	0.0	0.0	2.9	0.0	0.0	

VHB

Synchro 9 Report Existing PM.syn

VHB

Synchro 9 Report Existing PM.syn

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US 460 Corridor Safety Study 7: Dominion Way & US 460/Windsor Boulevard

2nd-Term Q (Q2), veh/In	
3rd-Term Q (Q3), veh/In	
%ile Back of Q Factor (f_B%)	
%ile Back of Q (50%), veh/ln	
%ile Storage Ratio (RQ%)	
Initial Q (Qb), veh	
Final (Residual) Q (Qe), veh	
Sat Delay (ds), s/veh	
Sat Q (Qs), veh	
Sat Cap (cs), veh/h	
Initial Q Clear Time (tc), h	

Right Lane Group Data Assigned Mvmt Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Prot RT Sat Flow (s_R), veh/h/ln Prot RT Eff Green (g_R), s Prop RT Outside Lane (P_R) Lane Gro Cao (c), veh/h Lane Grp Cap (c), veh/h V/C Ratio (X) V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d3), s/veh Control Delay (d3), s/veh Tat-Term Q (Q1), veh/ln Srd-Term Q (Q2), veh/ln %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/ln %ile Back of Q (50%), veh/ln %ile Storage Ratio (RQ%) Initial Q (Db), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS

D-20 | ROUTE 460 SAFETY AND OPERATIONS STUDY

0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
0.0	2.5	0.0	0.0	0.0	3.1	0.0	0.0	
0.00	0.10	0.00	0.00	0.00	0.02	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	0	0	0	0	0	0	0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	12	0	14	0	16	0	0	
	R		R					
0	1	0	1	0	0	0	0	
0	4	0	34	0	0	0	0	
0	1583	0	1583	0	0	0	0	
0.0	0.1	0.0	2.0	0.0	0.0	0.0	0.0	
0.0	0.1	0.0	2.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
0	1146	0	69	0	0	0	0	
0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.00	
0	1146	0	337	0	0	0	0	
0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
0.0	3.6	0.0	43.9	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	3.6	0.0	49.2	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5.0							
	Α							

2040 No Build AM

US 460 Corridor Safety Study 2040 No Build AM 1: US 460/Pruden Boulevard & Northfield Drive ⊁ $\varphi \leftarrow \checkmark \checkmark$ -Lane Group EBT WBT EBL WBU WBR Lane Configurations - 11 Υ. л 3 Traffic Volume (vph) 11 1387 1154 80 0 Future Volume (vph) 11 1387 0 1154 80 8 3 1900 1900 1900 1900 1900 1900 1900 Ideal Flow (vphpl) Storage Length (ft) 305 125 195 0 155 Storage Lanes 1 1 1 1 Taper Length (ft) 190 200 Lane Util. Factor 1.00 0.95 1.00 0.95 1.00 1.00 1.00 0.850 0.850 Frt Flt Protected 0.950 0.950 Satd. Flow (prot) 1770 3539 1863 3539 1583 1770 1583 Flt Permitted 0.137 0.950 255 3539 1863 3539 1583 1770 1583 Satd. Flow (perm) Right Turn on Red Yes Yes Satd. Flow (RTOR) 109 8 25 Link Speed (mph) 55 55 Link Distance (ft) 537 2299 1306 Travel Time (s) 6.7 28.5 35.6 Peak Hour Factor 0.58 0.94 0.92 0.82 0.63 0.58 0.38 Adj. Flow (vph) 19 1476 0 1407 127 14 8 Shared Lane Traffic (%) 19 1476 0 1407 127 14 8 Lane Group Flow (vph) NA pm+pt NA Prot Prot Prot Turn Type pm+pt Protected Phases 6 5 2 2 7 4 1 Permitted Phases 6 Detector Phase 6 2 2 7 4 1 5 Switch Phase Minimum Initial (s) 5.0 15.0 5.0 15.0 15.0 7.0 7.0 Minimum Split (s) 13.3 23.3 9.5 34.9 34.9 14.4 14.4 Total Split (s) 20.0 48.0 20.0 48.0 48.0 22.0 22.0 22.2% 53.3% 22.2% 53.3% 53.3% 24.4% 24.4% Total Split (%) 11.7 39.7 15.5 40.1 40.1 14.6 14.6 Maximum Green (s) 4.8 4.8 4.0 Yellow Time (s) 4.8 4.8 3.5 4.0 3.5 3.5 1.0 3.1 3.1 3.4 3.4 All-Red Time (s) 0.0 0.0 0.0 0.0 0.0 Lost Time Adjust (s) 0.0 0.0 8.3 8.3 4.5 7.9 7.9 7.4 7.4 Total Lost Time (s) Lead/Lag Lead Lag Lead Lag Lag Lead-Lag Optimize? 3.0 3.0 3.0 3.0 3.0 3.0 3.0 Vehicle Extension (s) Recall Mode None C-Min None C-Min C-Min None None Walk Time (s) 7.0 7.0 Flash Dont Walk (s) 20.0 20.0 Pedestrian Calls (#/hr) 0 0 78.2 78.2 7.1 7.1 Act Effct Green (s) 78.7 85.3 0.87 0.95 0.08 0.08 Actuated g/C Ratio 0.87 0.87 v/c Ratio 0.06 0.44 0.46 0.09 0.10 0.06 1.2 0.9 1.8 40.1 22.7 Control Delay 5.2 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 1.2 0.9 5.2 1.8 40.1 22.7

US 460 Corridor Sa	afety Study						
1: US 460/Pruden	Boulevard &	& Northfie	ld Driv	е			
	*	-	+	*	、 、	1	

		-	•			-	•
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR
LOS	А	Α		Α	Α	D	С
Approach Delay		0.9		4.9		33.8	
Approach LOS		Α		А		С	
Queue Length 50th (ft)	1	3		0	0	8	0
Queue Length 95th (ft)	m1	57		290	10	17	3
Internal Link Dist (ft)		457		2219		1226	
Turn Bay Length (ft)	305				195		155
Base Capacity (vph)	419	3356		3073	1389	287	263
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	0.05	0.44		0.46	0.09	0.05	0.03

Intersection Summa	y		
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Leng	jth: 90		
Offset: 68 (76%), Re	ferenced to phase 2:WBTU	and 6:EBTL, Start of Green	
Natural Cycle: 65			
Control Type: Actuat	ed-Coordinated		
Maximum v/c Ratio:	0.46		
Intersection Signal D	elay: 3.2	Intersection LOS: A	
Intersection Capacity	y Utilization 57.3%	ICU Level of Service B	
Analysis Period (min) 15		

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

Splits and Phases: 1: US 460/Pruden Boulevard & Northfield Drive

▶ Ø1	 ▲ Ø2 (R)		√ Ø4	
20 s	48 s		22 s	
₽ Ø5	→Ø6 (R)		Ø7	
20 s	48 s		22 s	

2040 No Build AM

Novement Lane Configurations Traffic Volume (veh/h) Future Volume (veh/h) Number Initial Q. veh Ped-Bike Adj (A_pbT) Parking Bus Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Opposing Right Turn In Cap, veh/h HCM Platoon Ratio Prop Arrive On Green Ln Grp Delay, s/veh Ln Grp LOS Approach Vol, veh/h Approach Delay, s/veh Approach LOS

Timer: Assigned Phs Case No Phs Duration (G+Y+Rc) Change Period (Y+Rc), Max Green (Gmax), s Max Allow Headway (N Max Q Clear (g_c+l1), Green Ext Time (g_e), Prob of Phs Call (p_c) Prob of Max Out (p_x)

Left-Turn Movement D Assigned Mvmt Mvmt Sat Flow, veh/h

Through Movement Da Assigned Mvmt Mvmt Sat Flow, veh/h

Right-Turn Movement I Assigned Mvmt Mvmt Sat Flow, veh/h

Left Lane Group Data Assigned Mvmt Lane Assignment

VHB

Synchro 9 Report 2040 No Build AM.syn

Synchro 9 Report 2040 No Build AM.syn

VHB

Appendix D

US 460 Corridor Safety Study 1: US 460/Pruden Boulevard & Northfield Drive

2040 No Build AM

	≯	-	F	+	•	1	-		
	EBL	EBT	WBU	WBT	WBR	SBL	SBR		
	<u></u>	<u></u>	A	<u></u>	1	<u> </u>	1		
	11	1387	0	1154	80	8	3		
	11	1387	0	1154	80	8	3		
	1	6		2	12	7	14		
	0	0		0	0	0	0		
	1.00				1.00	1.00	1.00		
	1.00	1.00		1.00	1.00	1.00	1.00		
	1863	1863		1863	1863	1863	1863		
	19	14/6		1407	127	14	8		
	1	2		2	1	1	1		
	0.58	0.94		0.82	0.63	0.58	0.38		
£1	2	2		2	2	2	2		
nuence	res	2005		0405	1076	res	50		
	1.00	2805		2405	10/6	50	52		
	1.00	0.70		1.00	1.00	1.00	0.02		
	28.0	0.79		0.00	0.00	0.05	13 7		
	20.9	4.0		0.7	5.5	44.0	43.7		
	U	1495		1534	А	22	U		
		/ 3		8.4		11.2			
		4.5		Δ		-++.2 D			
		~		~		U			
		1	2	3	4	5	6	7	8
		1	2		4		6		
		1.1	7.0		9.0		4.0		
), s		10.2	69.4		10.4		79.6		
S		8.3	* 8.3		7.4		8.3		
		11.7	* 40		14.6		39.7		
iAH), s		3.6	4./		3.9		4.7		
5		2.2	21.0		2.7		15.4		
5		0.0	16.4		0.0		20.3		
		0.38	1.00		0.42		1.00		
		0.00	0.04		0.00		0.79		
ata									
		1	5		7				
		1774	0		1774				
ta									
a			2		1		6		
			2632		4		3633		
			303Z		U		3032		
Data									
			12		14		16		
			1583		1583		0		
		4	E	0	7	0	0	0	0
		(Dr/Dm)	Э	U	1	U	U	U	U
		(1.11.111)							

Synchro 9 Report 2040 No Build AM.syn

2040 No Build AM (Cont)

I: US 460/Pruden Bouleva	rd & No	orthfie	ld Driv	/e					1: US 460/Pruden Boulev	ard & No	orthfie	ld Driv	е				2040 NO B	<u>2: US</u>
arres in Grp Pro Vol (v), vob/b	10	0	0	14	0	0	0	0	Zriu-Term Q (QZ), Ven/In 3rd Torm Q (Q3), veh/lp	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.0	Lane Gr
Sip Vol (V), Vel //II	1774	0	0	14	0	0	0	0	Vile Back of O Faster (f. B%)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	0.0	Lane Co
S(p) Sat Flow (S), Venininin	0.2	0	0	0.7	0.0	0.0	0	0	%ile Back of Q (50%), yeh/lp	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	Traffic \
2 Serve Time (g_s), s	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	%ile Back of Q (50%), Ven/in	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	Future \
Jycle Q Clear Time (g_c), s	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	hit Storage Ratio (RQ%)	0.00	0.11	0.00	0.00	0.00	0.35	0.00	0.00	Ideal Flo
Perm LT Sat Flow (s_l), ven/n/in	337	0	0	1//4	0	0	0	0	Final (Desidual) O (Os) web	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Storage
Shared LT Sat Flow (s_sn), ven/n/in	0	0	0	0	0	0	0	0	Final (Residual) Q (Qe), Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Storage
/erm LT Eπ Green (g_p), s	/1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Delay (US), S/Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Taper I
'erm LT Serve Time (g_u), s	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Q (QS), Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Lane U
Perm LT Q Serve Time (g_ps), s	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Cap (CS), Veri/II	0	0.0	0.0	0.0	0.0	0.0	0.0	0	Frt
Ime to First Bik (g_t), s	0.0	61.1	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Elt Prote
erve Time pre Bik (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Right Lane Group Data									Satd Fl
Prop L1 Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	Assigned Mymt	0	12	0	14	0	16	0	0	 Elt Perm
ane Grp Cap (c), veh/h	132	0	0	58	0	0	0	0	Lane Assignment		R		R					Satd F
//C Ratio (X)	0.14	0.00	0.00	0.24	0.00	0.00	0.00	0.00	Lanes in Grp	0	1	0	1	0	0	0	0	Right T
vail Cap (c_a), veh/h	325	0	0	288	0	0	0	0	Grp Vol (v), veh/h	0	127	0	8	0	0	0	0	Satd Fl
Jpstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0	Link Sn
Jniform Delay (d1), s/veh	28.4	0.0	0.0	42.4	0.0	0.0	0.0	0.0	Q Serve Time (q s), s	0.0	2.5	0.0	0.4	0.0	0.0	0.0	0.0	Link Dis
ncr Delay (d2), s/veh	0.5	0.0	0.0	2.1	0.0	0.0	0.0	0.0	Cycle Q Clear Time (q c), s	0.0	2.5	0.0	0.4	0.0	0.0	0.0	0.0	Travel T
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Prot RT Sat Flow (s R) veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Peak H
Control Delay (d), s/veh	28.9	0.0	0.0	44.5	0.0	0.0	0.0	0.0	Prot RT Eff Green (g, R) s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
st-Term Q (Q1), veh/In	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.0	Pron RT Outside Lane (P. R)	0.00	1 00	0.00	1 00	0.00	0.00	0.00	0.00	Shared
.nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	1076	0.00	52	0.00	0.00	0.00	0.00	Lane Gr
rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	V/C Ratio (X)	0.00	0.12	0.00	0.15	0.00	0.00	0.00	0.00	Turn Tv
6ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	Avail Cap (c, a) veh/h	0.00	1076	0.00	257	0.00	0.00	0.00	0.00	Protecte
6ile Back of Q (50%), veh/In	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	Lipstream Filter (I)	0.00	1 00	0.00	1.00	0.00	0.00	0.00	0.00	Permitte
6ile Storage Ratio (RQ%)	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	Uniform Delay (d1) s/yeb	0.00	5.0	0.00	12.00	0.00	0.00	0.00	0.00	Detecto
nitial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Incr Delay (d2) s/veh	0.0	0.2	0.0	42.0	0.0	0.0	0.0	0.0	Switch
inal (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Initial O Delay (d2), siven	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	Minimur
∋at Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Control Delay (d), s/veh	0.0	5.3	0.0	/3.7	0.0	0.0	0.0	0.0	Minimur
iat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1st Torm O (O1) yeb/lp	0.0	1.1	0.0	43.7	0.0	0.0	0.0	0.0	Total Sr
sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	2nd Term $O(O2)$ yeb/ln	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	Total Sr
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	$2 \operatorname{rd} \operatorname{Term} O(O3)$ yeb/in	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	Maximu
Aiddle Lane Group Data									%ile Back of O Eactor (f B%)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	0.0	Yellow
Assigned Mymt	0	2	0	1	0	6	0	0	%ile Back of Q (50%) veh/lp	0.00	1.00	0.00	0.4	0.00	0.0	0.00	0.00	
ana Assianment	U	2 T	U	4	U	T	U	5	Vile Storage Patio (PO%)	0.0	0.15	0.0	0.4	0.0	0.0	0.0	0.0	Lost Tin
anes in Grn	0	2	0	0	0	2	0	0	Initial O (Ob) yeb	0.00	0.13	0.00	0.07	0.00	0.00	0.00	0.00	Total Lo
Srn Vol (v) veh/h	0	1407	0	0	0	1476	0	0	Final (Residual) O (Oa) yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	pad/l a
Pro Sat Flow (s) veh/h/ln	0	1770	0	0	0	1770	0	0	Sat Delay (ds) s/yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Lead-La
) Serve Time $(a, s) \in$	0.0	10 0	0.0	0.0	0.0	13 /	0.0	0.0	Sat $O(\Omega c)$ yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Vehicle
y = 0 Clear Time (q. c) s	0.0	10.0	0.0	0.0	0.0	13.4	0.0	0.0	Sat Can (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Recall
ane Grn Can (c) veh/h	0.0	2405	0.0	0.0	0.0	2805	0.0	0	Initial O Clear Time (to) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Act Effo
//C Patio (X)	0.00	0.50	0.00	0.00	0.00	0.53	0.00	0.00		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(Δr)	0.00	2/05	0.00	0.00	0.00	2805	0.00	0.00	Intersection Summary									v/c Ratio
Instream Filter (I)	0.00	1.00	0 00	0.00	0.00	1 00	0.00	0.00	HCM 2010 Ctrl Delay		6.7							Control
Iniform Delay (d1) shop	0.00	7.7	0.00	0.00	0.00	1.00	0.00	0.00	HCM 2010 LOS		А							
per Delay (d2) s/yeb	0.0	1.1	0.0	0.0	0.0	0.7	0.0	0.0	Notos									
atial O Dalay (d2), s/vell	0.0	1.0	0.0	0.0	0.0	0.7	0.0	0.0	NOLES									
Inual & Delay (us), S/Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	User approved ignoring U-Turning m	ovement.								Approac
Control Dolay (d) shuch	0.0	0.7	0.0	0.0	0.0	4.0	0.0	0.0	* HCM 2010 computational engine re	quires equal	l clearan	ce times fo	or the ph	ases cross	sing the b	arrier.		Appidad
Control Delay (d), s/veh	0.0	0.2	0.0	00	<u> </u>	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	0.0	0.0										Annroa

2040 No Build AM

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

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EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
<u>۳</u>	≜ ⊅		<u>۳</u>	- † †	1		4	1		4	
33	1174	26	174	959	80	9	10	54	40	33	6
33	1174	26	174	959	80	9	10	54	40	33	6
1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
250		0	400		175	0		50	0		0
1		0	1		1	0		1	0		0
0			0			0			0		
1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.995				0.850			0.850		0.991	
0.950	0500	0	0.950	0500	4500	•	0.969	4500	0	0.979	•
1//0	3522	0	1//0	3539	1583	0	1805	1583	0	1807	0
0.950	2500	0	0.950	2520	1500	0	0.743	1500	0	0.844	0
1770	3522	Vaa	1770	2228	1000	0	1304	1000	0	1000	Vee
	5	res			122			102		4	res
	25			25	155		25	125		20	
	2/00			463			20 /11			171	
	48.7			9.0			11.2			3.9	
0.46	0.07	0.61	0 59	0.96	0.60	0.40	0.75	0.44	0.64	0.5	0.63
72	1210	43	295	999	133	23	13	123	63	73	10
12	1210	10	200	000	100	20	10	120	00	10	10
72	1253	0	295	999	133	0	36	123	0	146	0
Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
1	6		5	2			8			4	
					2	8		8	4		
1	6		5	2	2	8	8	8	4	4	
5.0	15.0		5.0	15.0	15.0	5.0	5.0	5.0	7.0	7.0	
11.1	21.8		11.1	21.8	21.8	11.1	11.1	11.1	13.1	13.1	
24.0	45.0		22.0	43.0	43.0	23.0	23.0	23.0	23.0	23.0	
26.7%	50.0%		24.4%	47.8%	47.8%	25.6%	25.6%	25.6%	25.6%	25.6%	
17.9	38.2		15.9	36.2	36.2	16.9	16.9	16.9	16.9	16.9	
4.0	4.8		4.0	4.8	4.8	4.1	4.1	4.1	4.1	4.1	
2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
1.0	0.0		Lood	0.0	0.0		0.1	0.1		0.1	
Leau	Lay		Leau	Lay	Lay						
3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
None	C-Min		None	C-Min	C-Min	None	None	None	None	None	
9.0	42.1		15.9	51.3	51.3	Hono	13.0	13.0	Hono	13.0	
0.10	0.47		0.18	0.57	0.57		0.14	0.14		0.14	
0.41	0.76		0.95	0.50	0.14		0.18	0.37		0.64	
41.4	17.4		77.9	10.1	1.9		34.3	9.6		47.6	
0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
41.4	17.4		77.9	10.1	1.9		34.3	9.6		47.6	
D	В		Е	В	А		С	А		D	
	18.7			23.3			15.2			47.6	
	В			С			В			D	

Synchro 9 Report 2040 No Build AM.syn

2040 No Build AM (Cont)

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ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	41	109		168	180	0		18	0		77	
Queue Length 95th (ft)	m39	m243		155	102	2		36	0		60	
nternal Link Dist (ft)		2419			383			331			91	
Furn Bay Length (ft)	250			400		175			50			
Base Capacity (vph)	352	1649		312	2018	959		259	397		295	
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	0.76		0.95	0.50	0.14		0.14	0.31		0.49	
ntersection Summary												
Area Type: 0	Other											
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 25 (28%), Referenced	to phase	2:WBT ar	nd 6:EBT	, Start of (Green							
Vatural Cycle: 75												
Control Type: Actuated-Coor	dinated											
Maximum v/c Ratio: 0.95												
ntersection Signal Delay: 22	.1			In	tersectior	LOS: C						
ntersection Capacity Utilizati	ion 69.7%			IC	U Level o	of Service	С					
Analysis Period (min) 15												

▶ _{Ø1}	📕 📥 Ø2 (F	٤)	₽ø4	
24 s	43 s		23 s	
√ Ø5	₩ ₩ Ø6 (R)		1 08	

	•	→	\rightarrow	1	-		1	T	1	-	Ŧ	*
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Lane Configurations	<u>۲</u>	≜ ⊅		<u>۲</u>	- 11	1		र्भ	1		4	
Traffic Volume (veh/h)	33	1174	26	174	959	80	9	10	54	40	33	
Future Volume (veh/h)	33	1174	26	174	959	80	9	10	54	40	33	
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, veh	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	1863	1863	1900	1863	1900
Adj Flow Rate, veh/h	72	1210	43	295	999	133	22	13	123	62	73	1(
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	0	1	(
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.6
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap. veh/h	93	1712	61	313	2178	974	161	81	192	124	108	13
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.10	0.98	0.98	0.18	0.62	0.62	0.12	0.12	0.12	0.12	0.12	0.1
Ln Grp Delay, s/veh	50.0	4.2	4.1	72.2	10.0	7.6	35.7	0.0	41.2	40.5	0.0	0 (
	D	Α	A	F	A	A	D	0.0	D	D	0.0	
Approach Vol. veh/h	5	1325	~	_	1427		5	158	D	D	145	
Approach Delay, s/yeh		6.7			22.6			40.0			40.5	
Approach LOS		0.1 A			22.0 C			40.0 D			40.0 D	
T			•	2	-	-	<u>^</u>		0			
Assigned Dec		1	2	3	4	5	6	1	0			
		2.0	20		0 0	20	4.0		7.0			
Dase NU		2.0	0.0		0.0	2.0	4.0		17.0			
Change Deried (V, De)		10.0	02.2		17.0	22.0	51.0		6.1			
Change Period (Y+Rc), s		0.1	0.0		0.1	0.1	0.0		0.1			
Max Green (Gmax), s		17.9	30.2		16.9	15.9	38.2		16.9			
Max Allow Headway (MAH), s		3.8	5.1		4.9	3.8	5.1		4.9			
Max Q Clear (g_c+l1), s		5.6	15.6		10.1	16.8	3.8		8.7			
Green Ext Time (g_e), s		0.1	15.5		0.8	0.0	22.4		0.9			
Prob of Phs Call (p_c)		0.83	1.00		1.00	1.00	1.00		1.00			
Prob of Max Out (p_x)		0.00	0.74		0.44	1.00	0.57		0.23			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			554	1774			793			
Through Movement Data												
Assigned Mymt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		889		3487		670			
Pight Turn Movement Data												
Assigned Mumt			12		14		16		18			
Mymt Sat Flow veh/h			1583		107		124		1583			
			1000		101		121		1000			_
Left Lane Group Data		4	0	0	-7	F	0	0	2			
Assigned Wivmt		1	U	U	/	5 (Dec f)	U	U	3			
Long Appingment		///////////////////////////////////////										

US 460 Corridor Safety Study

2: US460/Pruden Boulevard & Rob's Drive

US 460 Corridor Safety Study

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2040 No Build AM.syn

Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_v Perm LT Sat Flow (s_l), Shared LT Sat Flow (s_ Perm LT Eff Green (g_p Perm LT Serve Time (g_ Perm LT Q Serve Time (Time to First Blk (g_f), s Serve Time pre Blk (g_fs Prop LT Inside Lane (P_ Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/vel Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d), s/veh 1st-Term Q (Q1), veh/In 2nd-Term Q (Q2), veh/In 3rd-Term Q (Q3), veh/In %ile Back of Q Factor (f %ile Back of Q (50%), ve %ile Storage Ratio (RQ% Initial Q (Qb), veh Final (Residual) Q (Qe), Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), Middle Lane Group Data

Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/l Q Serve Time (g_s), s Cycle Q Clear Time (g_c Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/ve Incr Delay (d2), s/veh Initial Q Delay (d3), s/vel Control Delay (d), s/veh 1st-Term Q (Q1), veh/In

VHB

Synchro 9 Report 2040 No Build AM.syn

VHB

Appendix D

2: US460/Pruden Boulevard & Rob's Drive

2040 No Build AM

	1	0	0	1	1	0	0	1	
	72	0	Ō	145	295	Ō	0	35	
In	1774	0	0	1550	1774	0	0	1462	
	3.6	0.0	0.0	6.5	14.8	0.0	0.0	0.0	
c), s	3.6	0.0	0.0	8.1	14.8	0.0	0.0	1.6	
veh/h/ln	0	0	0	1273	0	0	0	1336	Ī
sh), veh/h/ln	0	0	0	0	0	0	0	1391	
), s	0.0	0.0	0.0	10.9	0.0	0.0	0.0	10.9	
_u), s	0.0	0.0	0.0	9.3	0.0	0.0	0.0	2.8	
(g_ps), s	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.2	
s), s	0.0	0.0	0.0	1.5	0.0	0.0	0.0	1.2	
L)	1.00	0.00	0.00	0.43	1.00	0.00	0.00	0.63	
	93	0	0	245	313	0	0	242	
	0.77	0.00	0.00	0.59	0.94	0.00	0.00	0.14	
	353	0	0	346	313	0	0	340	
	0.79	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
eh	39.8	0.0	0.0	38.2	36.6	0.0	0.0	35.4	
	10.2	0.0	0.0	2.3	35.6	0.0	0.0	0.3	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	50.0	0.0	0.0	40.5	72.2	0.0	0.0	35.7	
	1.7	0.0	0.0	3.5	7.2	0.0	0.0	0.8	
ו	0.3	0.0	0.0	0.2	3.1	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
eh/in	2.0	0.0	0.0	3.7	10.3	0.0	0.0	0.8	
%)	0.20	0.00	0.00	0.85	0.65	0.00	0.00	0.06	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
a									
	0	2	0	4	0	6	0	8	
		Т				Т			
	0	2	0	0	0	1	0	0	
	0	999	0	0	0	614	0	0	
In	0	1770	0	0	0	1770	0	0	
	0.0	13.6	0.0	0.0	0.0	1.8	0.0	0.0	
c), s	0.0	13.6	0.0	0.0	0.0	1.8	0.0	0.0	
1	0	2178	0	0	0	869	0	0	
	0.00	0.46	0.00	0.00	0.00	0.71	0.00	0.00	
	0	2178	0	0	0	869	0	0	
	0.00	1.00	0.00	0.00	0.00	0.79	0.00	0.00	
eh	0.0	9.3	0.0	0.0	0.0	0.4	0.0	0.0	
	0.0	0.7	0.0	0.0	0.0	3.8	0.0	0.0	
n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	10.0	0.0	0.0	0.0	4.2	0.0	0.0	
	0.0	6.5	0.0	0.0	0.0	0.3	0.0	0.0	

Synchro 9 Report

2040 No Build AM.syn

2040 No Build AM (Cont)

US 460 Corridor Safety S 2: US460/Pruden Bouleva	2040 No Build AM								
2nd-Term Q (Q2), veh/In	0.0	0.2	0.0	0.0	0.0	0.9	0.0	0.0	
Brd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	6.7	0.0	0.0	0.0	1.3	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.43	0.00	0.00	0.00	0.01	0.00	0.00	
nitial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
-inal (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
_ane Assignment		R				T+R		R	
anes in Grp	0	1	0	0	0	1	0	1	
Grp Vol (v), veh/h	0	133	0	0	0	639	0	123	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1841	0	1583	
Q Serve Time (g_s), s	0.0	3.2	0.0	0.0	0.0	1.8	0.0	6.7	
Cycle Q Clear Time (g_c), s	0.0	3.2	0.0	0.0	0.0	1.8	0.0	6.7	
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.07	0.00	0.07	0.00	1.00	
_ane Grp Cap (c), veh/h	0	974	0	0	0	904	0	192	
//C Ratio (X)	0.00	0.14	0.00	0.00	0.00	0.71	0.00	0.64	
Avail Cap (c_a), veh/h	0	974	0	0	0	904	0	297	
Jpstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.79	0.00	1.00	
Jniform Delay (d1), s/veh	0.0	7.3	0.0	0.0	0.0	0.4	0.0	37.7	
ncr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	3.7	0.0	3.6	
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	7.6	0.0	0.0	0.0	4.1	0.0	41.2	
Ist-Ierm Q (Q1), veh/ln	0.0	1.4	0.0	0.0	0.0	0.4	0.0	2.9	
2nd-Term Q (Q2), ven/in	0.0	0.1	0.0	0.0	0.0	0.9	0.0	0.2	
Srd-Term Q (Q3), ven/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wile Back of Q Factor (1_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
Wile Back of Q (50%), Ven/In	0.0	1.4	0.0	0.0	0.0	1.3	0.0	3.1	
wile Storage Ratio (RQ%)	0.00	0.21	0.00	0.00	0.00	0.01	0.00	1.57	
rillial Q (QD), Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rinar (residual) Q (Qe), veri	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (OS), S/Ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (QS), VEN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
pitial O Class Time (ta) h	0	0.0	0	0.0	0.0	0	0.0	0	
miliar & clear mille (lc), n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ntersection Summary									
HCM 2010 Ctrl Delay		17.4							
ICM 2010 LOS		В							

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٢	A		۲	<u></u>	1		\$			ا	7
Traffic Volume (vph)	155	1016	0	11	657	65	1	113	95	104	46	64
Future Volume (vph)	155	1016	0	11	657	65	1	113	95	104	46	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	165		0	250		145	0		0	0		50
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	80			0			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.938				0.850
Flt Protected	0 950			0.950				0.999			0.969	
Satd Flow (prot)	1770	3539	0	1770	3539	1583	0	1746	0	0	1805	1583
Elt Permitted	0.950		, i i i i i i i i i i i i i i i i i i i	0.950	0000		Ŭ	0.995	, in the second s	, i i i i i i i i i i i i i i i i i i i	0.371	
Satd Flow (perm)	1770	3539	0	1770	3539	1583	0	1739	0	0	691	1583
Right Turn on Red	1110	0000	Yes	1110	0000	Yes	Ŭ	1100	Yes	Ű	001	Yes
Satd Flow (RTOR)			100			125		42	100			125
Link Speed (mph)		55			35	120		45			45	120
Link Distance (ff)		2858			2499			2180			1010	
Travel Time (s)		35.4			48.7			33.0			15.3	
Peak Hour Factor	0.83	0.00	0.02	0 35	0.0/	0 00	0.25	0.67	0.65	0.75	0.60	0.62
Adi Elow (unb)	197	1120	0.52	0.00	600	0.30	0.25	160	1/6	130	0.00	102
Shared Lane Traffic (%)	107	1123	0	31	099	12	4	109	140	159	11	105
Lano Group Flow (uph)	197	1120	٥	21	600	70	٥	310	٥	٥	216	103
	Drot	NA	0	Drot	035	Dorm	Dorm	515	0	Dorm	210	Dorm
Protocted Phases	1	N/A 6		FIUL	1NA 2	Feilii	Feim	N/A Q		Feilii	1	reiiii
Protected Phases	1	0		5	2	2	Q	0		4	4	4
Permilleu Phases	1	6		5	2	2	0	0		4	4	4
Switch Dhase	1	0		5	2	2	0	0		4	4	4
Switch Phase	F 0	15.0		F 0	15.0	15.0	7.0	7.0		7.0	7.0	7.0
Minimum Initial (S)	0.0	15.0		0.C	15.0	15.0	12.0	12.0		12.0	12.0	12.0
Minimum Split (S)	11.0	21.0		11.5	21.0	21.0	13.0	13.0		13.0	13.0	13.0
Total Split (S)	20.0	45.0		20.0	45.0	45.0	25.0	25.0		25.0	25.0	25.0
	22.2%	50.0%		22.2%	50.0%	50.0%	27.8%	27.8%		27.8%	27.8%	27.8%
Maximum Green (s)	14.0	38.2		13.5	38.2	38.2	18.2	18.2		18.2	18.2	18.2
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.8	4.8		4.8	4.8	4.8
All-Red Time (s)	2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	6.0	6.8		6.5	6.8	6.8		6.8			6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	None
Act Effct Green (s)	12.8	49.5		7.1	39.4	39.4		18.2			18.2	18.2
Actuated g/C Ratio	0.14	0.55		0.08	0.44	0.44		0.20			0.20	0.20
v/c Ratio	0.74	0.58		0.22	0.45	0.09		0.83			1.55	0.25
Control Delay	55.3	16.3		59.5	12.2	3.3		49.5			310.5	5.5
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	55.3	16.3		59.5	12.2	3.3		49.5			310.5	5.5
LOS	E	В		E	В	Α		D			F	А
Approach Delay		21.9			13.2			49.5			212.0	
Approach LOS		С			В			D			F	

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

2040 No Build AM

US 460 Corridor Safety Study

3: US460/Pruden E	Boulevar	d & Ki	ngs Fo	ork Rd					2	.0401	IO Duik	u / (ivi
	≯	+	*	4	Ļ	*	•	1	1	*	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	102	238		19	150	5		153			~175	0
Queue Length 95th (ft)	157	323		15	250	27		166			#181	2
Internal Link Dist (ft)		2778			2419			2100			930	
Turn Bay Length (ft)	165			250		145						50
Base Capacity (vph)	275	1945		265	1548	762		385			139	419
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	0.68	0.58		0.12	0.45	0.09		0.83			1.55	0.25

Int	ersection Summary			
Are	ea Type:		Oth	ner
Су	cle Length: 90			
Ac	tuated Cycle Lengt	n: 90		
Of	fset: 86 (96%), Refe	erence	d to	o phase
Na	tural Cycle: 70			
Со	ontrol Type: Actuate	d-Coo	rdir	nated
Ma	aximum v/c Ratio: 1	.55		
Int	ersection Signal De	lay: 44	4.5	
Int	ersection Capacity	Utiliza	tior	n 74.7%
An	alysis Period (min)	15		
~	Volume exceeds of	apacit	ty, (queue i
	Queue shown is m	aximu	m a	after two
#	95th percentile vo	lume e	XC	eeds ca
	Queue shown is m	aximu	m a	after two
Sp	lits and Phases:	3: US4	460	/Pruder
	•			+
_	Ø1			Ø
20	S			45 S

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VHB

Synchro 9 Report 2040 No Build AM.syn

VHB

Synchro 9 Report 2040 No Build AM.syn

D-24 | ROUTE 460 SAFETY AND OPERATIONS STUDY

VHB

2040 No Build AM

e 2:WBT and 6:EBT, Start of Green

Intersection LOS: D ICU Level of Service D

is theoretically infinite.

wo cycles. capacity, queue may be longer. vo cycles.

en Boulevard & Kings Fork Rd

Ø2 (R)	\$ Ø4	
45 s	25 s	
→Ø6 (R)	↑ Ø8	
45 s	25 s	

Synchro 9 Report 2040 No Build AM.syn
US 460 Corridor Safety Study 2040 No Build AM 3: US460/Pruden Boulevard & Kings Fork Rd ブ → → マ ← べ ベ 1 t. ۶ EBL EBT FBR WBL WBT WBR NBI Movement *** *** Lane Configurations **↑↑** 657 4) 113 Traffic Volume (veh/h) 95 104 11 65 6 46 155 1016 657 65 113 95 104 46 64 Future Volume (veh/h) 11 0 1 Number 12 18 1 6 16 2 7 4 14 5 3 8 Initial Q. veh 0 0 0 0 0 0 0 0 0 0 0 0 1.00 1.00 Ped-Bike Adj (A_pbT) 1.00 1.00 1.00 1.00 1.00 1.00 1 00 1.00 1 00 1 00 1 00 Parking Bus Adi 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 1863 1900 1900 1863 1863 Adj Flow Rate, veh/h 187 1129 0 31 699 72 4 169 146 139 77 103 Adj No. of Lanes 1 2 2 0 1 0 1 1 0 0 1 Peak Hour Factor 0.83 0.90 0.92 0.35 0.94 0.90 0.25 0.67 0.65 0.75 0.60 0.62 Percent Heavy Veh, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 Opposing Right Turn Influence Yes Yes Yes Yes 223 1927 0 53 1609 720 41 134 113 134 40 320 Cap. veh/h 1.00 1.00 1.00 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1 00 1.00 1.00 1.00 1.00 Prop Arrive On Green 0.54 0.00 0.03 0.45 0.45 0.20 0.20 0.20 0.20 0.20 0.20 0.13 Ln Grp Delay, s/veh 487 14.4 0.0 51.5 17.4 14.3 121.4 0.0 0.0 184.9 0.0 31.2 Ln Grp LOS D В В В F С D 319 319 Approach Vol, veh/h 1316 802 Approach Delay, s/veh 19.3 18.5 121.4 135.3 Approach LOS В F Timer: 1 4 Assigned Phs 4 5 Case No 2.0 3.0 7.0 2.0 4.0 8.0 Phs Duration (G+Y+Rc), s 17.3 47.7 25.0 9.2 55.8 25.0 Change Period (Y+Rc), s 6.0 6.8 6.8 6.5 6.8 6.8 Max Green (Gmax), s 14.0 38.2 13.5 38.2 18.2 18.2 Max Allow Headway (MAH), s 3.6 4.8 50 3.8 4.8 50 Max Q Clear (g_c+l1), s 11.3 14.1 20.2 3.6 21.2 20.2 Green Ext Time (g_e), s 0.1 13.6 0.0 0.0 10.9 0.0 Prob of Phs Call (p_c) 0.99 1.00 1.00 0.54 1.00 1.00 Prob of Max Out (p_x) 1.00 0.41 1.00 0.00 0.57 1.00 Left-Turn Movement Data Assigned Mvmt 1 7 5 3 Mvmt Sat Flow, veh/h 1774 339 1774 0 Through Movement Data Assigned Mvmt 2 4 6 8 Mvmt Sat Flow, veh/h 3539 199 3632 661 Right-Turn Movement Data Assigned Mvmt 12 14 16 18 Mvmt Sat Flow, veh/h 1583 1583 558 Left Lane Group Da Assigned Mvmt 1 0 0 5 0 0 3 Lane Assignment L+T+R (Prot) L+T (Prot)

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	187	0	0	216	31	0	0	319	
Grp Sat Flow (s), veh/h/ln	1774	0	0	539	1774	0	0	1219	
Q Serve Time (g_s), s	9.3	0.0	0.0	0.0	1.6	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	9.3	0.0	0.0	18.2	1.6	0.0	0.0	18.2	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1081	0	0	0	1223	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	531	0	0	0	0	
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	18.2	0.0	0.0	0.0	18.2	
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	12.9	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	12.9	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.64	1.00	0.00	0.00	0.01	
Lane Grp Cap (c), veh/h	223	0	0	175	53	0	0	287	
V/C Ratio (X)	0.84	0.00	0.00	1.24	0.58	0.00	0.00	1.11	
Avail Cap (c_a), veh/h	276	0	0	175	266	0	0	287	
Upstream Filter (I)	0.56	0.00	0.00	1.00	0.86	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	38.5	0.0	0.0	39.2	43.1	0.0	0.0	34.9	
Incr Delay (d2), s/veh	10.3	0.0	0.0	145.7	8.4	0.0	0.0	86.5	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	48.7	0.0	0.0	184.9	51.5	0.0	0.0	121.4	
1st-Term Q (Q1), veh/ln	4.5	0.0	0.0	4.3	0.8	0.0	0.0	7.1	
2nd-Term Q (Q2), veh/In	0.6	0.0	0.0	7.1	0.1	0.0	0.0	6.9	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	5.2	0.0	0.0	11.4	0.9	0.0	0.0	14.0	
%ile Storage Ratio (RQ%)	0.79	0.00	0.00	0.30	0.09	0.00	0.00	0.17	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	10.3	0.0	0.0	0.0	8.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	
Middle Lano Group Data									
	0	2	0	4	0	6	0	0	
Assigned MVMt	U	2	U	4	U	о Т	U	ŏ	
	0	1	0	0	0	1	0	0	
Lanes III GFP	0	2	0	0	0	1100	0	0	
Grp voi (v), ven/n	0	1770	0	0	0	1770	0	0	
GIP Sat Flow (S), Ven/n/in	0.0	1770	0	0	0	1//0	0	0	
Q Serve Time (g_s), s	0.0	12.1	0.0	0.0	0.0	19.2	0.0	0.0	
Uycle Q Clear Time (g_C), s	0.0	12.1	0.0	0.0	0.0	19.2	0.0	0.0	
Lane Grp Cap (c), ven/n	0	1609	0	0	0	1927	0	0	
	0.00	0.43	0.00	0.00	0.00	0.59	0.00	0.00	
Avail Cap (C_a), ven/n	0	1609	0	0	0	1927	0	0	
Upstream Filter (I)	0.00	0.86	0.00	0.00	0.00	0.56	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	16.7	0.0	0.0	0.0	13.7	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	1/.4	0.0	0.0	0.0	14.4	0.0	0.0	
ist-ierm Q (Q1), veh/in	0.0	5.8	0.0	0.0	0.0	9.3	0.0	0.0	

VHB

Synchro 9 Report 2040 No Build AM.syn

VHB

Synchro 9 Report 2040 No Build AM.syn

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

2040 No Build AM

2nd-Term Q (Q2), veh/In 3rd-Term Q (Q3), veh/In %ile Back of Q Factor (f %ile Back of Q (50%), v %ile Storage Ratio (RQ% Initial Q (Qb), veh Final (Residual) Q (Qe) Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h

VHB

HCM 2010 LOS

Appendix D

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

2040 No Build AM

2nd-Term Q (Q2), veh/In	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	6.0	0.0	0.0	0.0	9.4	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.06	0.00	0.00	0.00	0.09	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment	2	R	-	R					
Lanes in Gro	0	1	0	1	0	0	0	0	
Gro Vol (v), veh/h	0	72	0	103	0	0	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0 0	0	0	
Q Serve Time (g, s), s	0.0	2.3	0.0	5.0	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	2.3	0.0	5.0	0.0	0.0	0.0	0.0	
Prot RT Sat Flow (s R) veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	i
Prot RT Eff Green (g. R) s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop PT Outside Lane (P. P.)	0.0	1.00	0.0	1.00	0.0	0.0	0.0	0.0	
	0.00	700	0.00	200	0.00	0.00	0.00	0.40	-
Lane Grp Cap (c), ven/n	0 00	720	0 00	320	0 00	0 00	0 00	0 00	
	0.00	0.10	0.00	0.32	0.00	0.00	0.00	0.00	
Avail Cap (c_a), ven/n	0	720	0	320	0	0	0	0	
Upstream Filter (I)	0.00	0.86	0.00	1.00	0.00	0.00	0.00	0.00	
Unitorm Delay (d1), s/veh	0.0	14.0	0.0	30.6	0.0	0.0	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	14.3	0.0	31.2	0.0	0.0	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	1.0	0.0	2.2	0.0	0.0	0.0	0.0	
2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	1.1	0.0	2.2	0.0	0.0	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.19	0.00	1.13	0.00	0.00	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		44.3							

D

US 460 Corridor Sa	fety St	udy								2040 1	lo Buil	d AM
4: Providence Road	l/Lake	Prince	Drive	& US4	-60/Pru	iden B	ouleva	ırd				
	۶	-	\mathbf{r}	4	+	•	1	t	1	1	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	≜ †}•		٦	- † †	1		4			4	
Traffic Volume (vph)	9	1041	77	6	651	78	44	25	15	118	35	4
Future Volume (vph)	9	1041	77	6	651	78	44	25	15	118	35	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		110	0		0	0		0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (ft)	160			150			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986				0.850		0.965			0.992	
Flt Protected	0.950			0.950				0.977			0.967	
Satd, Flow (prot)	1770	3490	0	1770	3539	1583	0	1756	0	0	1787	0
Flt Permitted	0.950			0.950				0.781			0.764	
Satd. Flow (perm)	1770	3490	0	1770	3539	1583	0	1404	0	0	1412	0
Right Turn on Red			Yes			Yes	-		Yes	-		Yes
Satd Flow (RTOR)		15				131		18			3	
Link Speed (mph)		55			55			45			45	
Link Distance (ff)		471			2858			1931			2337	
Travel Time (s)		5.8			35.4			29.3			35.4	
Peak Hour Factor	0.50	0.0	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0 33
Adi Flow (vph)	18	1132	115	18	731	132	59	36	33	144	58	12
Shared Lane Traffic (%)	10	1102	110	10	701	102	00	00	00	177	00	12
Lane Group Flow (yph)	18	1247	0	18	731	132	0	128	0	0	214	0
Turn Type	Prot	NΔ	U	Prot	NΔ	Perm	Perm	NΔ	U	Perm	NΔ	U
Protected Phases	1	6		5	2	i cim	T CIIII	8		T CITI	11/1	_
Permitted Phases	1	U		0	2	2	8	U		4	т	
Detector Phase	1	6		5	2	2	8	8		4	4	
Switch Phase	1	U		0	2	2	0	U		-	т	
Minimum Initial (c)	5.0	15.0		5.0	15.0	15.0	70	70		70	70	_
Minimum Split (s)	11.8	21.8		11.8	21.8	21.8	13.3	13.3		13.8	13.8	
Total Solit (s)	18.0	46.0		18.0	46.0	46.0	26.0	26.0		26.0	26.0	
Total Split (%)	20.0%	51 1%		20.0%	51 1%	51 1%	20.0	28.0%		28.0%	28.0%	
Maximum Green (s)	11.2	30.2		11.2	30.2	30.2	10.7	10.7		10.2	10.2	_
Vellow Time (s)	/ 8	1.8		/ 8	1.8	1.8	19.7	19.7		19.2	19.2	
All Pod Time (s)	2.0	2.0		2.0	2.0	2.0	4.0	4.0		2.0	2.0	
Lost Timo Adjust (s)	2.0	2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0	
Total Lost Time (a)	0.0	0.0		6.0	0.0	0.0 6 0		6.0			6.0	
	0.0	0.0		0.0	0.0	0.0		0.5			0.0	
Lead Lag Optimize?	Leau	Lay		Leau	Lay	Lay						
Vehicle Extension (a)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Venicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	_
Minimum Gap (s)	0.2	3.5		0.2	3.5	3.5	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	_
Time To Reduce (s)	U.U	20.0		U.U	20.0	20.0	U.U	U.U		U.U	U.U	
Recall Mode	INONE	IVIIN		INONE	IVIIN	IVIIN	None	None		None	None	
Act Effect Green (s)	b./	30.2		6.7	30.2	30.2		16.2			15.6	
Actuated g/C Ratio	0.10	0.47		0.10	0.47	0.47		0.25			0.24	
V/C Ratio	0.10	0.77		0.10	0.44	0.16		0.35			0.63	
Control Delay	35.9	19.2		35.8	13.8	3.5		24.8			35.1	_
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
I otal Delay	35.9	19.2		35.8	13.8	3.5		24.8			35.1	

US 460 Corridor S 4: Providence Roa	afety Stı d/Lake F	udy Prince	Drive a	& US4	60/Pru	den Bo	ouleva	rd
	٨	+	*	4	+	*	1	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT
109	Р	D		П	D	٨		C

LOS	D	В	D	В	A	С	D	
Approach Delay		19.4		12.7		24.8	35.1	
Approach LOS		В		В		С	D	
Queue Length 50th (ft)	6	167	6	81	0	32	66	
Queue Length 95th (ft)	16	376	11	184	6	73	110	
Internal Link Dist (ft)		391		2778		1851	2257	
Turn Bay Length (ft)	220		200		110			
Base Capacity (vph)	332	2302	332	2329	1087	476	457	
Starvation Cap Reductn	0	0	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	0.05	0.54	0.05	0.31	0.12	0.27	0.47	
Intersection Summary								
Area Type:	Other							
Cycle Length: 90								
Actuated Cycle Length: 6	4.9							
Natural Cycle: 65								
Control Type: Actuated-U	ncoordinated							
Manimum de Datia 077								

Maximum v/c Ratio: 0.77 Intersection Signal Delay: 18.6 Intersection Capacity Utilization 55.1%

Analysis Period (min) 15

Splits and Phases: 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

	Ø2	Ø4
18 s	46 s	26 s
√ Ø5	→ Ø6	≪ † ø8
18 s	46 s	26 s

Intersection LOS: B

ICU Level of Service B

Assigned Phs	
Case No	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green (Gmax), s	
Max Allow Headway (MAH), s	
Max Q Clear (g_c+l1), s	
Green Ext Time (g_e), s	
Prob of Phs Call (p_c)	
Prob of Max Out (p_x)	
Left-Turn Movement Data	

Through Movement Data Assigned Mvmt Mvmt Sat Flow, veh/h

Right-Turn Movement Data Assigned Mvmt Mvmt Sat Flow, veh/h

VHB

Synchro 9 Report

2040 No Build AM.syn

2040 No Build AM

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NBR SBL SBT SBR

Synchro 9 Report 2040 No Build AM.syn

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US 460 Corridor Safety Study 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

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Movement	FRI	FRT	FBR	• WRI	WRT	WRR	NRI	NRT	NBR	SBI	SBT	SBR
Lane Configurations	K	A1.	LDIX	K	**	1	NDL	4	NDIX	ODL	4	
Traffic Volume (veh/h)	9	1041	77	6	651	78	44	25	15	118	35	4
Future Volume (veh/h)	9	1041	77	6	651	78	44	25	15	118	35	4
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	18	1132	115	18	731	132	59	36	33	144	58	12
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	38	1592	162	38	1736	777	184	109	74	271	81	15
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
Prop Arrive On Green	0.02	0.49	0.49	0.02	0.49	0.49	0.17	0.17	0.17	0.17	0.17	0.17
Ln Grp Delay, s/veh	40.4	14.6	14.6	40.4	10.8	9.3	24.5	0.0	0.0	26.8	0.0	0.0
Ln Grp LOS	D	В	В	D	В	A	С			С		
Approach Vol, veh/h		1265			881			128			214	
Approach Delay, s/veh		15.0			11.2			24.5			26.8	
Approach LOS		В			В			С			С	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		8.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		8.2	38.6		18.1	8.2	38.6		18.1			
Change Period (Y+Rc), s		6.8	6.8		6.8	6.8	6.8		* 6.8			
Max Green (Gmax), s		11.2	39.2		19.2	11.2	39.2		* 20			
Max Allow Headway (MAH), s		3.6	4.7		5.0	3.6	4.7		5.0			
Max Q Clear (g_c+I1), s		2.7	10.6		10.1	2.7	19.7		0.3			
Green Ext Time (g_e), s		0.0	15.2		1.2	0.0	12.1		1.5			
Prob of Phs Call (p_c)		0.28	1.00		1.00	0.28	1.00		1.00			
Prob of Max Out (p_x)		0.00	0.42		0.22	0.00	0.00		0.04			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			1025	1774			596			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		467		3245		629			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		89		329		426			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Prot)			L+T+R	(Prot)			L+T+R			

US 460 Corridor Safety Study 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard 2040 No Build AM

	1	٥	٥	1	1	٥	٥	1	
Cro Vol (v) voh/h	19	0	0	21/	10	0	0	128	
Grp Vol (V), Vel/II	1774	0	0	1591	1774	0	0	1651	
O Sonyo Timo (g. s) s	0.7	0.0	0.0	3.0	0.7	0.0	0.0	0.0	
Q Serve Time (Q_{s}), s	0.7	0.0	0.0	9.0 9.1	0.7	0.0	0.0	0.0	
Derm LT Set Flow (a, l), yeb/b/lp	0.7	0.0	0.0	1252	0.7	0.0	0.0	4.0	
Shared LT Sat Flow (S_I), Vel // // // //	0	0	0	1303	0	0	0	1002	
Derm LT Eff Croop (g_p) o	0.0	0	0	11.2	0	0.0	0	1075	
Perm LT Ell Green (g_p), s	0.0	0.0	0.0	7.0	0.0	0.0	0.0	11.3	
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	7.0	0.0	0.0	0.0	3.2	
Ferm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	
Time to First Bik (g_1), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	2.3	
Serve Time pre Bik (g_is), s	0.0	0.0	0.0	0.4	1.00	0.0	0.0	2.3	
	1.00	0.00	0.00	0.07	1.00	0.00	0.00	0.40	
Lane Grp Cap (c), ven/n	38	0	0	367	38	0	0	368	
V/C Ratio (X)	0.48	0.00	0.00	0.58	0.48	0.00	0.00	0.35	
Avail Cap (c_a), ven/h	306	0	0	545	306	0	0	564	
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	31.4	0.0	0.0	25.3	31.4	0.0	0.0	23.9	
Incr Delay (d2), s/veh	9.0	0.0	0.0	1.5	9.0	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	
Control Delay (d), s/veh	40.4	0.0	0.0	26.8	40.4	0.0	0.0	24.5	
1st-Term Q (Q1), veh/In	0.3	0.0	0.0	3.6	0.3	0.0	0.0	2.0	
2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
%ile Back of Q (50%), veh/In	0.4	0.0	0.0	3.8	0.4	0.0	0.0	2.1	
%ile Storage Ratio (RQ%)	0.05	0.00	0.00	0.04	0.05	0.00	0.00	0.03	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	8	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	731	0	0	0	617	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	8.6	0.0	0.0	0.0	17.7	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	8.6	0.0	0.0	0.0	17.7	0.0	0.0	
Lane Grp Cap (c), veh/h	0	1736	0	0	0	868	0	0	
V/C Ratio (X)	0.00	0.42	0.00	0.00	0.00	0.71	0.00	0.00	
Avail Cap (c_a), veh/h	0	2138	0	0	0	1069	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	10.6	0.0	0.0	0.0	12.9	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	1.7	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	10.8	0.0	0.0	0.0	14.6	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	4.2	0.0	0.0	0.0	8.6	0.0	0.0	

US 460 Corridor Safety 3 4: Providence Road/Lak	Study e Prince	Drive	& US4	60/Pru	den Bo	ouleva	rd		2040 No Build AM
2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	4.2	0.0	0.0	0.0	9.0	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.59	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment		R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	132	0	0	0	630	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1805	0	0	
Q Serve Time (g_s), s	0.0	3.0	0.0	0.0	0.0	17.7	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	3.0	0.0	0.0	0.0	17.7	0.0	0.0	
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.06	0.00	0.18	0.00	0.26	
Lane Grp Cap (c), veh/h	0	777	0	0	0	885	0	0	
V/C Ratio (X)	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	
Avail Cap (c_a), veh/h	0	957	0	0	0	1090	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	9.2	0.0	0.0	0.0	12.9	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	1.7	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	9.3	0.0	0.0	0.0	14.6	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	1.3	0.0	0.0	0.0	8.8	0.0	0.0	
2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	1.3	0.0	0.0	0.0	9.2	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.31	0.00	0.00	0.00	0.60	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		15.1							

HCM 2010 LOS

VHB

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

В

VHB

Synchro 9 Report 2040 No Build AM.syn

Synchro 9 Report 2040 No Build AM.syn

Lane Group
Lane Configurations
Traffic Volume (vph)
Future Volume (vph)
Ideal Flow (vphpl)
Lane Util. Factor
Frt
Flt Protected
Satd. Flow (prot)
Flt Permitted
Satd. Flow (perm)
Link Speed (mph)
Link Distance (ft)
Travel Time (s)
Peak Hour Factor
Adj. Flow (vph)
Shared Lane Traffic (%)
Lane Group Flow (vph)
Sign Control
Intersection Summary
Area Type:
Area Type.
Intersection Capacity Lit
Analysis Pariod (min) 15
Analysis Fellou (IIIII) 13

VHB

Appendix D

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard

2040 No Build AM

	-	\mathbf{F}	1	-	1	1
	EBT	EBR	WBL	WBT	NBL	NBR
าร	≜ †}			<u></u>		1
h)	1159	0	0	738	0	2
h)	1159	0	0	738	0	2
	1900	1900	1900	1900	1900	1900
	0.95	0.95	1.00	0.95	1.00	1.00
						0.865
	3539	0	0	3539	0	1611
	3539	0	0	3539	0	1611
	55			55	25	
	1965			471	1166	
	24.4			5.8	31.8	
	0.96	0.92	0.92	0.95	0.25	0.25
	1207	0	0	777	0	8
ic (%)						
(vph)	1207	0	0	777	0	8
,	Free			Free	Stop	
lary	01					
	Other					
ignalize	d 11 40 00/			10		() ·
city Utiliz	zation 42.0%			IC	U Level	of Service
nin) 15						

0.1

_**≜**î≽

1159

Traffic Vol, veh/h 1159 0 0 738 0 2

Conflicting Peds, #/hr 0 0 0 0 0 0

- -

Veh in Median Storage, # 0 - - 0 0 -

Major1 Major2

- -Mov Cap-1 Maneuver - - - - - 441

EB HCM Control Delay, s 0 0 13.3

Minor Lane/Major Mvmt NBLn1 EBT EBR WBT

0.018

0

0

Intersection

Movement

Sign Control

Grade, %

Mvmt Flow

Major/Minor

Stage 1

Int Delay, s/veh

Lane Configurations

Future Vol. veh/h

RT Channelized

Storage Length

Peak Hour Factor

Heavy Vehicles, %

Conflicting Flow All

Stage 2 Critical Hdwy

Critical Hdwy Stg 1

Critical Hdwy Stg 2

Pot Cap-1 Maneuver

Platoon blocked, %

Mov Cap-2 Maneuver

Stage 2

Follow-up Hdwy

Stage 1 Stage 2

Stage 1

Approach

HCM LOS

Capacity (veh/h)

HCM Lane LOS

HCM Lane V/C Ratio

HCM Control Delay (s)

HCM 95th %tile Q(veh)

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard

EBT EBR WBL WBT NBL

44

0

0

Minor1

0

0 738

Free Free Free Free Stop Stop

- -

 96
 92
 92
 95
 25
 25

 2
 2
 2
 2
 2
 2
 2
 2

1207 0 0 777 0 8

0 0 - - - 604

- - - - 6.94

- - - - - -

- - 0 - 0 -

- - 0 - 0 -

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441 - - -

13.3 - - -

B - - -0.1 - - -

--

NB

R

WB

- - - - - -

- - - - - - 3.32 - - 0 - 0 441

0

- None - None - None

2040 No Build AM

US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

Lane Group

Lane Configurations

Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Storage Length (ft)

Storage Lanes

Taper Length (ft)

Lane Util. Factor

Satd. Flow (prot)

Satd, Flow (perm)

Link Speed (mph)

Link Distance (ft)

Travel Time (s)

Peak Hour Factor

Adj. Flow (vph)

Sign Control

Area Type:

Shared Lane Traffic (%)

Lane Group Flow (vph)

Intersection Summary

Control Type: Unsignalized

Analysis Period (min) 15

Intersection Capacity Utilization 39.3%

Flt Protected

Flt Permitted

Frt

⊁

EBL

4 768

0

0

25

→

1

0.999

55

42.2

Free

Other

3402

0.999

EBT

4 768

 \mathbf{i}

1

20

20

340

0.850

2040 No Build AM

0

0

0.932

0.976

0.976

45

2290

34.7

Stop

0 1694

0 1694

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1

Ο

25

74

74

300

0.850

1583

1583

1

3

3

0.960

0.960

45

2230

33.8

Stop

0 1788

0 1788

* *

0

0

0

0 0

0.95 0.95 1.00 1.00 0.95 0.95 1.00 1.00 1.00 1.00 1.00 1.00 1.00

0

0

0.38 0.89 0.80 0.68 0.90 0.92 0.41 0.25 0.34 0.25 0.92 0.25

11 863 25 35 549 0 63 12 218 4 0 4

0 874 25 35 549 0 0 75 218 0 8 0

26

26

0

25

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WBT

55

5235

64.9

Free

ICU Level of Service A

24 494

24 494

1

3 **≜**î,

400

125

1 1

0.950

0.950

0 3536 1583 1770 3539

0 3536 1583 1770 3539

US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		^	1	5	≜t ⊾			र्भ	1		4	
Traffic Vol. veh/h	4	768	20	24	494	0	26	3	74	1	0	1
Future Vol. veh/h	4	768	20	24	494	0	26	3	74	1	0	1
Conflicting Peds. #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sian Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None		-	None	-	-	None
Storage Length	-		340	400	-	-	-		300	-	-	-
Veh in Median Storage	# -	0	-	-	0	-	-	0	-	-	0	-
Grade %	-	0	-	-	0	-		0	-		0	
Peak Hour Factor	38	89	80	68	90	92	41	25	34	25	92	25
Heavy Vehicles %	2	2	2	2	2	2	2	20	2	20	2	20
Mymt Flow	11	863	25	35	540	0	63	12	218	1	<u>د</u>	1
	11	005	20		040	0	00	12	210	+	0	4
Major/Minor N	/lajor1			Major2		1	Minor1		1	Ainor2		
Conflicting Flow All	549	0	0	863	0	0	1229	1503	431	1078	1503	274
Stage 1	-	-	-	-	-	-	884	884	-	619	619	-
Stage 2	-	-	-	-	-	-	345	619	-	459	884	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1017	-	-	775	-	-	134	120	573	173	120	724
Stage 1	-	-	-	-	-	-	307	362	-	443	478	-
Stage 2	-	-	-	-	-	-	644	478	-	551	362	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1017	-	-	775	-	-	127	112	573	94	112	724
Mov Cap-2 Maneuver	-	-	-	-	-	-	127	112	-	94	112	-
Stage 1	-	-	-	-	-	-	301	354	-	434	456	-
Stage 2	-			-	-	-	612	456	-	323	354	
	_											
Approach	EB	_	_	WB		_	NB			SB		_
HCM Control Delay, s	0.1			0.6			29.5			27.8		
HCM LOS							D			D		
Minor Lane/Major Mvmt	t I	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1		
Capacity (veh/h)		124	573	1017	-	-	775	-	-	166		
HCM Lane V/C Ratio		0.608	0.38	0.01	-	-	0.046	-	-	0.048		
HCM Control Delay (s)		71.2	15.1	8.6	-	-	9.9	-	-	27.8		
HCM Lane LOS		F	C	A			Α		-	o		
HCM 95th %tile Q(veh)		31	18	0	-	-	0.1	-	-	0.2		
		0.1	1.0	5			0.1			0.2		

Major/Minor	Major1	
Conflicting Flow All	549	
Stage 1	-	
Stage 2	-	
Critical Hdwy	4.14	
Critical Hdwy Stg 1	-	
Critical Hdwy Stg 2	-	
Follow-up Hdwy	2.22	
Pot Cap-1 Maneuver	1017	
Stage 1	-	
Stage 2	-	
Platoon blocked, %		
Mov Cap-1 Maneuver	1017	
Mov Cap-2 Maneuver	-	
Stage 1	-	
Stage 2	-	
Annroach	FR	
HCM Control Dolay	0.1	_
HCM LOS	0.1	

/linor Lane/Major Mvmt	NBLn
Capacity (veh/h)	124
ICM Lane V/C Ratio	0.60
ICM Control Delay (s)	71.
ICM Lane LOS	I
ICM 95th %tile Q(veh)	3.1

VHB

Synchro 9 Report 2040 No Build AM.syn

VHB

Synchro 9 Report 2040 No Build AM.syn

VHB

D-28 | ROUTE 460 SAFETY AND OPERATIONS STUDY

US 460 Corridor Safety Study 7: Dominion Way & US 460/Windsor Boulevard

	-	\mathbf{r}	4	-	1	1
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	44	1	3	*	3	1
Traffic Volume (vph)	810	60	63	461	4	8
Future Volume (vph)	810	60	63	461	4	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		180	325		0	0
Storage Lanes			1		1	1
Taper Length (ft)			225		25	
Lane Util Factor	0.95	1 00	1 00	0.95	1 00	1.00
Frt	0.00	0.850	1.00	0.00	1.00	0.850
Fit Protected		0.000	0 950		0 950	0.000
Satd Flow (prot)	3530	1583	1770	3530	1770	1583
Elt Dermitted	2029	1303	0.200	0009	0.050	1000
Satd Flow (porm)	3530	1592	0.290	3520	1770	1592
Dight Turp on Dod	3238	1000	540	2228	1770	1000
		100				Tes
Sald. FIOW (KTUK)		109			05	18
Link Speed (mph)	55			55	25	
LINK Distance (ft)	709			3402	1205	
Travel Time (s)	8.8			42.2	32.9	
Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44
Adj. Flow (vph)	900	109	117	524	8	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	900	109	117	524	8	18
Turn Type	NA	Perm	D.P+P	NA	Prot	Prot
Protected Phases	2		1	6	4	4
Permitted Phases		2	2			
Detector Phase	2	2	1	6	4	4
Switch Phase	_					
Minimum Initial (s)	15.0	15.0	70	15.0	5.0	5.0
Minimum Solit (s)	21.5	21.5	16.0	21.5	11.0	11.0
Total Split (s)	47.0	47.0	21.0	68.0	26.0	26.0
Total Split (%)	50.0%	50.0%	21.0	72 3%	20.0	20.0
Maximum Crean (a)	JU.U /0	JU.0 /0	10.0	12.3 /0 64 E	21.1 /0	21.1 /0
Vallew Time (a)	40.5	40.5	12.0	01.5	20.0	20.0
Tellow Time (S)	0.5	5.5	5.0	5.5	3.0	3.0
All-Red Time (s)	1.0	1.0	4.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	9.0	6.5	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	65.2	65.2	70.9	86.3	6.1	6.1
Actuated g/C Ratio	0.69	0.69	0.75	0.92	0.06	0.06
v/c Ratio	0.37	0.10	0.23	0.16	0.07	0.15
Control Delay	7.5	1.9	3.5	1.3	42.0	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	1.9	3.5	1.3	42.0	21.1
105	Δ	Δ	Δ	Δ	. <u></u> 0	
Annroach Delay	0.0	~	~	17	27 5	U
	0.9			1.7	21.5	
Approach LUS	A			A	C	

US 460 Corridor S	Safety Stu	ıdy					2040 No Build AM
7: Dominion Way	& US 460)/Winc	lsor Bo	ouleva	rd		
	-	\mathbf{F}	4	+	٠	۲	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Queue Length 50th (ft)	77	0	3	0	5	0	
Queue Length 95th (ft)	188	2	15	41	11	5	
Internal Link Dist (ft)	629			3322	1125		
Turn Bay Length (ft)		180	325				
Base Capacity (vph)	2452	1130	585	3247	376	350	
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	0.37	0.10	0.20	0.16	0.02	0.05	
Intersection Summary							
Area Type:	Other						
Cycle Length: 94							
Actuated Cycle Length: 94	1						
Offset: 73 (78%), Reference	ced to phase	2:EBWB	and 6:WE	3T, Start o	of Green		
Natural Cycle: 50							
Control Type: Actuated-Co	pordinated						
Maximum v/c Ratio: 0.37							
Intersection Signal Delay:	5.3			In	tersectior	n LOS: A	
Intersection Capacity Utiliz	zation 50.3%			IC	U Level o	of Service	A
Analysis Period (min) 15							

Splits and Phases: 7: Dominion Way & US 460/Windsor Boulevard

Ø1	🖉 🥌 Ø2 (R)	▲ ₩Ø4	
21 s	47 s	26 s	
	•		
68 s			

	-	~	•	+	•	~			
Movement	FRT	FRR	WRI	WRT	NRI	NRR			
	**	1	K	**	K	1			
Traffic Volume (voh/h)	810	60	63	461	4	9			
Future Volume (veh/h)	810	00	63	461	4	8			
Number	2	12	1	6	7	14			
Initial O veh	0	0	0	0	0	0			
Ped-Bike Adi (A phT)	0	1.00	1 00	0	1.00	1.00			
Parking Bus Adi	1 00	1.00	1.00	1.00	1.00	1.00			
Adi Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863			
Adi Flow Rate veh/h	900	1000	117	524	8	18			
Adj No. of Lanes	200	103	1	2	1	10			
Peak Hour Eactor	0.90	0.55	0.54	0.88	0.50	0.44			
Percent Heavy Veh %	2.55	2.05	2.04	2	2	2			
Opposing Right Turn Influence	<u> </u>	2	Yee	2	Yee	2			
Can veh/h	2386	1067	516	2976	47	42			
HCM Platoon Ratio	1 00	1 00	1.00	1 00	1 00	1 00			
Pron Arrive On Green	0.67	0.67	0.07	0.84	0.03	0.03			
In Grn Delay, s/veh	7.2	5.6	4.0	1.5	46.5	52.1			
In Grn LOS	Δ	Δ	μ.υ Δ	Δ	-0.0 D	D			
Approach Vol. veh/h	1009		~	641	26	U			
Approach Delay, s/veh	7.0			2.0	50.4				
Approach LOS	A			2.0 A	D				
Timer		1	2	3		5	6	7	Q
Assigned Des		1	2	3	4	5	6	1	0
		10	7.0		4		0		
Case No		1.2	7.0		9.0		4.0		
Change Deried (V · De) . c		10.7	09.9		0.0		65.5		
Max Croop (Cmax) a		9.0	0.0		20.0		0.0		
Max Allow Headway (MAH)		12.0	40.5		20.0		01.5		
Max Allow Headway (MAH), S		3.0	4.7		4.0		4.7		
Green Ext Time (a. a) a		0.1	10.4		0.1		4.0		
Prob of Phs Call (n. c)		0.1	1.00		0.0		1 00		
Prob of Max Out (p_c)		0.95	0.15		0.49		0.01		
r rob or wax Out (p_x)		0.01	0.13		0.00		0.01		
Left-Turn Movement Data									
Assigned Mvmt		1	5		7				
Mvmt Sat Flow, veh/h		1774	0		1774				
Through Movement Data									
Assigned Mvmt			2		4		6		
Mvmt Sat Flow, veh/h			3632		0		3632		
Pight-Turn Movement Data									
Ngnt-Turn wovement Data			10		14		16		
Assigned Mvmt			12						
Assigned Mvmt Mvmt Sat Flow, veh/h			1583		1583		0		
Assigned Mvmt Mvmt Sat Flow, veh/h			1583		1583		0		
Assigned Mvmt Mvmt Sat Flow, veh/h Left Lane Group Data Assigned Mvmt		1	1583	0	1583	0	0	0	0

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Appendix D

US 460 Corridor Safety Study 7: Dominion Way & US 460/Windsor Boulevard

2040 No Build AM

T: Dominion Way & US 460/Wind Lanes in Grp 1 Grp Vol (v), veh/h 117 Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_s), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0 0 0.0 0.0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0.0 0.0 0 0 0	1 8 1774 0.4 0.4 1774	0 0 0 0.0 0.0	0 0 0	0	0	 7: Dominion 2nd-Term Q (Q2 3rd Term Q (Q3
Lanes in Grp 1 Grp Vol (v), veh/h 117 Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0 0.0 0.0 0 0 0 0.0 0.0	0 0 0.0 0.0 0.0 0	1 8 1774 0.4 0.4 1774	0 0 0.0 0.0	0 0 0	0 0	0 0	2nd-Term Q (Q2 3rd-Term Q (Q3
Lanes in Grp 1 Grp Vol (v), veh/h 117 Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0 0.0 0.0 0 0 0.0 0.0	0 0 0.0 0.0 0 0	1 8 1774 0.4 0.4 1774	0 0 0.0 0.0	0 0 0	0 0	0	2nd-Term Q (Q2 3rd-Term Q (Q3
Lanes in Grp 1 Grp Vol (v), veh/h 117 Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0 0.0 0.0 0 0 0.0 0.0	0 0 0.0 0.0 0 0	1 8 1774 0.4 0.4 1774	0 0 0.0 0.0	0 0 0	0	0	2nd-Term Q (Q2 3rd-Term Q (Q3)
Grp Vol (v), veh/h 117 Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0.0 0.0 0 0 0 0.0 0.0	0 0.0 0.0 0 0 0	8 1774 0.4 0.4 1774	0 0 0.0 0.0	0 0	0	0	3rd-Term O (O3)
Grp Sat Flow (s), veh/h/ln 1774 Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0.0 0.0 0 0 0.0 0.0	0 0.0 0.0 0 0	1774 0.4 0.4 1774	0 0.0 0.0	0	0		
Q Serve Time (g_s), s 1.6 Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0.0 0.0 0 0.0 0.0 0.0	0.0 0.0 0 0	0.4 0.4 1774	0.0 0.0	0.0	v	0	%ile Back of Q F
Cycle Q Clear Time (g_c), s 1.6 Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0.0 0 0.0 0.0	0.0	0.4	0.0	0.0	0.0	0.0	%ile Back of Q (
Perm LT Sat Flow (s_l), veh/h/ln 556 Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0 0.0 0.0	0	1774		0.0	0.0	0.0	 %ile Storage Ra
Shared LT Sat Flow (s_sh), veh/h/ln 0	0 0.0 0.0	0		0	0	0	0	Initial Q (Qb), ve
	0.0	0.0	0	0	0	0	0	Final (Residual)
Perm LT Eff Green (g_p), s 65.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Delay (ds), s
Perm LT Serve Time (g_u), s 52.9	~ ~	0.0	0.0	0.0	0.0	0.0	0.0	Sat Q (Qs), veh
Perm LT Q Serve Time (g_ps), s 3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Sat Cap (cs), ve
Time to First Blk (g_f), s 0.0	63.4	0.0	0.0	0.0	0.0	0.0	0.0	Initial Q Clear Ti
Serve Time pre Blk (g_fs), s 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Right Lane Grou
Prop LT Inside Lane (P_L) 1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	 Assigned Mymt
Lane Grp Cap (c), veh/h 516	0	0	47	0	0	0	0	Lane Assignmer
V/C Ratio (X) 0.23	0.00	0.00	0.17	0.00	0.00	0.00	0.00	Lanes in Grn
Avail Cap (c_a), veh/h 616	0	0	377	0	0	0	0	Grn Vol (v) veh/
Upstream Filter (I) 1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	Grn Sat Flow (s)
Uniform Delay (d1), s/veh 3.8	0.0	0.0	44.8	0.0	0.0	0.0	0.0	O Serve Time (o
Incr Delay (d2), s/veh 0.2	0.0	0.0	1.7	0.0	0.0	0.0	0.0	Cycle O Clear Ti
Initial Q Delay (d3), s/veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Drot DT Sat Elou
Control Delay (d), s/veh 4.0	0.0	0.0	46.5	0.0	0.0	0.0	0.0	Prot PT Eff Groc
1st-Term Q (Q1), veh/In 0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Prop PT Outside
2nd-Term Q (Q2), veh/ln 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	PTOP RT Outside
3rd-Term Q (Q3), veh/In 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Lane Grp Cap (C
%ile Back of Q Factor (f_B%) 1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	V/C Ratio (X)
%ile Back of Q (50%), veh/ln 0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0	Avail Cap (c_a),
%ile Storage Ratio (RQ%) 0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	Upstream Filter
Initial Q (Qb), veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Uniform Delay (d
Final (Residual) Q (Qe), veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Incr Delay (d2),
Sat Delay (ds), s/veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Initial Q Delay (d
Sat Q (Qs), veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Control Delay (d
Sat Cap (cs), veh/h 0	0	0	0	0	0	0	0	Ist-Term Q (Q1)
Initial Q Clear Time (tc), h 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Zna-Term Q (Q2
Middle Long Crown Date								3rd-Term Q (Q3)
						0	0	%IIE Back of Q F
Assigned MVML 0	2 T	0	4	0	0	0	U	%ile Back of Q (
	1	٥	٥	٥	1	٥	٥	%Ile Storage Ra
Lanes in Grp 0	2	0	0	0	2	0	0	initial Q (Qb), ve
Grp Vol (V), Ven/m	900	0	0	0	524	0	0	Final (Residual)
Grp Sat Flow (s), ven/n/in 0	1770	0	0	0	1//0	0	0	Sat Delay (ds), s
Q Serve Time (g_s), s 0.0	10.4	0.0	0.0	0.0	2.0	0.0	0.0	Sat Q (Qs), Ven
Cycle Q Clear Time (g_c), s 0.0	10.4	0.0	0.0	0.0	2.0	0.0	0.0	Sat Cap (cs), ve
Lane Grp Cap (c), ven/n 0	2386	0	0	0	2976	0	0	Initial Q Clear 11
	0.38	0.00	0.00	0.00	0.18	0.00	0.00	Intersection Sur
Avail Cap (c_a), ven/n 0	2386	0 00	0 00	0 00	29/6	0 00	0 00	HCM 2010 Ctrl [
Upstream Fliter (I) 0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	HCM 2010 LOS
Uniform Delay (d1), s/ven 0.0	6.7	0.0	0.0	0.0	1.4	0.0	0.0	
Incr Delay (d2), s/ven 0.0	0.5	0.0	0.0	0.0	0.1	0.0	0.0	
Initial Q Delay (d3), s/veh 0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/ven 0.0	1.2	0.0	0.0	0.0	1.5	0.0	0.0	
Ist-Term Q (Q1), ven/in 0.0	5.0	0.0	0.0	0.0	1.2	0.0	0.0	

2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
%ile Back of Q (50%), veh/ln	0.0	5.2	0.0	0.0	0.0	1.3	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.20	0.00	0.00	0.00	0.01	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	0	
Lane Assignment		R		R					
Lanes in Grp	0	1	0	1	0	0	0	0	
Grp Vol (v), veh/h	0	109	0	18	0	0	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	0	0	0	
Q Serve Time (q s), s	0.0	2.3	0.0	1.1	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g c), s	0.0	2.3	0.0	1.1	0.0	0.0	0.0	0.0	
Prot RT Sat Flow (s R) veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R) s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P R)	0.00	1 00	0.00	1 00	0.00	0.00	0.00	0.00	
ane Grn Can (c) veh/h	0.00	1067	0	42	0.00	0	0.00	0.00	
V/C Ratio (X)	0.00	0.10	0.00	0.43	0.00	0.00	0.00	0.00	
Avail Cap (c, a) veh/h	0	1067	0.00	337	0.00	0.00	0.00	0	
Upstream Filter (I)	0.00	1 00	0.00	1 00	0.00	0.00	0.00	0.00	
Uniform Delay (d1) s/veh	0.0	5.4	0.0	45.1	0.0	0.0	0.0	0.0	
Incr Delay (d2) s/veh	0.0	0.1	0.0	7.0	0.0	0.0	0.0	0.0	
Initial Q Delay (d3) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d) s/veh	0.0	5.6	0.0	52.1	0.0	0.0	0.0	0.0	
1st-Term () (()) veh/ln	0.0	1.0	0.0	0.5	0.0	0.0	0.0	0.0	
2nd-Term Q (Q2) veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
3rd-Term Q (Q3) veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of O Factor (f B%)	0.0	1.00	0.00	1 00	0.00	1.00	0.00	0.00	
%ile Back of O (50%) veh/lp	0.00	1.00	0.00	0.5	0.00	0.0	0.00	0.00	
%ile Storage Patio (PO%)	0.0	0.14	0.0	0.0	0.0	0.0	0.0	0.0	
Initial O (Ob) veb	0.00	0.14	0.00	0.01	0.00	0.00	0.00	0.00	
Final (Residual) O (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (de) s/yeb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat O (Oc) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Can (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
$\operatorname{Dat} \operatorname{Dap} (\operatorname{Dap} (\operatorname{Dap} (\operatorname{Tap} (\operatorname{ta})))$	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		5.7							
HCM 2010 LOS		A							

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1: US 460/Pruden Boulevard & Northfield Drive .

	_	-	•	•		*	*	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
Lane Configurations	5	44	ŋ	^	1	5	1	_
Traffic Volume (vph)	11	1558	0	1607	71	66	28	
Future Volume (vph)	11	1558	0	1607	71	66	28	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	305		125		195	0	155	
Storage Lanes	1		1		1	1	1	
Taper Length (ft)	190		200			0		
Lane Util, Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Frt					0.850		0.850	
Fit Protected	0.950					0.950		
Satd, Flow (prot)	1770	3539	1863	3539	1583	1770	1583	
Flt Permitted	0.050					0.950		
Satd. Flow (perm)	93	3539	1863	3539	1583	1770	1583	
Right Turn on Red					Yes		Yes	
Satd. Flow (RTOR)					71		74	
Link Speed (mph)		55		55		25		
Link Distance (ft)		537		2299		1306		
Travel Time (s)		6.7		28.5		35.6		
Peak Hour Factor	0.58	0.94	0.92	0.82	0.63	0.58	0.38	
Adj. Flow (vph)	19	1657	0	1960	113	114	74	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	19	1657	0	1960	113	114	74	
Turn Type	pm+pt	NA	pm+pt	NA	Prot	Prot	Prot	
Protected Phases	1	6	5	2	2	7	4	
Permitted Phases	6	· ·	2	-	-			
Detector Phase	1	6	5	2	2	7	4	
Switch Phase								
Minimum Initial (s)	5.0	15.0	5.0	15.0	15.0	7.0	7.0	
Minimum Split (s)	13.3	23.3	9.5	34.9	34.9	14.4	14.4	
Total Split (s)	18.0	69.0	18.0	69.0	69.0	23.0	23.0	
Total Split (%)	16.4%	62.7%	16.4%	62.7%	62.7%	20.9%	20.9%	
Maximum Green (s)	97	60 7	13.5	61 1	61 1	15.6	15.6	
Yellow Time (s)	4.8	4.8	3.5	4.8	4.8	4.0	4.0	
All-Red Time (s)	3.5	3.5	1.0	3.1	3.1	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	8.3	8.3	4.5	7.9	7.9	74	74	
Lead/Lag	Lead	Lan	Lead	l an	l an	1.4	7.4	
Lead-Lag Ontimize?	Loud	Lug	Louu	Lug	Lug			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	
Walk Time (s)	NOUG	0-iviii1	NULLE	7 0	7 0	NULLE	NULLE	
Flash Dont Walk (c)				20.0	20.0			
Padastrian Calls (#/br)				20.0	20.0			
Act Effet Groop (c)	80.0	80.0		76.9	76.9	10.1	10.1	
Actuated a/C Patio	02.2	02.2		0.70	0.0	0.11	0.11	
Nolualeu y/C Rallu	0.75	0.75		0.70	0.70	0.11	0.11	
Control Dolay	0.12	11 5		16.0	0.10	0.09	12 5	
Outline Delay	4.3	0.0		10.9	3.9	0.0	13.5	
Queue Delay	0.0	0.0		16.0	0.0	0.0 E9 F	0.0 12 F	
Total Delay	4.3	11.5		10.9	3.9	50.5	13.5	

1: US 460/Pruden	Bouleva	rd & N	lorthfie	ld Driv	/e			2040 No Build
	٨	+	ł	Ļ	•	*	~	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
LOS	А	В		В	Α	E	В	
Approach Delay		11.4		16.2		40.8		
Approach LOS		В		В		D		
Queue Length 50th (ft)	6	466		349	7	78	0	
Queue Length 95th (ft)	m2	399		627	18	82	0	
Internal Link Dist (ft)		457		2219		1226		
Turn Bay Length (ft)	305				195		155	
Base Capacity (vph)	217	2645		2472	1127	251	288	
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	0.09	0.63		0.79	0.10	0.45	0.26	
Intersection Summary								
Area Type:	Other							
Cycle Length: 110								
Actuated Cycle Length: 11	0							
Offset: 61 (55%), Reference	ed to phase	2:WBTU	and 6:EB	TL, Start	of Green			
Natural Cycle: 90								
Control Type: Actuated-Co	ordinated							
Maximum v/c Ratio: 0.79								
Intersection Signal Delay:	15.3			In	tersection	LOS: B		
Intersection Capacity Utiliz	ation 63.0%			IC	CU Level c	of Service	В	
Analysis Period (min) 15								
m Volumo for 05th porco	ntilo auquo i	e motoro	h hu unetr	oom cian	ol .			

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

Splits and Pha	ases:	1: US 460/Pruden Boulevard & Northfield Drive		
		4 Φ ¹ ² ² (R)		4
18 s		69 s		23 s



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Appendix D

2040 No Build

1: US 460/Pruden Boulevard & Northfield Drive

HCM 2010 cannot analyze U-Turning movements.

2: US460/Pruden B	JS460/Pruden Boulevard & Rob's Drive 2040 N								lo Build			
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	<u> </u>	¢β		<u> </u>	<u></u>	1		ų	7		4	
Traffic Volume (vph)	6	1442	5	27	1520	140	8	8	39	35	1	7
Future Volume (vph)	6	1442	5	27	1520	140	8	8	39	35	1	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	400		175	0		50	0		0
Storage Lanes	1		0	1		1	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850			0.850		0.978	
Flt Protected	0.950			0.950				0.969			0.961	
Satd. Flow (prot)	1770	3536	0	1770	3539	1583	0	1805	1583	0	1751	0
Flt Permitted	0.950			0.950				0.816			0.746	
Satd. Flow (perm)	1770	3536	0	1770	3539	1583	0	1520	1583	0	1359	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				147			98		8	
Link Speed (mph)		35			35			25			30	
Link Distance (ft)		2499			463			411			171	
Travel Time (s)		48.7			9.0			11.2			3.9	
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Adj. Flow (vph)	13	1487	8	46	1583	233	20	11	89	55	2	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	1495	0	46	1583	233	0	31	89	0	68	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8		8	4		
Detector Phase	1	6		5	2	2	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0	5.0	7.0	7.0	
Minimum Split (s)	11.1	21.8		11.1	21.8	21.8	11.1	11.1	11.1	13.1	13.1	
Total Split (s)	21.0	62.0		21.0	62.0	62.0	27.0	27.0	27.0	27.0	27.0	
Total Split (%)	19.1%	56.4%		19.1%	56.4%	56.4%	24.5%	24.5%	24.5%	24.5%	24.5%	
Maximum Green (s)	14.9	55.2		14.9	55.2	55.2	20.9	20.9	20.9	20.9	20.9	
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.1	6.8		6.1	6.8	6.8		6.1	6.1		6.1	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						_
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	_
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None	None	None	None	
Act Effect Green (s)	0.4	/8.5		8.3	85.2	85.Z		10.2	10.2		10.5	_
Actuated g/C Ratio	0.06	0.71		0.08	0.77	0.77		0.09	0.09		0.10	
V/C Katio	0.13	0.59		0.35	0.58	0.19		0.22	0.38		0.50	
Control Delay	33.3	20.3		53.9	5.0	1.9		48.1	12.2		53.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
	33.3	20.3		53.9	5.0	1.9		40.1	12.2		03.Z	
LUS Annrach Delev	C	00.4		U	A	A		D 01.5	В		D	
Approach Delay		20.4			5.8			21.5			53.2	
Approach LOS		U			A			U			U	

	٦	-	$\mathbf{\tilde{\mathbf{v}}}$	4	-	•	•	1	1	1	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBF
Queue Length 50th (ft)	8	437		35	124	10		21	0		41	
Queue Length 95th (ft)	m11	m379		m44	127	8		40	0		37	
Internal Link Dist (ft)		2419			383			331			91	
Turn Bay Length (ft)	250			400		175			50			
Base Capacity (vph)	239	2523		239	2740	1259		288	380		264	
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	0.59		0.19	0.58	0.19		0.11	0.23		0.26	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 0 (0%), Referenced t	to phase 2:	WBT and	6:EBT, S	tart of Gre	een							
Natural Cycle: 60												
Control Type: Actuated-Coo	rdinated											
Maximum v/c Ratio: 0.59												
Intersection Signal Delay: 13	3.4			In	tersectior	LOS: B						
Intersection Capacity Utiliza	tion 65.9%			IC	U Level o	of Service	С					
Analysis Period (min) 15												
	المنتمنية ماللا	e motorod	by upotr	oom cian	al							

		₩ Ø4
21 s	62 s	27 s
√ Ø5	↓ → Ø6 (R)	- 1 ₀₈
21 s	62 s	27 s

Number	1
Initial Q, veh	0
Ped-Bike Adj (A_pbT)	1.00
Parking Bus Adj	1.00
Adj Sat Flow, veh/h/ln	1863
Adj Flow Rate, veh/h	13
Adj No. of Lanes	1
Peak Hour Factor	0.46
Percent Heavy Veh, %	2
Opposing Right Turn Influence	Yes
Cap, veh/h	26
HCM Platoon Ratio	2.00
Prop Arrive On Green	0.03
Ln Grp Delay, s/veh	58.0
Ln Grp LOS	E
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	
Timer:	
Assigned Phs	
Case No	
Phs Duration (G+Y+Rc), s	
Change Period (Y+Rc), s	
Max Green (Gmax), s	
Max Allow Headway (MAH), s	
Max Q Clear (g_c+l1), s	
Green Ext Time (g_e), s	
Prob of Phs Call (p_c)	
Prob of Max Out (p_x)	
Left-Turn Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	
Through Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	
Right-Turn Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	

Movement Lane Configurations Traffic Volume (veh/h) Future Volume (veh/h)

Number

Left Lane Group Data Assigned Mvmt Lane Assignment

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	ግ	↑ ⊅		ሻ	- † †	1		र्स	1		- 4 >	
	6	1442	5	27	1520	140	8	8	39	35	1	7
	6	1442	5	27	1520	140	8	8	39	35	1	7
	1	6	16	5	2	12	3	8	18	7	4	14
	0	0	0	0	0	0	0	0	0	0	0	0
	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1863	1863	1900	1863	1863	1863	1900	1863	1863	1900	1863	1900
	13	1487	8	46	1583	233	20	11	89	55	2	11
	1	2	0	1	2	1	0	1	1	0	1	0
	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
	2	2	2	2	2	2	2	2	2	2	2	2
е	Yes			Yes			Yes			Yes		
	26	2562	14	61	2581	1155	132	61	132	132	9	16
	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.03	1.00	1.00	0.03	0.73	0.73	0.08	0.08	0.08	0.08	0.08	0.08
	58.0	0.7	0.7	69.8	8.4	5.1	47.4	0.0	54.9	51.5	0.0	0.0
	E	Α	А	E	А	A	D		D	D		
		1508			1862			120			68	
		1.2			9.5			53.0			51.5	
		A			A			D			D	
		1	2	3	4	5	6	7	8			
		1	2		4	5	6		8			
		2.0	3.0		8.0	2.0	4.0		7.0			
		7.7	87.0		15.3	9.9	84.9		15.3			
		6.1	6.8		6.1	6.1	6.8		6.1			
		14.9	55.2		20.9	14.9	55.2		20.9			
;		3.8	5.0		4.8	3.8	5.0		4.8			
		2.8	26.1		8.6	4.8	2.0		8.0			
		0.0	25.9		0.6	0.0	43.7		0.6			
		0.33	1.00		1.00	0.75	1.00		1.00			
		0.00	0.88		0.01	0.00	0.78		0.01			
		1			7	5			3			
		1774			876	1774			940			
			2		4		6		8			
			3530		110		3610		730			
			2229		110		3010		139			
			12		14		16		18			
			1583		190		19		1583			
		1	0	0	7	5	0	0	3			
		(Prot)			L+T+R	(Prot)			L+T			

2: US460/Pruden Boulevard & Rob's Drive

2040 No Build

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	13	0	0	68	46	0	0	31	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1177	1774	0	0	1679	
Q Serve Time (g_s), s	0.8	0.0	0.0	4.8	2.8	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.8	0.0	0.0	6.6	2.8	0.0	0.0	1.8	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1315	0	0	0	1423	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	1712	
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	9.2	0.0	0.0	0.0	9.2	
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	7.4	0.0	0.0	0.0	2.6	
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.1	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.5	0.0	0.0	0.0	1.1	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.81	1.00	0.00	0.00	0.65	
Lane Grp Cap (c), veh/h	26	0	0	157	61	0	0	194	
V/C Ratio (X)	0.49	0.00	0.00	0.43	0.76	0.00	0.00	0.16	
Avail Cap (c a), veh/h	240	0	0	300	240	0	0	357	
Upstream Filter (I)	0.37	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	53.0	0.0	0.0	49.7	52.7	0.0	0.0	47.0	
Incr Delay (d2), s/veh	5.1	0.0	0.0	1.9	17.1	0.0	0.0	0.4	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	58.0	0.0	0.0	51.5	69.8	0.0	0.0	47.4	
1st-Term Q (Q1), veh/ln	0.4	0.0	0.0	2.0	1.4	0.0	0.0	0.9	
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.4	0.0	0.0	2.1	1.7	0.0	0.0	0.9	
%ile Storage Ratio (RQ%)	0.04	0.00	0.00	0.49	0,11	0.00	0.00	0.06	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	8	
Lane Assignment	^	1	^	^	0		^	^	
Lanes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	1583	0	0	0	729	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	24.1	0.0	0.0	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	24.1	0.0	0.0	0.0	0.0	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2581	0	0	0	1256	0	0	
V/C Ratio (X)	0.00	0.61	0.00	0.00	0.00	0.58	0.00	0.00	
Avail Cap (c_a), veh/h	0	2581	0	0	0	1256	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.37	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	
Incr Delay (d2), s/veh	0.0	1.1	0.0	0.0	0.0	0.7	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	8.4	0.0	0.0	0.0	0.7	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	11.7	0.0	0.0	0.0	0.0	0.0	0.0	
									Currentere O Develo

nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.0	
rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
kile Back of Q Factor (f B%)	0.00	1 00	0.00	1 00	0.00	1 00	0.00	1 00	
le Back of Q (50%) veh/ln	0.0	12.0	0.0	0.0	0.0	0.3	0.0	0.0	
kile Storage Ratio (RQ%)	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	
nitial Q (Qb) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
inal (Residual) Q (Qe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
light Lane Group Data									
ssigned Mvmt	0	12	0	14	0	16	0	18	
ane Assignment		R				T+R		R	
anes in Grp	0	1	0	0	0	1	0	1	
Grp Vol (v), veh/h	0	233	0	0	0	766	0	89	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1859	0	1583	
Q Serve Time (g_s), s	0.0	5.1	0.0	0.0	0.0	0.0	0.0	6.0	
Cycle Q Clear Time (g_c), s	0.0	5.1	0.0	0.0	0.0	0.0	0.0	6.0	
rot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rop RT Outside Lane (P_R)	0.00	1.00	0.00	0.16	0.00	0.01	0.00	1.00	
ane Grp Cap (c), veh/h	0	1155	0	0	0	1320	0	132	
/C Ratio (X)	0.00	0.20	0.00	0.00	0.00	0.58	0.00	0.68	
wail Cap (c_a), veh/h	0	1155	0	0	0	1320	0	301	
lpstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.37	0.00	1.00	
Iniform Delay (d1), s/veh	0.0	4.7	0.0	0.0	0.0	0.0	0.0	49.0	
ncr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.0	0.7	0.0	5.9	
nitial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
control Delay (d), s/veh	0.0	5.1	0.0	0.0	0.0	0.7	0.0	54.9	
st-Term Q (Q1), veh/In	0.0	2.2	0.0	0.0	0.0	0.0	0.0	2.6	
nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.2	
srd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
6ile Back of Q (50%), veh/ln	0.0	2.3	0.0	0.0	0.0	0.3	0.0	2.8	
6ile Storage Ratio (RQ%)	0.00	0.34	0.00	0.00	0.00	0.00	0.00	1.44	
nitial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
inal (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	U	0	0	0	U	0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Itersection Summary		0.2							
Civi 2010 Ctri Delay		8.3							

2: US460/Pruden Boulevard & Rob's Drive

VHB

Synchro 9 Report 2040 No Build PM.syn

VHB

Synchro 9 Report 2040 No Build PM.syn

2040 No Build

Approach Delay Approach LOS

VHB

Appendix D

2040 No Build

3: US460/Pruden	Boulevard	&	Kinas	Fork	Rd
0.00100/110001	Boalovara	~	range	1 0110	

	ار	-+	>	4	+	×.	•	t	~	1	Ţ	4
Lane Group	FRI	FRT	FRP	WRI	W/RT	WRP	NRI	NRT	NRD	SBI	SBT	SBD
Lane Configurations	100	<u>A1</u> .	LDIX	WDL K		1	NDL		NDIX	JDL	100	
Traffic Volume (vph)	120	123/	11	108	1180	200	6	1/2	31	0/	8/	105
Future Volume (vph)	120	1234	11	100	1180	200	6	1/12	31	0/	8/	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	165	1500	0	250	1500	145	0	1500	0	0	1500	50
Storage Lanes	100		0	1		1	0		0	0		1
Taper Length (ft)	80		Ū	0		•	25		Ū	25		
Lane Util Factor	1 00	0.95	0.95	1 00	0.95	1 00	1 00	1 00	1 00	1 00	1 00	1 00
Frt		0.999	0.00		0.00	0 850		0.977				0 850
Flt Protected	0.950	0.000		0.950		0.000		0.996			0.977	0.000
Satd, Flow (prot)	1770	3536	0	1770	3539	1583	0	1813	0	0	1820	1583
Flt Permitted	0.950		-	0.950			-	0.867	-		0.527	
Satd, Flow (perm)	1770	3536	0	1770	3539	1583	0	1578	0	0	982	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd, Flow (RTOR)		1				134		9				102
Link Speed (mph)		55			35			45			45	
Link Distance (ft)		2858			2499			2180			1010	
Travel Time (s)		35.4			48.7			33.0			15.3	
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Adj. Flow (vph)	145	1371	12	309	1265	222	24	212	48	125	140	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	145	1383	0	309	1265	222	0	284	0	0	265	169
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8			4		4
Detector Phase	1	6		5	2	2	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	11.0	21.8		11.5	21.8	21.8	13.8	13.8		13.8	13.8	13.8
Total Split (s)	22.0	56.0		22.0	56.0	56.0	32.0	32.0		32.0	32.0	32.0
Total Split (%)	20.0%	50.9%		20.0%	50.9%	50.9%	29.1%	29.1%		29.1%	29.1%	29.1%
Maximum Green (s)	16.0	49.2		15.5	49.2	49.2	25.2	25.2		25.2	25.2	25.2
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.8	4.8		4.8	4.8	4.8
All-Red Time (s)	2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Lost Time (s)	6.0	6.8		6.5	6.8	6.8		6.8			6.8	6.8
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	None
Act Effct Green (s)	13.4	49.2		15.5	51.8	51.8		25.2			25.2	25.2
Actuated g/C Ratio	0.12	0.45		0.14	0.47	0.47		0.23			0.23	0.23
v/c Ratio	0.67	0.87		1.24	0.76	0.27		0.77			1.18	0.38
Control Delay	61.3	35.2		170.2	40.4	17.1		53.9			157.1	17.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	61.3	35.2		170.2	40.4	17.1		53.9			157.1	17.8
LOS	E	D		F	D	В		D			F	В
Approach Delay		37.6			59.8			53.9			102.9	
Approach LOS		D			E			D			F	

Synchro 9 Report

2040 No Build PM.syn

3: US460/Pruden I	Boulevar	rd & Ki	ngs Fo	ork Rd							2040 N	o Build
	۶	→	\mathbf{r}	4	-	×	•	t	۲	1	ţ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	99	454		~273	417	72		183			~225	38
Queue Length 95th (ft)	149	558		103	573	181		194			#204	45
Internal Link Dist (ft)		2778			2419			2100			930	
Turn Bay Length (ft)	165			250		145						50
Base Capacity (vph)	257	1582		249	1665	815		368			224	441
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	0.56	0.87		1.24	0.76	0.27		0.77			1.18	0.38
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110)											
Offset: 93 (85%), Reference	ed to phase	2:WBT ar	nd 6:EBT	, Start of (Green							
Natural Cycle: 130												
Control Type: Actuated-Co	ordinated											
Maximum v/c Ratio: 1.24												
Intersection Signal Delay: 5	55.6			In	tersectior	n LOS: E						
Intersection Capacity Utiliza	ation 82.2%			IC	U Level o	of Service	E					
Analysis Period (min) 15												
 Volume exceeds capac 	ity, queue is	theoretic	ally infinit	e.								
Queue shown is maxim	um after two	cycles.										
# 95th percentile volume	exceeds cap	pacity, que	eue may	be longer								
Queue shown is maxim	um after two	cycles.										

Splits and Phases: 3: US460/Pruden Boulevard & Kings Fork Rd

VHB

✓ Ø1	Ø2 (R)	↓ Ø4
22 s	56 s	32 s
√ Ø5	● → Ø6 (R)	
22 s	56 s	32 s

3: US460/Pruden Boulevard & Kings Fork Rd

	≯	+	\mathbf{F}	1	Ļ	*	•	1	1	1	Ŧ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	^ î>		2	<u></u>	1		\$			ŧ	1
Traffic Volume (veh/h)	120	1234	11	108	1189	200	6	142	31	94	84	105
Future Volume (veh/h)	120	1234	11	108	1189	200	6	142	31	94	84	105
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1863
Adj Flow Rate, veh/h	145	1371	12	309	1265	222	24	212	48	125	140	169
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	1
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	175	1608	14	250	1749	783	35	142	29	113	81	363
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
Prop Arrive On Green	0.10	0.45	0.45	0.14	0.49	0.49	0.23	0.23	0.23	0.23	0.23	0.23
Ln Grp Delay, s/veh	55.6	32.9	32.7	177.8	24.0	17.1	233.9	0.0	0.0	241.3	0.0	37.5
Ln Grp LOS	Е	С	С	F	С	В	F			F		D
Approach Vol, veh/h		1528			1796			284			434	
Approach Delay, s/veh		35.0			49.6			233.9			162.0	
Approach LOS		С			D			F			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		2.0	3.0		7.0	2.0	4.0		8.0			
Phs Duration (G+Y+Rc), s		16.8	61.2		32.0	22.0	56.0		32.0			
Change Period (Y+Rc), s		6.0	6.8		6.8	6.5	6.8		6.8			
Max Green (Gmax), s		16.0	49.2		25.2	15.5	49.2		25.2			
Max Allow Headway (MAH), s		3.6	4.8		4.8	3.8	4.8		4.8			
Max Q Clear (g_c+l1), s		10.8	32.9		27.2	17.5	39.5		27.2			
Green Ext Time (g_e), s		0.1	13.9		0.0	0.0	8.7		0.0			
Prob of Phs Call (p_c)		0.99	1.00		1.00	1.00	1.00		1.00			
Prob of Max Out (p_x)		0.23	0.87		1.00	1.00	0.94		1.00			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			281	1774			0			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		353		3595		621			
Right-Turn Movement Data												
Assigned Mymt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		1583		31		126			
Left Lane Group Data												
Lon Lano Oroap Data												
Assigned Mymt		1	0	0	7	5	0	0	3			

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Synchro 9 Report 2040 No Build PM.syn

2040 No Build

Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Perm LT Sat Flow (s_l), veh/h/ln Shared LT Sat Flow (s_sh), veh/h/ln Perm LT Eff Green (g_p), s Perm LT Serve Time (g_u), s Perm LT Q Serve Time (g_ps), s Time to First Blk (g_f), s Serve Time pre Blk (g_fs), s Prop LT Inside Lane (P_L) Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d), s/veh 1st-Term Q (Q1), veh/In 2nd-Term Q (Q2), veh/In 3rd-Term Q (Q3), veh/In %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/ln %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h Middle Lane Group Data Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Lane Grp Cap (c), veh/h V/C Ratio (X)

VHB

Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Initial Q Delay (d3), s/veh Control Delay (d), s/veh 1st-Term Q (Q1), veh/ln

3: US460/Pruden Boulevard & Kings Fork Rd

	1	0	0	1	1	0	0	1	
	145	0	0	265	309	0	0	284	
1	774	0	0	634	1774	0	0	748	
	8.8	0.0	0.0	0.0	15.5	0.0	0.0	0.0	
	8.8	0.0	0.0	25.2	15.5	0.0	0.0	25.2	
	0	0	0	1137	0	0	0	1087	
	0	0	0	608	0	0	0	0	
	0.0	0.0	0.0	25.2	0.0	0.0	0.0	25.2	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.5	0.0	0.0	0.0	10.4	
	0.0	0.0	0.0	0.5	0.0	0.0	0.0	10.4	
	1.00	0.00	0.00	0.47	1.00	0.00	0.00	0.08	
	175	0	0	193	250	0	0	207	
	0.83	0.00	0.00	1.37	1.24	0.00	0.00	1.37	
	258	0	0	193	250	0	0	207	
	0.48	0.00	0.00	1.00	0.79	0.00	0.00	1.00	
	48.7	0.0	0.0	45.2	47.3	0.0	0.0	38.4	
	6.9	0.0	0.0	196.2	130.5	0.0	0.0	195.4	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	55.6	0.0	0.0	241.3	177.8	0.0	0.0	233.9	
	4.3	0.0	0.0	5.9	7.6	0.0	0.0	6.3	
	0.3	0.0	0.0	10.5	9.1	0.0	0.0	11.2	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
	4.6	0.0	0.0	16.4	16.6	0.0	0.0	17.5	
	0.71	0.00	0.00	0.44	1.69	0.00	0.00	0.21	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	17.9	14.8	0.0	0.0	19.3	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.3	
	0	2	0	4	0	6	0	8	
		Т				Т			
	0	2	0	0	0	1	0	0	
	0	1265	0	0	0	675	0	0	
	0	1770	0	0	0	1770	0	0	
	0.0	30.9	0.0	0.0	0.0	37.5	0.0	0.0	
	0.0	30.9	0.0	0.0	0.0	37.5	0.0	0.0	
	0	1749	0	0	0	791	0	0	
	0.00	0.72	0.00	0.00	0.00	0.85	0.00	0.00	
	0	1749	0	0	0	791	0	0	
	0.00	0.79	0.00	0.00	0.00	0.48	0.00	0.00	
	0.0	21.9	0.0	0.0	0.0	27.2	0.0	0.0	
	0.0	2.1	0.0	0.0	0.0	5.8	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	24.0	0.0	0.0	0.0	32.9	0.0	0.0	
	0.0	15.1	0.0	0.0	0.0	18.2	0.0	0.0	ľ

3: US460/Pruden Boulevard & Kings Fork Rd

2nd-Term Q (Q2), veh/In	0.0	0.5	0.0	0.0	0.0	1.3	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	15.6	0.0	0.0	0.0	19.4	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.16	0.00	0.00	0.00	0.18	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment		R		R		T+R			
Lanes in Grp	0	1	0	1	0	1	0	0	
Grp Vol (v), veh/h	0	222	0	169	0	708	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	1583	0	1857	0	0	
Q Serve Time (g_s), s	0.0	9.1	0.0	10.1	0.0	37.5	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	9.1	0.0	10.1	0.0	37.5	0.0	0.0	
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.02	0.00	0.17	
Lane Grp Cap (c), veh/h	0	783	0	363	0	831	0	0	Ì
V/C Ratio (X)	0.00	0.28	0.00	0.47	0.00	0.85	0.00	0.00	
Avail Cap (c_a), veh/h	0	783	0	363	0	831	0	0	
Upstream Filter (I)	0.00	0.79	0.00	1.00	0.00	0.48	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	16.4	0.0	36.6	0.0	27.2	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.9	0.0	5.5	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	17.1	0.0	37.5	0.0	32.7	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	3.9	0.0	4.4	0.0	19.1	0.0	0.0	
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.1	0.0	1.3	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	4.1	0.0	4.5	0.0	20.4	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.72	0.00	2.29	0.00	0.19	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		69.1							ĺ
HCM 2010 LOS		E							

VHB

Synchro 9 Report 2040 No Build PM.syn Time To Reduce (s)

Recall Mode Act Effct Green (s)

Actuated g/C Ratio

v/c Ratio

Control Delay

Queue Delay

Total Delay

VHB

0.0 20.0

None Min

0.08 0.50

0.17 0.81

49.0 24.0

0.0 0.0

49.0 24.0

7.0 46.5

2040 No Build

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard 2													
	٦	-	\mathbf{i}	4	+	×	1	1	۲	1	ţ	~	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	<u>۲</u>	≜†î≽		٦	^	1		\$			\$		
Traffic Volume (vph)	11	1231	60	26	1198	138	100	38	11	70	63	8	
Future Volume (vph)	11	1231	60	26	1198	138	100	38	11	70	63	8	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	220		0	200		110	0		0	0		0	
Storage Lanes	1		0	1		1	0		0	0		0	
Taper Length (ft)	160			150			25			25			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.991				0.850		0.985			0.985		
Flt Protected	0.950			0.950				0.970			0.981		
Satd. Flow (prot)	1770	3507	0	1770	3539	1583	0	1780	0	0	1800	0	
Flt Permitted	0.950			0.950				0.648			0.793		
Satd. Flow (perm)	1770	3507	0	1770	3539	1583	0	1189	0	0	1455	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		10				129		5			5		
Link Speed (mph)		55			55			45			45		
Link Distance (ft)		471			2858			1931			2337		
Travel Time (s)		5.8			35.4			29.3			35.4		
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33	
Adj. Flow (vph)	22	1338	90	79	1346	234	133	55	24	85	105	24	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	22	1428	0	79	1346	234	0	212	0	0	214	0	
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA		
Protected Phases	1	6		5	2			8			4		
Permitted Phases						2	8			4			
Detector Phase	1	6		5	2	2	8	8		4	4		
Switch Phase													
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0		
Minimum Split (s)	11.8	21.8		11.8	21.8	21.8	13.3	13.3		13.8	13.8		
Total Split (s)	16.0	67.0		16.0	67.0	67.0	27.0	27.0		27.0	27.0		
Total Split (%)	14.5%	60.9%		14.5%	60.9%	60.9%	24.5%	24.5%		24.5%	24.5%		
Maximum Green (s)	9.2	60.2		9.2	60.2	60.2	20.7	20.7		20.2	20.2		
Yellow Time (s)	4.8	4.8		4.8	4.8	4.8	4.8	4.8		4.8	4.8		
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0		
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0		
Total Lost Time (s)	6.8	6.8		6.8	6.8	6.8		6.3			6.8		
Lead/Lag	Lead	Lag		Lead	Lag	Lag							
Lead-Lag Optimize?		3			Ŭ	Ŭ							
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0		
Minimum Gap (s)	0.2	3.5		0.2	3.5	3.5	0.2	0.2		0.2	0.2		
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0		

 0.0
 20.0
 20.0
 0.0
 0.0

 0.0
 20.0
 20.0
 0.0
 0.0

 None
 Min
 Min
 None
 None

5.7

5.7

52.9 52.9

0.57 0.57

0.67 0.25

16.3

0.0 0.0 0.0

16.3

None

0.09

0.49

56.7

56.7

8.4

None

None 21.2

0.23

0.77

58.1

0.0

58.1

4: Providence Ro

0.0 0.0

20.7

0.22

0.65

47.7

0.0

47.7

2040 No Build PM.syn

Synchro 9 Report

None None

Lane Group LOS Approach Delay Approach LOS Queue Length 50th (ft) Queue Length 95th (ft) Internal Link Dist (ft) Turn Bay Length (ft) Base Capacity (vph) Starvation Cap Reductn Spillback Cap Reductn Storage Cap Reductn

Reduced v/c Ratio Intersection Summary

Area Type: Cycle Length: 110 Actuated Cycle Length: Natural Cycle: 80 Control Type: Actuated Maximum v/c Ratio: 0.8 Intersection Signal Dela Intersection Capacity Ut Analysis Period (min) 15 # 95th percentile volu Queue shown is max



Appendix D

oad/Lake Prince Drive & US460/Pruden Boulevard													
	≯	+	*	4	ł	*	<	1	1	*	ţ	~	
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
	D	С		E	В	А		E			D		
		24.3			16.7			58.1			47.7		
		С			В			E			D		
	13	382		48	221	22		126			124		
	22	471		37	415	30		#184			140		
		391			2778			1851			2257		
	220			200		110							
	183	2381		183	2437	1130		280			334		
n	0	0		0	0	0		0			0		
	0	0		0	0	0		0			0		
	0	0		0	0	0		0			0		
	0.12	0.60		0.43	0.55	0.21		0.76			0.64		
0	her												
93													
-Uncoc	rdinated												
31													
ay: 24.2	2			In	tersection	LOS: C							
tilizatio	n 58.5%			IC	U Level c	of Service	В						
5													
me exc	ceeds cap	acity, que	eue may l	be longer.									
ximum	after two	cycles.											
Densid		مط/ا مادم ٦	Daimana Dai		60/Davida	n Daviava							
	Jence Roa	au/Lake F	nnce Dr	ve & US4	60/Prude	n Bouleva	Ira						
Ø2													
S									27 s				
									-t				
-106									1Ø8			_	

4: Providence Road/	Lake F	ake Prince Drive & US460/Pruden Boulevard 2040 No Bui									lo Build	4: Providence Road/Lake	Prince	Drive 8	k US46	60/Pru	den Bo	ouleva	rd	
	•		~	~	+	×	•	t	*	\	Ţ	-	Lanes in Grp	1	0	0	1	1	0	0
			•	•			``			-	•	-	Grp Vol (v), veh/h	22	0	0	214	79	0	0
Novement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Grp Sat Flow (s), veh/h/ln	1774	0	0	1567	1774	0	0
ane Configurations	<u>۲</u>			<u>۲</u>	- † †	1		4			4		Q Serve Time (g_s), s	1.2	0.0	0.0	0.0	4.4	0.0	0.0
raffic Volume (veh/h)	11	1231	60	26	1198	138	100	38	11	70	63	8	Cycle Q Clear Time (g_c), s	1.2	0.0	0.0	12.6	4.4	0.0	0.0
Future Volume (veh/h)	11	1231	60	26	1198	138	100	38	11	70	63	8	Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	1341	0	0	0
lumber	1	6	16	5	2	12	3	8	18	7	4	14	Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1523	0	0	0
nitial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0	Perm LT Eff Green (g_p), s	0.0	0.0	0.0	19.2	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	Perm LT Serve Time (g_u), s	0.0	0.0	0.0	2.5	0.0	0.0	0.0
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	Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900	Time to First Blk (g_f), s	0.0	0.0	0.0	2.4	0.0	0.0	0.0
Adj Flow Rate, veh/h	22	1338	90	79	1346	234	133	55	24	85	105	24	Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	2.4	0.0	0.0	0.0
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0	Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.40	1.00	0.00	0.00
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33	Lane Grp Cap (c), veh/h	41	0	0	353	101	0	0
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2	V/C Ratio (X)	0.54	0.00	0.00	0.61	0.78	0.00	0.00
Opposing Right Turn Influence	e Yes			Yes			Yes			Yes			Avail Cap (c a), veh/h	164	0	0	369	164	0	0
Cap. veh/h	41	1833	123	101	2048	916	202	71	27	153	166	34	Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00
ICM 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	Uniform Delay (d1), s/veh	48.0	0.0	0.0	37.2	46.2	0.0	0.0
Prop Arrive On Green	0.02	0.54	0.54	0.06	0.58	0.58	0.19	0.19	0.19	0.19	0.19	0.19	Incr Delay (d2), s/yeh	10.7	0.0	0.0	2.6	12.1	0.0	0.0
n Gro Delay, s/veh	58.8	19.3	19.4	58.3	14.9	10.5	45.6	0.0	0.0	39.9	0.0	0.0	Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
n Gro LOS	E	В	В	E	В	В	D			D			Control Delay (d), s/veh	58.8	0.0	0.0	39.9	58.3	0.0	0.0
Approach Vol. veh/h	-	1450	-	-	1659	-	-	212		-	214		1st-Term Q (Q1), veh/ln	0.6	0.0	0.0	5.5	2.2	0.0	0.0
Approach Delay, s/veh		20.0			16.4			45.6			39.9		2nd-Term Q (Q2), veh/ln	0.1	0.0	0.0	0.3	0.3	0.0	0.0
Approach LOS		В			В			D			D		3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0
pproduct 200								-			-		%ile Back of Q Factor (f B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Timer:		1	2	3	4	5	6	7	8				%ile Back of Q (50%), veh/In	0.7	0.0	0.0	5.7	2.5	0.0	0.0
Assigned Phs		1	2		4	5	6		8				%ile Storage Ratio (RQ%)	0.08	0.00	0.00	0.06	0.32	0.00	0.00
Case No		2.0	3.0		8.0	2.0	4.0		8.0				Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phs Duration (G+Y+Rc), s		9.1	64.3		26.0	12.5	60.9		26.0				Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change Period (Y+Rc), s		6.8	6.8		6.8	6.8	6.8		* 6.8				Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green (Gmax), s		9.2	60.2		20.2	9.2	60.2		* 21				Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Allow Headway (MAH), s		3.6	4.7		5.1	3.6	4.7		5.1				Sat Cap (cs), veh/h	0	0	0	0	0	0	(
/lax Q Clear (g_c+l1), s		3.2	27.7		14.6	6.4	32.0		18.7				Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Green Ext Time (g_e), s		0.0	24.7		1.1	0.0	22.1		0.5											
Prob of Phs Call (p_c)		0.46	1.00		1.00	0.89	1.00		1.00				Middle Lane Group Data							
Prob of Max Out (p_x)		0.02	0.72		0.84	1.00	0.76		1.00				Assigned Mvmt	0	2	0	4	0	6	C
eft-Turn Movement Data													Lane Assignment		Т				Т	
		1			7	5			2				Lanes in Grp	0	2	0	0	0	1	(
Assigned Wivmu		1774			F24	C ۲774			744				Grp Vol (v), veh/h	0	1346	0	0	0	702	(
ivint Sat Flow, ven/n		1//4			221	1//4			741				Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	(
hrough Movement Data													Q Serve Time (g_s), s	0.0	25.7	0.0	0.0	0.0	29.8	0.0
Assigned Mymt			2		4		6		8				Cycle Q Clear Time (g_c), s	0.0	25.7	0.0	0.0	0.0	29.8	0.0
/vmt Sat Flow, veh/h			3539		860		3367		368				Lane Grp Cap (c), veh/h	0	2048	0	0	0	963	C
													V/C Ratio (X)	0.00	0.66	0.00	0.00	0.00	0.73	0.00
Right-Turn Movement Data													Avail Cap (c_a), veh/h	0	2144	0	0	0	1072	C
Assigned Mvmt			12		14		16		18				Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00
/lvmt Sat Flow, veh/h			1583		176		226		142				Uniform Delay (d1), s/veh	0.0	14.2	0.0	0.0	0.0	17.1	0.0
eft Lane Group Data													Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	2.3	0.0
Assigned Mymt		1	0	0	7	5	0	0	3				Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
noolyneu wwill		(Drot)	U	U		(Drot)	U	U	э 1.т.р				Control Delay (d), s/veh	0.0	14.9	0.0	0.0	0.0	19.3	0.0
ane Assignment		(101)			L+1+K	(101)			L+1+K				1st-Term Q (Q1) veh/ln	0.0	12.5	0.0	0.0	0.0	1/ /	0.0

VHB

Synchro 9 Report 2040 No Build PM.syn

VHB

Synchro 9 Report

2040 No Build PM.syn

2040 No Build

VHB

2nd-Term Q (Q2), veh/In	0.0	0.2	0.0	0.0	0.0	0.6	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/In	0.0	12.7	0.0	0.0	0.0	15.0	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.12	0.00	0.00	0.00	0.99	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment		R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	234	0	0	0	726	0	0	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1823	0	0	
Q Serve Time (g_s), s	0.0	7.3	0.0	0.0	0.0	30.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	7.3	0.0	0.0	0.0	30.0	0.0	0.0	
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.11	0.00	0.12	0.00	0.11	
Lane Grp Cap (c), veh/h	0	916	0	0	0	992	0	0	
V/C Ratio (X)	0.00	0.26	0.00	0.00	0.00	0.73	0.00	0.00	
Avail Cap (c a), veh/h	0	959	0	0	0	1104	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	10.4	0.0	0.0	0.0	17.1	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	2.3	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	10.5	0.0	0.0	0.0	19.4	0.0	0.0	
1st-Term Q (Q1), veh/ln	0.0	3.1	0.0	0.0	0.0	14.9	0.0	0.0	
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.0	3.2	0.0	0.0	0.0	15.5	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.73	0.00	0.00	0.00	1.03	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
intersection outninury									
HCM 2010 Ctrl Delay		21.0						_	

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

2040 No Build

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

5: Woodlawn Dr &	US460/I	Pruder	2040 No Build				
	-	\mathbf{F}	4	-	•	۲	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	A			^		1	
Traffic Volume (vph)	1297	2	0	1347	0	2	
Future Volume (vph)	1297	2	0	1347	0	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt						0.865	
Flt Protected							
Satd. Flow (prot)	3539	0	0	3539	0	1611	
Flt Permitted							
Satd. Flow (perm)	3539	0	0	3539	0	1611	
Link Speed (mph)	55			55	25		
Link Distance (ft)	1965			471	1166		
Travel Time (s)	24.4			5.8	31.8		
Peak Hour Factor	0.96	0.92	0.92	0.95	0.25	0.25	
Adj. Flow (vph)	1351	2	0	1418	0	8	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1353	0	0	1418	0	8	
Sign Control	Free			Free	Stop		
Intersection Summary							

Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 45.9% Analysis Period (min) 15 ICU Level of Service A

5: Woodlawn D	r & U	S460	/Pruc	den B	oule	/ard	2040 No Build	6: Old Suffolk R
Intersection								Lane Group
Int Delay, s/veh	0							Lane Configurations
Movement	FRT	FRR	WRI	WRT	NRI	NRR		Traffic Volume (vph)
Lano Configurations	A1.	LDI	TTDL		NDL	1		Future Volume (vph)
	1207	2	٥	1247	٥			Ideal Flow (vphpl)
Future Vol. veh/h	1297	2	0	1347	0	2		Storage Length (ft)
Conflicting Dodo #/hr	1297	2	0	1347	0	2		Storage Lanes
Connicting Peus, #/III	Eroo	Eroo	Eroo	Eroo	Cton	Ctop		Taper Length (ft)
Sign Control	Fiee	Free	Free	Free	Stop	Stop		Lane Util. Factor
RT Unannelized	-	None	-	None	-	None		Frt
Veh in Median Charana		-	-	-	-	0		Flt Protected
Ven in Wedian Storage	e, # 0	-	-	0	0	-		Satd. Flow (prot)
Grade, %	0	-	-	0	0	-		Flt Permitted
Peak Hour Factor	96	92	92	95	25	25		Satd. Flow (perm)
Heavy Vehicles, %	2	2	2	2	2	2		Link Speed (mph)
Nivmt Flow	1351	2	0	1418	0	8		Link Distance (ft)
								Travel Time (s)
Maior/Minor	Maior1	1	Maior2	1	Minor1			Peak Hour Factor
Conflicting Flow All	0	0		-	-	677		Adi, Flow (vph)
Stage 1	-	-	-	-	-	-		Shared Lane Traffic (%
Stage 2		-		-				Lane Group Flow (vph)
Critical Hdwy	-	-	-	-	-	6 94		Sign Control
Critical Hdwy Stg 1		-		-				
Critical Hdwy Stg 2	-	-	-	-	-	-		Intersection Summary
Follow-up Hdwy		-		-		3.32		Area Type:
Pot Can-1 Maneuver	-	-	0	-	0	395		Control Type: Unsignal
Stane 1	_	_	0	_	0	000		Intersection Capacity U
Stage 2	_	_	0	_	0	_		Analysis Period (min) 1
Platoon blocked %	_	_	0	_	U			
Mov Cap-1 Maneuver	-				-	305		
Mov Cap-1 Maneuver	_	-	-	_	-	000		
Stage 1	-	-	-	-	-	-		
Stage 2	_	-	-	_	-	-		
Sidye z	-		-		-	-		
Approach	EB		WB		NB			
HCM Control Delay, s	0		0		14.3			
HCM LOS					В			
Minor Lane/Major Mvm	nt	NBLn1	EBT	EBR	WBT			
Capacity (veh/h)		395	-	-	-			
HCM Lane V/C Ratio		0.02	-	-	-			
HCM Control Delay (s)		14.3	-	-	-			
HCM Lane LOS		В	-	-	-			
HCM 95th %tile Q(veh))	0.1	-	-	-			

Synchro 9 Report 2040 No Build PM.syn

VHB

Synchro 9 Report 2040 No Build PM.syn

VHB

Appendix D

6: Old Suffolk Rd & US 460/Windsor Boulevard 2040 No E													
	٦	-	\mathbf{r}	4	+	*	•	1	۲	1	ţ	4	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		- † †	1	<u>۲</u>	↑ Ъ			- କ	1		4		
Traffic Volume (vph)	1	586	49	69	1032	4	21	2	43	0	0	3	
Future Volume (vph)	1	586	49	69	1032	4	21	2	43	0	0	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		340	400		0	0		300	0		0	
Storage Lanes	0		1	1		0	0		1	0		0	
Taper Length (ft)	25			125			25			25			
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.999				0.850		0.865		
Flt Protected				0.950				0.959					
Satd. Flow (prot)	0	3539	1583	1770	3536	0	0	1786	1583	0	1611	0	
Flt Permitted				0.950				0.959					
Satd. Flow (perm)	0	3539	1583	1770	3536	0	0	1786	1583	0	1611	0	
Link Speed (mph)		55			55			45			45		
Link Distance (ft)		3402			5235			2230			2290		
Travel Time (s)		42.2			64.9			33.8			34.7		
Peak Hour Factor	0.38	0.89	0.80	0.68	0.90	0.92	0.41	0.25	0.34	0.25	0.92	0.25	
Adj. Flow (vph)	3	658	61	101	1147	4	51	8	126	0	0	12	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	661	61	101	1151	0	0	59	126	0	12	0	
Sign Control		Free			Free			Stop			Stop		
Intersection Summary													
Area Type:	Other												
Control Type: Unsignalized													
Intersection Capacity Utilization	ation 62.8%			IC	CU Level o	of Service	В						
Analysis Period (min) 15													

	6: Old Suffolk Rd & US 460/Windsor Boulevard	2040 No Build 7: Dominion Wa	7: Dominion Way & US 460/Windsor Boulevard				2040 No Build	7: Dominion Way	<u>/ & US /</u>		
			-	\mathbf{r}	4	-	1	1			_
III Line J, with J S III Line J, with J S III Line J, with J S	Intersection	Lane Group	EBT	EBR	WBL	WBT	NBL	NBR		Lane Group	E
Harmone File	Int Delay, s/veh 5	Lane Configurations	^	1	1	^	ľ	1		LOS	
Table Value Valu	Mexament EDI EDT EDD W/DI W/DT W/DD NDI NDT NDD CDI CDT CDD	Traffic Volume (vph)	649	3	1	1062	18	17		Approach Delay	4
and Long partial is the set of the		Future Volume (vph)	649	3	1	1062	18	17		Approach LOS	
ministry in ministr	Lane Configurations TT r T THA A r A	Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		Queue Length 50th (ft)	
Control point Contro point Control point Control point<	Iramic Vol, ven/n 1 586 49 59 1032 4 21 2 43 0 0 3	Storage Length (ft)		200	330		0	0		Queue Length 95th (ft)	1
Amerika Hari Amerika Hari <td< td=""><td>-ulule vol, venni i 586 49 69 1052 4 21 2 45 0 0 5</td><td>Storage Lanes</td><td></td><td>1</td><td>1</td><td></td><td>1</td><td>1</td><td></td><td>Internal Link Dist (ft)</td><td></td></td<>	-ulule vol, venni i 586 49 69 1052 4 21 2 45 0 0 5	Storage Lanes		1	1		1	1		Internal Link Dist (ft)	
approximation refer	Connictung Peas, #/nr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Taper Length (ft)			200		25			Turn Bay Length (ft)	
Number Number Note: <	Sign Control Free Free Free Free Free Free Stop Stop Stop Stop Stop	Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00		Base Capacity (vph)	28
Barting Hounge 1 a 9.0 4.0 a	RT Channelized None None None None None	Frt		0.850				0.850		Starvation Cap Reductn	
min in strategie i	Storage Length	Flt Protected			0.950		0.950			Spillback Cap Reductn	
State N Sing N	Ven in Median Storage, # - 0	Satd. Flow (prot)	3539	1583	1770	3539	1770	1583		Storage Cap Reductn	
start return size size <td>JTAGE, % - U U U U U U U U U U U U U U</td> <td>Flt Permitted</td> <td></td> <td></td> <td>0.370</td> <td></td> <td>0.950</td> <td></td> <td></td> <td>Reduced v/c Ratio</td> <td>0</td>	JTAGE, % - U U U U U U U U U U U U U U	Flt Permitted			0.370		0.950			Reduced v/c Ratio	0
interver Northow Sees Interver Northow Yes Northow Yes decrifter Major	-reak Flour Factor 30 89 80 68 90 92 41 25 34 25 92 25	Satd. Flow (perm)	3539	1583	689	3539	1770	1583		Internet O	
Some Some <th< td=""><td>Teavy venicies, 70 Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z</td><td>Right Turn on Red</td><td></td><td>Yes</td><td></td><td></td><td></td><td>Yes</td><td></td><td>Intersection Summary</td><td></td></th<>	Teavy venicies, 70 Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	Right Turn on Red		Yes				Yes		Intersection Summary	
Algenting Majer Minor Minor Link Speed (mgh) 55 55 25 Confiding frow All 151 0 0.658 0 0.1440 2016 576 Stage 1 - - - - 777 135 6.4 6.4 6.4 - - 6.4 6.4 - - - 6.4 6.4 -<	Vivit Flow 3 658 61 101 1147 4 51 8 126 0 0 12	Satd, Flow (RTOR)		5				39		Area Type:	Other
Majoritari Majorit		Link Speed (mph)	55			55	25			Cycle Length: 94	
Cardinary Prov AI 1151 0 0 645 0 1410 2016 276 Stage 1 - - - 6.64 644 - 654 654 1322 </td <td>Maior/Minor Maior1 Maior2 Minor1 Minor2</td> <td>Link Distance (ft)</td> <td>709</td> <td></td> <td></td> <td>3402</td> <td>1205</td> <td></td> <td></td> <td>Actuated Cycle Length: 9</td> <td>Э4</td>	Maior/Minor Maior1 Maior2 Minor1 Minor2	Link Distance (ft)	709			3402	1205			Actuated Cycle Length: 9	Э4
Stap 1 - - - 664 664 - 132 - - - 664 664 - - - 664 -	Conflicting Flow All 1151 0 0 658 0 0 1440 2018 329 1690 2016 576	Travel Time (s)	8.8			42.2	32.9			Offset: 0 (0%), Referenc	ed to phas
Singp 2 - - - 776 154 - 336 644 - 336 644 - 336 644 - 336 39 Chical Hoty Sig 1 - - - - - - 6.54 5.54 - 6.54 5.54 - 6.54 5.54 - 6.54 5.54 - 1.00 ND Prote (nph) 7.21 5 2 120 3.63 39 Coltor Jipe Algon J - - - 6.54 5.54 - 6.54 5.54 - 1.00 ND Prote Information Protein Pro	Stage 1 664 - 664 - 1352 -	Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44		Natural Cycle: 50	
Ching Hikky 4.14 - - - 7.46 6.54 6.54 6.54 - - - - - - 6.54 6.54 - - - - - - - - 6.54 6.54 - - - - 6.54 6.54 - - - - 6.54 6.54 - - - - - - - - 6.54 6.54 - <td>Stage 2 776 1354 - 338 664 -</td> <td>Adi, Flow (vph)</td> <td>721</td> <td>5</td> <td>2</td> <td>1207</td> <td>36</td> <td>39</td> <td></td> <td>Control Type: Actuated-0</td> <td>Coordinate</td>	Stage 2 776 1354 - 338 664 -	Adi, Flow (vph)	721	5	2	1207	36	39		Control Type: Actuated-0	Coordinate
Drine Howy Stg 1 <td>Critical Holwy 414 - 414 - 754 654 694 754 654 694</td> <td>Shared Lane Traffic (%</td> <td>)</td> <td>-</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td>Maximum v/c Ratio: 0.41</td> <td>1</td>	Critical Holwy 414 - 414 - 754 654 694 754 654 694	Shared Lane Traffic (%)	-	_					Maximum v/c Ratio: 0.41	1
Singel Singel Column Singel Sing	Tritical Holy Sta 1	Lane Group Flow (vph)	721	5	2	1207	36	39		Intersection Signal Delay	y: 4.9
Calcow LPHANP 2.22 . 2.52 4.02 3.32 4.02 3.32 Analysis Period (nm) 15 Calcow LPHANP 2.22 . . <	Critical Howy Stg 7	Turn Type	NA	Perm	D P+P	NA	Prot	Prot		Intersection Capacity Uti	lization 43
DepCl Ga: 926 - 935 93 660 936 61 938 460 Singe 1 - - 416 456 215 158 2 2 1 6 4 4 500 Singe 2 - - - 356 667 40 51 460 Wor Cap ⁻¹ Minewer 603 - <t< td=""><td>Follow-up Hdwy 222 - 222 - 352 402 332 352 402 332</td><td>Protected Phases</td><td>2</td><td></td><td>1</td><td>6</td><td>4</td><td>4</td><td></td><td>Analysis Period (min) 15</td><td><i>)</i></td></t<>	Follow-up Hdwy 222 - 222 - 352 402 332 352 402 332	Protected Phases	2		1	6	4	4		Analysis Period (min) 15	<i>)</i>
Singer 1 1 1 416 456 158 217 1 Singer 2 2 2 1 6 4 4 5	Pot Cap-1 Maneuver 603 926 93 58 667 61 58 460	Permitted Phases	_	2	2	Ū					
Släge 2 · </td <td>Stage 1 416 456 - 158 217 -</td> <td>Detector Phase</td> <td>2</td> <td>2</td> <td>1</td> <td>6</td> <td>4</td> <td>4</td> <td></td> <td>Splits and Phases: 7:</td> <td>Dominion</td>	Stage 1 416 456 - 158 217 -	Detector Phase	2	2	1	6	4	4		Splits and Phases: 7:	Dominion
Platon blocks/s -	Stage 2 356 216 - 650 456 -	Switch Phase	-	-		v		•		6	⊥_
Work Cap-1 Manever 603 - 926 - - 83 51 667 40 51 460 Stage 1 - - - - - - 63 51 - 40 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 400 51 410 51 5	Platoon blocked %	Minimum Initial (s)	15.0	15.0	70	15.0	50	50		▼ Ø1	
No. Voc Qa-2 Manevoret - <td>Mov Cap-1 Maneuver 603 926 83 51 667 40 51 460</td> <td>Minimum Split (s)</td> <td>21.5</td> <td>21.5</td> <td>16.0</td> <td>21.5</td> <td>11.5</td> <td>11.5</td> <td></td> <td>215</td> <td>47</td>	Mov Cap-1 Maneuver 603 926 83 51 667 40 51 460	Minimum Split (s)	21.5	21.5	16.0	21.5	11.5	11.5		215	47
Stage 1 - </td <td>Mov Cap-2 Maneuver</td> <td>Total Split (s)</td> <td>47.0</td> <td>47.0</td> <td>21.0</td> <td>68.0</td> <td>26.0</td> <td>26.0</td> <td></td> <td>Ø6 (R)</td> <td></td>	Mov Cap-2 Maneuver	Total Split (s)	47.0	47.0	21.0	68.0	26.0	26.0		Ø6 (R)	
Stage 2 - </td <td>Stape 1</td> <td>Total Split (%)</td> <td>50.0%</td> <td>50.0%</td> <td>22.3%</td> <td>72.3%</td> <td>27.7%</td> <td>27.7%</td> <td></td> <td>68 s</td> <td></td>	Stape 1	Total Split (%)	50.0%	50.0%	22.3%	72.3%	27.7%	27.7%		68 s	
Congret EB WB NB SB CCM Control Delay, s 0 0.8 51.7 13 CCM Control Delay, s 0 0.8 51.7 13 Control Delay, s 0.00 0.0 0.0 0.0 0.0 0.0 Control Delay, s 0.769 0.19 0.004 - 460 10.3 3.0 </td <td>Stage 2 309 192 513 452 -</td> <td>Maximum Green (s)</td> <td>40.5</td> <td>40.5</td> <td>12.0</td> <td>61.5</td> <td>20.0</td> <td>20.0</td> <td></td> <td></td> <td></td>	Stage 2 309 192 513 452 -	Maximum Green (s)	40.5	40.5	12.0	61.5	20.0	20.0			
Approach EB WB NB SB 4CM Control Delay, s 0 0.8 51.7 13 4CM LOS F B B - F B 4CM LOS F B B - - 926 - 460 4CM Los Time VC Ratio 0.769 0.19 0.04 - - 0.026 0.0	04490 E 010 10E	Yellow Time (s)	5.5	5.5	5.0	5.5	3.0	3.0			
Approach EB WB NB SB HCM Control Delay, s 0 0.8 51.7 13 HCM Control Delay, s 0 0.0 6.5 6.5 9.0 6.5 6.0 6.0 HCM Control Delay, s 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Vinor Lane/Major Mvmt NBLn1NBLn2 EBL EBR WBR SBLn1 0.026 3.0 3.		All-Red Time (s)	1.0	1.0	4.0	1.0	3.0	3.0			
HCM Control Delay, s 0 0.8 51.7 13 HCM LOS F B Vinor Lane/Major Mvmt NBLn1 NBLn2 EBL EBT EBR WBL WBR SBLn1 Capacity (veh/n) 77 667 603 - 926 - - 460 CM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 CM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 CM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 CM Los Control Delay (s) 13.7. 0.7 0.4 - 0.1 GM and LOS F B B - A - B GM and LOS F B B - 0.1 - 0.10 GM and LOS F B B - 0.1 - 0.026 GM and LOS F B B - 0.1 - 0.026 GM and Streid 0.7 <td>Approach EB WB NB SB</td> <td>Lost Time Adjust (s)</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td></td>	Approach EB WB NB SB	Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0			
HCM LOS F B Minor Lane/Major Mvmt NBLn1 NBLn2 EBI EBI EBI WB WB WBR SBLn1 Capacity (veh/h) 77 667 603 - 926 - 460 CCM Lone V/C Ratio 0.769 0.19 0.004 - - 0.026 HCM LOS F B B - - A - - HCM LOS F B B - - 0.1 - 0.026 HCM LOS F B B - - 0.1 - 0.026 HCM Sth 'ktile Q(veh) 3.7 0.7 0 - 0.1 - 0.1 HCM 95th 'ktile Q(veh) 3.7 0.7 0 - 0.1 - 0.01 HCM 95th 'ktile Q(veh) 3.7 0.7 0 - 0.1 - 0.02 HCM 95th 'ktile Q(veh) 3.7 0.7 0.4 - 0.1 - 0.01 HCM 95th 'ktile Q(veh) 3.7 0.7 0.4 -	HCM Control Delay, s 0 0.8 51.7 13	Total Lost Time (s)	6.5	6.5	9.0	6.5	6.0	6.0			
Minor Lane/Major Mvmt NBLn1 NBLn2 EBL EBL WBL WBT WBR Medical Capacity (veh/h) 77 667 603 - 926 - 460 HCM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 HCM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 HCM Lane V/C Ratio 0.769 0.19 0.04 - 0.13 - 0.026 HCM Lane V/C Ratio 0.769 0.19 0.04 - 0.13 - 0.026 HCM Long V/C Ratio 0.779 0.77 0 - 0.1 - 1.3 HCM String V(veh) 3.7 0.7 0 - 0.1 - 0.1 - 0.1 HCM 95th %tile Q(veh) 3.7 0.7 0.4 - 0.1 - 0.1 - 0.1 V/C Ratio 0.20 0.00 0.00 0.00 <td< td=""><td>HCM LOS F B</td><td>Lead/Lag</td><td>Lag</td><td>Lag</td><td>Lead</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td></td><td></td></td<>	HCM LOS F B	Lead/Lag	Lag	Lag	Lead	0.0	0.0	0.0			
Minor Lane/Major Mvmt NBLn1 NBLn2 EBL EBT EBR WBL WBR SBLn1 Capacity (veh/h) 77 667 603 - - 926 - - 460 Capacity (veh/h) 77 667 603 - - 0.11 - - 0.026 HCM Lane V/C Ratio 0.769 0.19 0.004 - - 1.3 HCM Control Delay (s) 137.2 11.7 11 - - B HCM Uane LOS F B B - - B - - B HCM 95th % tile Q(veh) 3.7 0.7 0 - 0.1 - - 0.1 Vehicle Extension (s) 74.5 74.1 74.7 - - 0.1 Vehicle Extension (s) 74.5 74.5 74.5 74.7 74.4 7.4 HCM 95th % tile Q(veh) 3.7 0.7 0.4 - 0.1 - - 0.1 Vehicle Extension (s) 74.5 74.5 74.5 77.7 7.4		Lead-Lag Ontimize?	209	209	2000						
Wind Later Major Will Notice Later Major Will Will Will Will Will Will Will Wil		Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			
Capacity (Verini) 17 667 603 - - 400 HCM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 HCM Lane V/C Ratio 0.769 0.19 0.004 - 0.11 - 0.026 HCM Lane V/C Ratio 0.739 0.19 0.004 - 13 HCM Lane LOS F B B - A - B HCM 95th %tile Q(veh) 3.7 0.7 0 - 0.1 - 0.1 V/C Ratio 0.79 0.79 0.77 0.4 - 0.1 - 0.1 HCM 95th %tile Q(veh) 3.7 0.7 - 0.4 - 0.1 - 0.1 V/C Ratio 0.26 0.00 0.00 0.41 0.26 0.24 V/C Ratio 0.26 0.00 0.00 0.41 0.26 0.24 V/C Ratio 0.26 0.00 0.00 0.41 0.26 0.24		Minimum Gan (s)	3.5	3.5	0.0	3.5	0.0	0.0			
HCM Date V/O Ratio 0.703 0.703 0.704 - - 0.002 HCM Control Delay (s) 137.2 11.7 11 - 9.4 - 13 HCM Lone LOS F B B - A - B HCM 95th %tile Q(veh) 3.7 0.7 0 - 0.1 Control Delay 15.0 15.0 15.0 0.0 0.0 HCM 95th %tile Q(veh) 3.7 0.7 - 0.4 - 0.1 Control Delay 16.7 74.5 72.1 77.7 7.4 7.4 HCM 95th %tile Q(veh) 3.7 0.7 - 0.4 - 0.1 Control Delay 16.7 4.6 4.0 3.0 3.5 44.6 16.9 Ueue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Ueue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Ueue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Ueue Delay 0.0	Japacity (venim) // bb/ b03 92b 460	Time Before Reduce (s)) 25.0	25.0	0.0	25.0	0.0	0.0			
How Control Delay (s) 107.2 11.7 11 - - 5.4 - 1.3 HCM Lane LOS F B B - A - B B - A - B HCM 95th %tile Q(veh) 3.7 0.7 0 - 0.4 - 0.1 HCM 95th %tile Q(veh) 3.7 0.7 0 - 0.1 None C-Min None C-Min None ACM 95th %tile Q(veh) 3.7 0.7 0 - 0.1 Rec (Different (s) 74.5 72.1 77.7 7.4 7.4 Queue Delay 0.0 0.26 0.00 0.00 0.41 0.26 0.24 Orthorization 0.26 0.00 0.00 0.41 0.26 0.24 Optimization 0.16 0.16 0.16 0.00 0.00 0.01 0.01 0.01 Optimization 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0.16 0	$\frac{1}{1000} Latte V/C Ratio 0.709 0.19 0.004 0.11 0.020$	Time To Reduce (s)	15.0	15.0	0.0	15.0	0.0	0.0			
HCM 95th %tile Q(veh) 3.7 0.7 0 - 0.4 - 0.1 Act Match of Control Delay 4.6 4.0 3.0 3.5 44.6 16.9 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 4.6 4.0 3.0 3.5 44.6 16.9	HCM Long LOS E P P 131.2 11.7 11 9.4 13	Recall Mode	C-Min	C-Min	None	C-Min	None	None			
Actuated g/C Ratio 0.79 0.79 0.79 0.83 0.08 v/c Ratio 0.26 0.00 0.01 0.26 0.24 Control Delay 4.6 4.0 3.0 3.5 44.6 16.9 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 4.6 4.0 3.0 3.5 44.6 16.9		Act Effet Green (s)	74.5	74.5	72 1	77 7	7 4	7 4			
v/c Ratio 0.26 0.00 0.41 0.26 0.24 Control Delay 4.6 4.0 3.0 3.5 44.6 16.9 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0	יוסא איז איז איז איז איז איז איז איז איז אי	Actuated g/C Ratio	0.79	0.79	0.77	0.83	0.08	0.08			
Control Delay 0.0 0.0 0.0 0.0 Queue Delay 0.0 0.0 0.0 0.0 Total Delay 4.6 4.0 3.0 3.5		v/c Ratio	0.26	0.00	0.00	0.41	0.26	0.24			
Queue Delay 0.0 0.0 0.0 0.0 0.0 Total Delay 4.6 4.0 3.0 3.5 4.6 1.6		Control Delay	4.6	4.0	3.0	3.5	44.6	16.9			
		Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0			
		Total Delay	0.0	4.0	3.0	3.5	44.6	16.9			

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US 460/Windsor Boulevard

2040 No Build

→	\mathbf{F}	4	+	1	1
EBT	EBR	WBL	WBT	NBL	NBR
Α	Α	А	А	D	В
4.6			3.5	30.2	
Α			А	С	
45	0	0	92	21	0
141	2	1	134	27	3
629			3322	1125	
	200	330			
2803	1255	673	2923	376	367
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0.26	0.00	0.00	0.41	0.10	0.11

phase 2:EBWB and 6:WBT, Start of Green

- (P)		▲ • 04	
on Way & US 460/Wind	sor Boulevard		
43.9%	ICU Level of Service A		
	Intersection LOS: A		

7: Dominion Way & US 460/Windsor Boulevard

2040 No Build

	-	$\mathbf{\hat{z}}$	4	+	1	1				
Movement	EBT	EBR	WBL	WBT	NBL	NBR				
Lane Configurations	44	1	5	44	۲	1				
Traffic Volume (veh/h)	649	3	1	1062	18	17				
Future Volume (veh/h)	649	3	1	1062	18	17				
Number	2	12	1	6	7	14				
Initial Q, 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	1863	1863	1863				
Adj Flow Rate, veh/h	721	5	2	1207	36	39				
Adj No. of Lanes	2	1	1	2	1	1				
Peak Hour Factor	0.90	0.55	0.54	0.88	0.50	0.44				
Percent Heavy Veh, %	2	2	2	2	2	2				
Opposing Right Turn Influence			Yes		Yes					
Cap, veh/h	2555	1143	555	2907	81	72				
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				
Prop Arrive On Green	0.72	0.72	0.00	0.82	0.05	0.05				
Ln Grp Delay, s/veh	4.8	3.7	3.4	2.7	47.5	50.0				
Ln Grp LOS	Α	А	А	Α	D	D				
Approach Vol, veh/h	726			1209	75					
Approach Delay, s/veh	4.8			2.7	48.8					
Approach LOS	А			A	D					
Timer:		1	2	3	4	5	6	7	8	
Assigned Phs		1	2		4		6			
Case No		1.2	7.0		9.0		4.0			
Phs Duration (G+Y+Rc), s		9.4	74.3		10.3		83.7			
Change Period (Y+Rc), s		9.0	6.5		6.0		6.5			
Max Green (Gmax), s		12.0	40.5		20.0		61.5			
Max Allow Headway (MAH), s		3.6	4.7		4.0		4.7			
Max Q Clear (g_c+l1), s		2.0	8.7		4.3		10.7			
Green Ext Time (g_e), s		0.0	15.7		0.1		18.9			
Prob of Phs Call (p_c)		0.05	1.00		0.86		1.00			
Prob of Max Out (p_x)		0.00	0.28		0.00		0.11			
Left-Turn Movement Data										-
Assigned Mvmt		1	5		7					
Mvmt Sat Flow, veh/h		1774	0		1774					
Through Movement Data										
Assigned Mvmt			2		4		6			
Mvmt Sat Flow, veh/h			3632		0		3632			
Right-Turn Movement Data										
Assigned Mvmt			12		14		16			
Mvmt Sat Flow, veh/h			1583		1583		0			
Left Lane Group Data										
Assigned Mvmt		1	5	0	7	0	0	0	0	
Lane Assignment		(Pr/Pm)								

Grp Vol (v), veh/h	2	0	0	36	0	0	0	0	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1774	0	0	0	0	
Q Serve Time (g_s), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	
Perm LT Sat Flow (s I), veh/h/ln	725	0	0	1774	0	0	0	0	
Shared LT Sat Flow (s sh), veh/h/ln	0	0	0	0	0	0	0	0	
Perm LT Eff Green (g p), s	69.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Serve Time (g_u), s	61.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Q Serve Time (g ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time to First Blk (g f), s	0.0	67.8	0.0	0.0	0.0	0.0	0.0	0.0	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop LT Inside Lane (P L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Lane Grn Can (c) veh/h	555	0.00	0.00	81	0.00	0.00	0.00	0.00	
V/C Ratio (X)	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	
Avail Cap (c. a) veh/h	775	0.00	0.00	377	0.00	0.00	0.00	0.00	
Linetroom Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Uniform Doloy (d1) olyob	2.4	0.00	0.00	12.7	0.00	0.00	0.00	0.00	
Incr Delay (d2) s/veh	5.4	0.0	0.0	43.7	0.0	0.0	0.0	0.0	
Initial O Delay (d2), siven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Cantral Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Let Term Q (Q1) web/le	3.4	0.0	0.0	47.5	0.0	0.0	0.0	0.0	
Ist-Term Q (Q1), veh/in	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	
2nd-Term Q (Q2), veh/in	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
3rd-Term Q (Q3), ven/in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%Ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
%ile Back of Q (50%), ven/in	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
Initial Q (QD), ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), ven/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	0	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	2	0	0	
Grp Vol (v), veh/h	0	721	0	0	0	1207	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (q s), s	0.0	6.7	0.0	0.0	0.0	8.7	0.0	0.0	
Cycle Q Clear Time (g c), s	0.0	6.7	0.0	0.0	0.0	8.7	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2555	0	0	0	2907	0	0	
V/C Ratio (X)	0.00	0.28	0.00	0.00	0.00	0.42	0.00	0.00	
Avail Cap (c a), veh/h	0	2555	0	0	0	2907	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	4.6	0.0	0.0	0.0	2.3	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	4.8	0.0	0.0	0.0	2.7	0.0	0.0	
1st-Term Q (Q1), veh/ln	0.0	3.2	0.0	0.0	0.0	4.0	0.0	0.0	
	0.0	0.2	0.0	0.0	0.0		0.0	0.0	

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7: Dominion Way & US 460/Windsor Boulevard

Lanes in Grp

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2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f %ile Back of Q (50%), ve %ile Storage Ratio (RQ% Initial Q (Qb), veh Final (Residual) Q (Qe) Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc),

Right Lane Group Data Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h Q Serve Time (g_s), s Cycle Q Clear Time (g_ Prot RT Sat Flow (s_R) Prot RT Eff Green (g_R Prop RT Outside Lane Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Avail Cap (c_a), veri/in Upstream Filter (I) Uniform Delay (d1), s/vel Incr Delay (d2), s/veh Initial Q Delay (d3), s/vel Control Delay (d), s/veh 1st-Term Q (Q1), veh/In 2nd-Term Q (Q2), veh/li 3rd-Term Q (Q3), veh/lr %ile Back of Q Factor (%ile Back of Q (50%), %ile Storage Ratio (RQ Initial Q (Qb), veh Final (Residual) Q (Qe), Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc) Intersection Summary HCM 2010 Ctrl Delay

HCM 2010 LOS

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Appendix D

7: Dominion Way & US 460/Windsor Boulevard

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2040 No Build
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									_
'In	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	
n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
veh/ln	0.0	3.3	0.0	0.0	0.0	4.2	0.0	0.0	
Q%)	0.00	0.13	0.00	0.00	0.00	0.03	0.00	0.00	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
), 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	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1									l
	0	12	0	14	0	16	0	0	
		R		R					
	0	1	0	1	0	0	0	0	
	0	5	0	39	0	0	0	0	
ı/ln	0	1583	0	1583	0	0	0	0	
	0.0	0.1	0.0	2.3	0.0	0.0	0.0	0.0	
_C), S	0.0	0.1	0.0	2.3	0.0	0.0	0.0	0.0	_
), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(P_R)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
'n	0	1143	0	72	0	0	0	0	
	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	
	0	1143	0	337	0	0	0	0	
	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
reh	0.0	3.6	0.0	43.9	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0	
eh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
h	0.0	3.7	0.0	50.0	0.0	0.0	0.0	0.0	
n	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
In	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
n ((0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(t_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
ven/In	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	
2%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
), ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
), N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		52							

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2040 Build AM

US 460 Corridor Sa 1: US 460/Pruden I	afety St Bouleva	udy ard & N	lorthfie	eld Driv	/e			2040 Build AM
	٦	+	ł	Ļ	•	1	~	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
Lane Configurations	ň	<u></u>	a.	^	1	<u>۲</u>	1	
Traffic Volume (vph)	11	1387	0	1154	80	8	3	
Future Volume (vph)	11	1387	0	1154	80	8	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	305		125		195	0	155	
Storage Lanes	1		1		1	1	1	
Taper Length (ft)	190		200			0		
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	
Frt					0.850		0.850	
Flt Protected	0.950					0.950		
Satd. Flow (prot)	1770	3539	1863	3539	1583	1770	1583	
Flt Permitted	0.137					0.950		
Satd. Flow (perm)	255	3539	1863	3539	1583	1770	1583	
Right Turn on Red					Yes		Yes	
Satd, Flow (RTOR)					109		8	
Link Speed (mph)		55		55	100	25	Ŭ	
Link Distance (ft)		537		2299		1306		
Travel Time (s)		67		28.5		35.6		
Peak Hour Factor	0.58	0.94	0.92	0.82	0.63	0.58	0.38	
Adi Flow (vph)	19	1476	0.02	1407	127	14	8	
Shared Lane Traffic (%)			Ū				•	
Lane Group Flow (vph)	19	1476	0	1407	127	14	8	
Turn Type	pm+pt	NA	pm+pt	NA	Prot	Prot	Prot	
Protected Phases	p pt	6	5	2	2	7	4	
Permitted Phases	6	v	2	-	-	•		
Detector Phase	1	6	5	2	2	7	4	
Switch Phase		· ·	•	-	-	•		
Minimum Initial (s)	5.0	15.0	5.0	15.0	15.0	70	70	
Minimum Split (s)	13.3	23.3	9.5	34.9	34.9	14.4	14.4	
Total Split (s)	20.0	48.0	20.0	48.0	48.0	22.0	22.0	
Total Split (%)	22.2%	53.3%	22.2%	53.3%	53.3%	24.4%	24.4%	
Maximum Green (s)	11 7	39.7	15.5	40 1	40 1	14.6	14.6	
Yellow Time (s)	4.8	4.8	3.5	4.8	4.8	4.0	4.0	
All-Red Time (s)	3.5	3.5	1.0	3.1	3.1	3.4	3.4	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	83	83	4.5	7 9	7 9	7.4	7.4	
Lead/Lag	l ead	l an	Lead	l an	lan	7.4	1.4	
Lead-Lag Ontimize?	Louu	Lug	Loud	Lug	Lug			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None	
Walk Time (c)	NONE	C-IVIIII	NULLE	7.0	7.0	NUNE	NULLE	
Flash Dont Walk (s)				20.0	20.0			
Pedestrian Calls (#/hr)				20.0	20.0			
Act Effet Green (s)	78 7	85.3		78.2	78.2	71	71	
Actuated a/C Ratio	0.87	00.0		0.87	0.87	0.09	0.09	
No Ratio	0.07	0.95		0.07	0.07	0.00	0.00	
Control Delay	0.00	0.44		0.40 5 0	0.09 1 Q	10 1	22.7	
Ouque Delay	1.1	1.1		0.2	1.0	40.1	22.7	
Total Dolay	0.0	0.0		0.0	1.0	10.0	0.0	
Total Delay	1.1	1.1		5. Z	1.0	40.1	22.1	

US 460 Corridor Sa	afety Stu	2040 Build AM						
1: US 460/Pruden	Bouleva	rd & N	orthfiel	d Driv	'e			
	≯	-	F	-	•	1	∢	
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR	
LOS	А	Α		Α	А	D	С	
Approach Delay		1.1		4.9		33.8		
Approach LOS		А		Α		С		
Queue Length 50th (ft)	1	3		0	0	8	0	
Queue Length 95th (ft)	m2	57		290	10	17	3	
Internal Link Dist (ft)		457		2219		1226		
Turn Bay Length (ft)	305				195		155	
Base Capacity (vph)	419	3356		3073	1389	287	263	
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	0.05	0.44		0.46	0.09	0.05	0.03	
Intersection Summary								
Area Type:	Other							
Cycle Length: 90								
Actuated Cycle Length: 90								
Offset: 80 (89%), Reference	ed to phase	2:WBTU	and 6:EB1	L, Start	of Green			
Natural Cycle: 65								
Control Type: Actuated-Coc	ordinated							
Maximum v/c Ratio: 0.46								
Intersection Signal Delay: 3	.2			In	tersection	LOS: A		
Intersection Capacity Utiliza	ation 57.3%			IC	U Level c	of Service	В	
Analysis Period (min) 15								
m Volume for 95th percen	tile queue is	s metered	l by upstre	am signa	al.			
				2				
Splits and Phases: 1: US	460/Pruder	n Bouleva	rd & North	field Driv	/e			
▶ _{Ø1}	- +t-	2 (B)						₽ Ø4
20 s	48 s	- 19						22 s
F								
™Ø5	1 00	5 (R)						07

Max Green (Gmax), s	
Max Allow Headway (MAH),	S
Max Q Clear (g_c+l1), s	
Green Ext Time (g_e), s	
Prob of Phs Call (p c)	
Prob of Max Out (p_x)	
Left-Turn Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	
Through Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	
Right-Turn Movement Data	
Assigned Mvmt	
Mvmt Sat Flow, veh/h	
Left Lane Group Data	
Assigned Mymt	

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US 460 Corridor Safety Study 1: US 460/Pruden Boulevard & Northfield Drive

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2040 Build AM

Movement EBL EBT WBU WBT WBR SBL SBR Lane Configurations 1
Movement EBL EBT WBU WBT WBR SBL SBR Lane Configurations 1
Lane Configurations 1
Traffic Volume (veh/h) 11 1387 0 1154 80 8 3 Future Volume (veh/h) 11 1387 0 1154 80 8 3 Number 1 6 2 12 7 14 Initial Q, veh 0 0 0 0 0 0 Ped-Bike Adj (A, pbT) 1.00 1.00 1.00 1.00 1.00 1.00 Ped-Bike Adj (A, pbT) 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 Adj Elow Rate, veh/h 19 1476 1407 127 14 8 Adj No. of Lanes 1 2 2 1 1 1 Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 <
Future Volume (veh/h) 11 1387 0 1154 80 8 3 Number 1 6 2 12 7 14 Initial Q, veh 0 0 0 0 0 0 Ped-Bike Adj (A_pbT) 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 Adj Sat Flow, veh/h/ln 1863 1863 1863 1863 1863 1863 Adj Flow Rate, veh/h 19 1476 1407 127 14 8 Adj Flow, of Lanes 1 2 2 1 1 1 Peack Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2
Number 1 6 2 12 7 14 Initial Q, veh 0
Initial Q, veh 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 Parking Bus Adj 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Adj Sat Flow, veh/h/In 1863 1863 1863 1863 1863 1863 Adj Flow Rate, veh/h 19 1476 1407 127 14 8 Adj No. of Lanes 1 2 2 1 1 1 Peacent Heavy Veh, % 2
Ped-Bike Adj (A_pbT) 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 1863 1863 1863 Adj Sat Flow, veh/h/ln 19 1476 1407 127 14 8 Adj Flow Rate, veh/h 19 1476 1407 127 14 8 Adj Rov of Lanes 1 2 2 1 1 1 Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2
Adj Sat Flow, veh/h/ln 1863 1863 1863 1863 1863 1863 Adj Flow Rate, veh/h 19 1476 1407 127 14 8 Adj No. of Lanes 1 2 2 1 1 1 Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2 2 2 2 2 2 2 Opposing Right Turn Influence Yes Yes Yes 2
Adj Flow Rate, veh/h 19 1476 1407 127 14 8 Adj No. of Lanes 1 2 2 1 1 1 Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2 2 2 2 2 2 2 Opposing Right Turn Influence Yes Yes Yes Yes Yes Cap, veh/h 132 2805 2405 1076 58 52 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Prop Arrive On Green 0.02 0.79 0.68 0.68 0.03 0.03 Ln Grp LOS C A A D D Approach Vol, veh/h 1495 1534 22 Approach LOS A A A D T T 444.2 Approach LOS A A D D T T 8
Adj No. of Lanes 1 2 2 1 1 1 Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2 2 2 2 2 2 2 Opposing Right Turn Influence Yes Yes Yes Yes Yes Cap, veh/h 132 2805 2405 1076 58 52 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Prop Arrive On Green 0.02 0.79 0.68 0.68 0.03 0.03 Ln Grp Delay, s/veh 28.9 4.0 8.7 5.3 44.5 43.7 In Grp LOS C A A D D Approach Vol, veh/h 1495 1534 22 Approach LOS A A A D D Timer: 1 2 3 4 5 6 7 8
Peak Hour Factor 0.58 0.94 0.82 0.63 0.58 0.38 Percent Heavy Veh, % 2 1 2 3 4 2 3 3 2 2 2 2 2 2 2 2
Percent Heavy Veh, % 2 3
Opposing Right Turn Influence Yes Yes Cap, veh/h 132 2805 2405 1076 58 52 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Prop Arrive On Green 0.02 0.79 0.68 0.68 0.03 0.03 In Grp Delay, s/veh 28.9 4.0 8.7 5.3 44.5 43.7 In Grp LOS C A A A D D Approach Vol, veh/h 1495 1534 22 4proach Delay, s/veh 4.3 8.4 44.2 Approach LOS A A D D Timer: 1 2 3 4 5 6 7 8
Cap, veh/h 132 2805 2405 1076 58 52 HCM Platoon Ratio 1.00 1.00 1.00 1.00 1.00 1.00 Prop Arrive On Green 0.02 0.79 0.68 0.68 0.03 0.03 In Grp Delay, s/veh 28.9 4.0 8.7 5.3 44.5 43.7 In Grp LOS C A A A D D Approach Vol, veh/h 1495 1534 22 4pproach Delay, s/veh 4.3 8.4 44.2 Approach LOS A A D D Timer: 1 2 3 4 5 6 7 8
HCM Platoon Ratio 1.00
Prop Arrive On Green 0.02 0.79 0.68 0.68 0.03 0.03 Ln Grp Delay, s/veh 28.9 4.0 8.7 5.3 44.5 43.7 Ln Grp LOS C A A D D Approach Vol, veh/h 1495 1534 22 40 Approach Delay, s/veh 4.3 8.4 44.2 44.2 Approach LOS A A D D Timer: 1 2 3 4 5 6 7 8
Ln Grp Delay, s/veh 28.9 4.0 8.7 5.3 44.5 43.7 Ln Grp LOS C A A A D D Approach Vol, veh/h 1495 1534 22 Approach Delay, s/veh 4.3 8.4 44.2 Approach LOS A A D D Timer: 1 2 3 4 5 6 7 8
Ln Grp LOS C A A D D Approach Vol, veh/h 1495 1534 22 Approach Vol, veh/h 4.3 8.4 44.2 Approach LOS A A D D Improach Vol, veh/h 10 Timer: 1 2 3 4 5 6 7 8
Approach Vol, veh/h 1495 1534 22 Approach Delay, s/veh 4.3 8.4 44.2 Approach LOS A A D Timer: 1 2 3 4 5 6 7 8
Approach Delay, s/veh 4.3 8.4 44.2 Approach LOS A A D Timer: 1 2 3 4 5 6 7 8
Approach LOS A A D Timer: <u>1 2 3 4 5 6 7 8</u>
Timer: 1 2 3 4 5 6 7 8
Assigned Phs 1 2 4 6
Case No 1.1 7.0 9.0 4.0
Phs Duration (G+Y+Rc), s 10.2 69.4 10.4 79.6
Change Period (Y+Rc), s 8.3 * 8.3 7.4 8.3
Max Green (Gmax), s 11.7 * 40 14.6 39.7
Max Allow Headway (MAH), s 3.6 4.7 3.9 4.7
Max Q Clear (g_c+l1), s 2.2 21.0 2.7 15.4
Green Ext Time (g_e), s 0.0 16.4 0.0 20.3
Prob of Phs Call (p_c) 0.38 1.00 0.42 1.00
Prob of Max Out (p_x) 0.00 0.84 0.00 0.79
Left-Turn Movement Data
Assigned Mvmt 1 5 7
Mymt Sat Flow, veh/h 1774 0 1774
Through Movement Data
Through Movement Data Assigned Mymt 2 4 6
Drough Movement Data Assigned Mvmt 2 4 6 Vvmt Sat Flow, veh/h 3632 0 3632
Through Movement Data Assigned Mvmt 2 4 6 Vvmt Sat Flow, veh/h 3632 0 3632
Through Movement Data Assigned Mvmt 2 4 6 Vvmt Sat Flow, veh/h 3632 0 3632 Right-Turn Movement Data
Assigned Movement Data Assigned Mvmt 2 4 6 Mvmt Sat Flow, veh/h 3632 0 3632 Right-Turn Movement Data
Through Movement Data Assigned Mvmt 2 4 6 Vvmt Sat Flow, veh/h 3632 0 3632 Right-Turn Movement Data 2 14 16 Vvmt Sat Flow, veh/h 1583 1583 0
Through Movement Data Assigned Mvmt 2 4 6 Vivmt Sat Flow, veh/h 3632 0 3632 Right-Turn Movement Data Assigned Mvmt 12 14 16 Vivmt Sat Flow, veh/h 1583 1583 0
Through Movement Data Assigned Mvmt 2 4 6 Assigned Mvmt 2 0 3632 3632 Wint Sat Flow, veh/h 3632 0 3632 3632 Right-Turn Movement Data 2 14 16 3632 30

US 460 Corridor Safety Study	2040 Build AM
1: US 460/Pruden Boulevard & Northfield Drive	

Lanes in Grp	1	0	0	1	0	0	0	0	
Grp Vol (v), veh/h	19	0	0	14	0	0	0	0	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1774	0	0	0	0	
Q Serve Time (g_s), s	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	
Perm LT Sat Flow (s_l), veh/h/ln	337	0	0	1774	0	0	0	0	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0	
Perm LT Eff Green (g_p), s	71.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Serve Time (g_u), s	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Perm LT Q Serve Time (g_ps), s	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Time to First Blk (g_f), s	0.0	61.1	0.0	0.0	0.0	0.0	0.0	0.0	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Lane Grp Cap (c), veh/h	132	0	0	58	0	0	0	0	
V/C Ratio (X)	0.14	0.00	0.00	0.24	0.00	0.00	0.00	0.00	
Avail Cap (c a), veh/h	325	0	0	288	0	0	0	0	
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Uniform Delay (d1), s/veh	28.4	0.0	0.0	42.4	0.0	0.0	0.0	0.0	
Incr Delay (d2) s/yeh	0.5	0.0	0.0	21	0.0	0.0	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	28.9	0.0	0.0	44.5	0.0	0.0	0.0	0.0	
1st-Term Q (Q1), veh/ln	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.0	
2nd-Term Q (Q2) veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1 00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
%ile Back of Q (50%) veh/lp	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	
%ile Storage Batio (RO%)	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	
Initial Q (Qb) veh	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.00	
Final (Residual) Q (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat O (Os) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Can (cs) veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Initial O Clear Time (tc) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mvmt	0	2	0	4	0	6	0	0	
Lane Assignment		Т				Т			
Lanes in Grp	0	2	0	0	0	2	0	0	
Grp Vol (v), veh/h	0	1407	0	0	0	1476	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (g_s), s	0.0	19.0	0.0	0.0	0.0	13.4	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	19.0	0.0	0.0	0.0	13.4	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2405	0	0	0	2805	0	0	
V/C Ratio (X)	0.00	0.59	0.00	0.00	0.00	0.53	0.00	0.00	
Avail Cap (c_a), veh/h	0	2405	0	0	0	2805	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	7.7	0.0	0.0	0.0	3.3	0.0	0.0	
Incr Delay (d2), s/veh	0.0	1.0	0.0	0.0	0.0	0.7	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	8.7	0.0	0.0	0.0	4.0	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	9.2	0.0	0.0	0.0	6.4	0.0	0.0	
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US 460 Corridor Safety S 1: US 460/Pruden Boulev	2040 Build AM								
2nd-Term Q (Q2), veh/In	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.0	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
%ile Back of Q (50%), veh/ln	0.0	9.5	0.0	0.0	0.0	6.6	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.00	0.00	0.35	0.00	0.00	
nitial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data	0	40	0	44	0	40	0	0	
Assigned MVmt	0	12	0	14	0	16	0	0	
	0	- R 1	0	- K	0	0	0	0	
anes in Gip	0	107	0	1	0	0	0	0	
Sip voi (v), ven/n	0	1502	0	1500	0	0	0	0	
Sip Sat Flow (S), ven/n/in	0	1000	0	1000	0	0	0	0.0	
y Serve Time (g_S), S	0.0	2.0	0.0	0.4	0.0	0.0	0.0	0.0	
by cle Q Clear Time (g_c), s	0.0	2.5	0.0	0.4	0.0	0.0	0.0	0.0	
rot RT Sat Flow (s_R), ven/n/in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
ane Grp Cap (c), ven/n	0 00	1076	0 00	52	0 00	0 00	0 00	0 00	
VC Ralio (A)	0.00	0.1Z	0.00	0.10	0.00	0.00	0.00	0.00	
Instream Filter (I)	0 00	1076	0 00	257	0 00	0 00	0 00	0 00	
Ipstream Filler (I)	0.00	1.00 E 0	0.00	1.00	0.00	0.00	0.00	0.00	
per Delay (d2), s/ven	0.0	0.2	0.0	42.3	0.0	0.0	0.0	0.0	
nici Delay (uz), s/ven	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	
Control Doloy (d), s/veh	0.0	5.3	0.0	13.7	0.0	0.0	0.0	0.0	
st Torm O (O1) voh/ln	0.0	1.1	0.0	43.7	0.0	0.0	0.0	0.0	
(Q1), veh/ln	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	
rd-Term $O(O3)$ veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
Lie Back of O Eactor (f. B%)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	0.0	
Lie Back of Q (50%) yeb/lp	0.00	1.00	0.00	0.2	0.00	0.0	0.00	0.00	
kile Storage Ratio (RO%)	0.0	0.15	0.0	0.2	0.0	0.0	0.0	0.0	
nitial Q (Qb) veh	0.00	0.10	0.0	0.00	0.0	0.00	0.00	0.0	
inal (Residual) O (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
at Cap (cs), veh/h	0.0	0	0	0	0	0	0	0.0	
nitial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ntersection Summary									
ICM 2010 Ctrl Delay		6.7							
ICM 2010 LOS		A							
lotes									
Jser approved ignoring U-Turning m	ovement.								
HCM 2010 computational ongine re		l clearan	o timos f	or the nha		sina the h	orrior		

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Lane Group	
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util Factor	
Frt	
Fit Protected	
Satd Flow (prot)	
Elt Dormittod	
Sotd Flow (porm)	
Dight Turn on Pod	
Salo. Flow (RTOR)	
Link Speed (mpn)	
LINK Distance (π)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%
Lane Group Flow (vp	h)
Turn Type	
Protected Phases	
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Ontimizo?	
Vehicle Extension (a)	
Pocall Mode	
Act Effet Crean (a)	
Actuated a/C Deti-	
Actuated g/C Ratio	
V/C Katio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	

Appendix D

2040 Build AM

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

EBL EBR WBL WBT NBR NBL NBT NBR SBL SBR SBR <th></th> <th>۶</th> <th>+</th> <th>*</th> <th>4</th> <th>+</th> <th>•</th> <th>•</th> <th>Ť</th> <th>1</th> <th>1</th> <th>ţ</th> <th>~</th>		۶	+	*	4	+	•	•	Ť	1	1	ţ	~
1 1 1 1 1 1 1 4 1 4 1 4 3 1 33 1174 26 174 959 80 9 10 54 40 33 6 33 1174 26 174 959 80 9 10 54 40 33 6 1900 100		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		٦	A		٦	<u></u>	1		र्स	1		4	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		33	1174	26	174	959	80	9	10	54	40	33	6
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		33	1174	26	174	959	80	9	10	54	40	33	6
250 0 400 175 0 50 0 0 1 0 1 1 0 1 0 0 0 1.00 0.95 0.95 1.00 0.95 0.850 0.969 0.979 1.770 3522 0 1770 3539 1583 0 1805 1583 0 1807 0 0.950 0.950 0.950 0.752 0.844 0 1588 0 1805 1583 0 1807 0 0.950 0.950 0.950 0.752 30 0.844 0 158 0 177 353 131 123 4 35 35 25 30 0 160 0.99 0.90 112 3.9 0 0 0 16 0.90 0.60 0.40 0.75 0.44 0.45 0.63 73 10 72 1210 43 295 999		1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		250		0	400		175	0		50	0		0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		1		0	1		1	0		1	0		0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		0			0			0			0		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			0.995				0.850			0.850		0.991	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		0.950			0.950				0.969			0.979	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1770	3522	0	1770	3539	1583	0	1805	1583	0	1807	0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.950			0.950				0.752			0.844	
Yes Jan Jan <td></td> <td>1//0</td> <td>3522</td> <td>0</td> <td>1//0</td> <td>3539</td> <td>1583</td> <td>0</td> <td>1401</td> <td>1583</td> <td>0</td> <td>1558</td> <td>0</td>		1//0	3522	0	1//0	3539	1583	0	1401	1583	0	1558	0
5 131 123 4 35 35 25 30 2499 463 411 171 48.7 9.0 11.2 3.9 0.46 0.97 0.61 0.59 0.96 0.60 0.40 0.75 0.44 0.64 0.45 0.63 72 1210 43 295 999 133 0 36 123 0 146 0 72 1253 0 295 999 133 0 36 123 0 146 0 Prot NA Prot NA Perm Perm NA Perm NA 1 6 5 2 2 8 8 4 4 5.0 15.0 5.0 15.0 7.0 7.0 7.0 7.0 11.1 21.8 21.1 21.8 13.1 13.1 13.1 13.1 13.1 13.1 <td< td=""><td></td><td></td><td>_</td><td>Yes</td><td></td><td></td><td>Yes</td><td></td><td></td><td>Yes</td><td></td><td></td><td>Yes</td></td<>			_	Yes			Yes			Yes			Yes
35 35 25 30 2499 463 411 171 48.7 9.0 11.2 3.9 0.46 0.97 0.61 0.59 0.96 0.60 0.40 0.75 0.44 0.64 0.45 0.63 72 1210 43 295 999 133 23 13 123 63 73 10 72 1253 0 295 999 133 0 36 123 0 146 0 Prot NA Perr Perm NA Perm Perm NA 4 1 6 5 2 2 8 8 4 4 5.0 15.0 5.0 15.0 7.0 7.0 7.0 7.0 11.1 21.8 21.8 13.1 13.1 13.1 13.1 13.1 13.1 24.0 43.0 22.0 41.0 25.0			5			25	131		05	123		4	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			35			35			25 411			30 171	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			2499 19 7			403			411			3.0	
72 1210 43 295 999 133 23 13 123 63 73 100 72 1253 0 295 999 133 0 36 123 0 146 0 Prot NA Prot NA Perm Perm Perm NA Perm NA 1 6 5 2 8 8 4 4 1 6 5 2 2 8 8 4 1 6 5 2 2 8 8 4 1 6 5 2 2 8 8 4 1 6 5 2 2 8 8 4 1 6 5 2 2 8 8 4 1 6 5 2 2 8 8 4 1 26 50 12.0 20.0		0.46	40.7	0.61	0.50	0.0	0.60	0.40	0.75	0.44	0.64	0.45	0.63
12 12 12 12 13 13 12 13 10 12 13 10 12 13 10 14 10 72 1253 0 295 999 133 0 36 123 0 146 0 Prot NA Prot NA Perm Perm NA Perm NA 1 6 5 2 8 8 4 4 1 6 5 2 2 8 8 4 4 11.1 21.8 11.1 21.8 13.1		0.40	1210	0.01	205	0.90	133	0.40	13	123	63	0.43	0.03
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		12	1210	40	200	333	100	20	10	120	00	15	10
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$,	72	1253	0	295	999	133	0	36	123	0	146	0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Prot	NA	Ū	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	· ·
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	6		5	2			8			4	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							2	8		8	4		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		1	6		5	2	2	8	8	8	4	4	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$													
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		5.0	15.0		5.0	15.0	15.0	7.0	7.0	7.0	7.0	7.0	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		11.1	21.8		11.1	21.8	21.8	13.1	13.1	13.1	13.1	13.1	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		24.0	43.0		22.0	41.0	41.0	25.0	25.0	25.0	25.0	25.0	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		26.7%	47.8%		24.4%	45.6%	45.6%	27.8%	27.8%	27.8%	27.8%	27.8%	
4.0 4.8 4.0 4.8 4.8 4.1 4.1 4.1 4.1 4.1 2.1 2.0 2		17.9	36.2		15.9	34.2	34.2	18.9	18.9	18.9	18.9	18.9	
2.1 2.0 2.1 2.0 3.0 <td></td> <td>4.0</td> <td>4.8</td> <td></td> <td>4.0</td> <td>4.8</td> <td>4.8</td> <td>4.1</td> <td>4.1</td> <td>4.1</td> <td>4.1</td> <td>4.1</td> <td></td>		4.0	4.8		4.0	4.8	4.8	4.1	4.1	4.1	4.1	4.1	
0.0 0.0 <td></td> <td>2.1</td> <td>2.0</td> <td></td> <td>2.1</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td></td>		2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
b.1 b.8 b.1 b.8 b.8 b.8 b.1 b.1 b.1 Lead Lag		0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Lead Lag Lag Lag 3.0		6.1	6.8		6.1	6.8	6.8		6.1	6.1		6.1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Lead	Lag		Lead	Lag	Lag						
None C-Min None C-Min C-Min None		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
None Control None		J.U Nono	C Min		J.U Nono	C Min	C Min	J.U Nono	Nono	Nono	Nono	Nono	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.0	/1 7		15.0	50.0	50.0	NULLE	13 /	13 /	NULLE	13 /	
0.41 0.77 0.95 0.50 0.14 0.17 0.36 0.62 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 D C E B A C A D 26.1 23.4 14.7 45.6 C C B D		0.10	0.46		0.18	0.57	0.57		0.15	0.15		0.15	
44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 D C E B A C A D 26.1 23.4 14.7 45.6 C C B D		0.10	0.77		0.10	0.50	0.07		0.10	0.36		0.62	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 D C E B A C A D 26.1 23.4 14.7 45.6 C C B D		44 1	25.1		78.1	10.2	17		33.3	9.2		45.6	
44.1 25.1 78.1 10.2 1.7 33.3 9.2 45.6 D C E B A C A D 26.1 23.4 14.7 45.6 C C D D C C C B D D D D		0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
D C E B A C A D 26.1 23.4 14.7 45.6 C C B D		44.1	25.1		78.1	10.2	1.7		33.3	9.2		45.6	
26.1 23.4 14.7 45.6 C C B D		D	С		E	В	A		С	A		D	
C C B D			26.1			23.4			14.7			45.6	
			С			С			В			D	

US 460 Corridor Safety Study 2040 Build AM 2: US460/Pruden Boulevard & Rob's Drive												
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	39	300		168	181	1		18	0		77	
Queue Length 95th (ft)	38	#471		159	115	1		35	0		58	
Internal Link Dist (ft)		2419			383			331			91	
Turn Bay Length (ft)	250			400		175			50			
Base Capacity (vph)	352	1632		312	2001	952		294	429		330	
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	0.77		0.95	0.50	0.14		0.12	0.29		0.44	
Intersection Summary												
Area Type:	Other											
Cycle Length: 90												
Actuated Cycle Length: 90												
Offset: 36 (40%), Reference	ed to phase	2:WBT ar	nd 6:EBT	, Start of	Green							
Natural Cycle: 75												
Control Type: Actuated-Coc	ordinated											
Maximum v/c Ratio: 0.95												
Intersection Signal Delay: 2	25.2			In	tersectior	LOS: C	•					
Intersection Capacity Utiliza	ation 69.7%			IC	U Level o	of Service	C					
Analysis Period (min) 15												
# 95tri percentile volume	exceeds ca	bacity, que	eue may	be longer	•							
Queue snown is maximu	Queue shown is maximum after two cycles.											

Splits and Phases: 2: US460/Pruden Boulevard & Rob's Drive

VHB

	● Ø2 (R)	Ø4
24 s	41s	25 s
√ Ø5	₩ Ø6 (R)	√ ¶ <i>ø</i> 8
22 s	43 s	25 s

		1		-	۰	ŧ	-
WBT	ST WBR	NBL	NBT	NBR	SBL	SBT	SBF
ነ ተተ	14 M		ę	1		\$	
4 959	59 80	9	10	54	40	33	6
1 959	59 80	9	10	54	40	33	6
5 2	2 12	3	8	18	7	4	14
) 0	0 0	0	0	0	0	0	0
)	1.00	1.00		1.00	1.00		1.00
) 1.00	00 1.00	1.00	1.00	1.00	1.00	1.00	1.00
3 1863	63 1863	1900	1863	1863	1900	1863	1900
5 999	99 133	22	13	123	62	73	10
1 2	2 1	0	1	1	0	1	0
0.96	96 0.60	0.40	0.75	0.44	0.64	0.45	0.63
2 2	2 2	2	2	2	2	2	2
 s		Yes	_	_	Yes	_	_
3 2172	72 972	162	82	193	125	109	13
) 1.00	00 100	1.00	1.00	1.00	1.00	1.00	1.00
3 0.61	61 0.61	0.12	0.12	0.12	0.12	0.12	0.12
2 10.1)1 76	35.6	0.0	41.0	40.3	0.0	0.0
= 10.1	R Δ	00.0	0.0	-1.0 D	40.0 D	0.0	0.0
1427	27		158	U	U	145	
22.7)7		39.8			40.3	
22.1	 C		00.0 D			40.0 D	
U	U		D			0	
3 4	4 5	6	7	8			
4	4 5	6		8			
8.0	3.0 2.0	4.0		7.0			
17.1	1 22.0	50.9		17.1			
6.1	6.1 6.1	6.8		6.1			
18.9	3.9 15.9	36.2		18.9			
4.9	1.9 3.8	5.1		4.9			
10.1).1 16.8	26.4		8.7			
0.9).9 0.0	8.3		1.0			
1.00	00 1.00	1.00		1.00			
0.18	18 1.00	0.91		0.10			
7	7 5			3			
555	55 1774			796			
1	1	6		8			
894	94	3487		670			
001	01	0101		010			
14	14	16		18			
107	07	124		1583			
) 7	7 5	0	0	3			
L+T+R	⊦R (Prot)			L+T			
0	0 L+T-	0 7 5 L+T+R (Prot)	0 7 5 0 L+T+R (Prot)	0 7 5 0 0 L+T+R (Prot)	0 7 5 0 0 3 L+T+R (Prot) L+T	0 7 5 0 0 3 L+T+R (Prot) L+T 2	0 7 5 0 0 3 L+T+R (Prot) L+T Synchro 9 2040 Build

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

2040 Build AM

Lanes in Grp
Grp Vol (v), veh/h
Grp Sat Flow (s), veh/h/ln
Q Serve Time (g_s), s
Cycle Q Clear Time (g_c), s
Perm LT Sat Flow (s_l), veh/h/ln
Shared LT Sat Flow (s_sh), veh/h/ln
Perm LT Eff Green (g_p), s
Perm LT Serve Time (g_u), s
Perm LT Q Serve Time (g_ps), s
Time to First Blk (g_f), s
Serve Time pre Blk (g_fs), s
Prop LT Inside Lane (P_L)
Lane Grp Cap (c), veh/h
V/C Ratio (X)
Avail Cap (c_a), veh/h
Upstream Filter (I)
Uniform Delay (d1), s/veh
Incr Delay (d2), s/veh
Initial Q Delay (d3), s/veh
Control Delay (d), s/veh
1st-Term Q (Q1), veh/ln
2nd-Term Q (Q2), veh/In
3rd-Term Q (Q3), veh/In
%ile Back of Q Factor (f_B%)
%ile Back of Q (50%), veh/in
%ile Storage Ratio (RQ%)
Initial Q (QD), ven
Final (Residual) Q (Qe), ven
Sat Delay (ds), s/ven
Sat Q (QS), ven
Sat Cap (CS), veri/fi
Middle Lane Group Data

Middle Lane Group Data
Assigned Mvmt
Lane Assignment
Lanes in Grp
Grp Vol (v), veh/h
Grp Sat Flow (s), veh/h/ln
Q Serve Time (g_s), s
Cycle Q Clear Time (g_c), s
Lane Grp Cap (c), veh/h
V/C Ratio (X)
Avail Cap (c_a), veh/h
Upstream Filter (I)
Uniform Delay (d1), s/veh
Incr Delay (d2), s/veh
Initial Q Delay (d3), s/veh
Control Delay (d), s/veh
1st-Term Q (Q1), veh/ln

Synchro 9 Report 2040 Build AM.syn

VHB

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$ 0.0 0.0 0.0 9.4 0.0 0.0 0.0 2.9 \\ 0.0 0.0 0.0 6.4 0.0 0.0 0.0 0.0 \\ 0.0 0.0 0.0 1.5 0.0 0.0 0.0 1.2 \\ 1.0 0.00 0.0 0.43 1.00 0.00 0.00 0.63 \\ 94 0 0 247 313 0 0 244 \\ 0.77 0.00 0.00 0.59 0.94 0.00 0.00 0.14 \\ 353 0 0 381 313 0 0 374 \\ 353 0 0 381 313 0 0 0 0 0 0 0 0 0 $	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
1.00 0.00 0.43 1.00 0.00 0.63 94 0 0 247 313 0 0 244 0.77 0.00 0.00 0.59 0.94 0.00 0.00 0.14 353 0 0 381 313 0 0 374	
94 0 0 247 313 0 0 244 0.77 0.00 0.00 0.59 0.94 0.00 0.00 0.14 353 0 0 381 313 0 0 374	
0.77 0.00 0.00 0.59 0.94 0.00 0.00 0.14 353 0 0 381 313 0 0 374	
353 0 0 381 313 0 0 374	
0.69 0.00 0.00 1.00 1.00 0.00 0.00 1.00	
42.1 0.0 0.0 38.1 36.6 0.0 0.0 35.4	
8.7 0.0 0.0 2.2 35.6 0.0 0.0 0.3	
50.7 0.0 0.0 40.3 72.2 0.0 0.0 35.6	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
0 0 0 0 0 0 0	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
T T	
00 137 00 00 00 244 00 00	
0.0 13.7 0.0 0.0 0.0 24.4 0.0 0.0	
0 2172 0 0 0 867 0 0	
0.00 0.46 0.00 0.00 0.00 0.71 0.00 0.00	
0 2172 0 0 0 867 0 0	
0.00 1.00 0.00 0.00 0.00 0.69 0.00 0.00	
0.0 9.4 0.0 0.0 0.0 17.9 0.0 0.0	
0.0 0.7 0.0 0.0 0.0 3.4 0.0 0.0	
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
0.0 10.1 0.0 0.0 0.0 21.3 0.0 0.0	
0.0 6.7 0.0 0.0 0.0 11.8 0.0 0.0	

US 460 Corridor Safety S	2040 Build AM								
2: US460/Pruden Boulev									
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.0	0.0	0.8	0.0	0.0	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
%ile Back of Q (50%), veh/In	0.0	6.9	0.0	0.0	0.0	12.6	0.0	0.0	
%ile Storage Ratio (RQ%)	0.00	0.44	0.00	0.00	0.00	0.13	0.00	0.00	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Right Lane Group Data									
Assigned Mvmt	0	12	0	14	0	16	0	18	
Lane Assignment		R				T+R		R	
Lanes in Grp	0	1	0	0	0	1	0	1	
Grp Vol (v), veh/h	0	133	0	0	0	639	0	123	
Grp Sat Flow (s), veh/h/ln	0	1583	0	0	0	1841	0	1583	
Q Serve Time (g_s), s	0.0	3.2	0.0	0.0	0.0	24.4	0.0	6.7	
Cycle Q Clear Time (g_c), s	0.0	3.2	0.0	0.0	0.0	24.4	0.0	6.7	
Prot RT Sat Flow (s R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prot RT Eff Green (g R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Prop RT Outside Lane (P R)	0.00	1.00	0.00	0.07	0.00	0.07	0.00	1.00	
Lane Grn Can (c) veh/h	0	972	0	0	0	902	0	193	
V/C Ratio (X)	0.00	0.14	0.00	0.00	0.00	0.71	0.00	0.64	
Avail Can (c, a) veh/h	0.00	972	0.00	0.00	0.00	902	0.00	332	
Unstream Filter (I)	0.00	1 00	0.00	0.00	0.00	0.69	0.00	1.00	
Uniform Delay (d1) s/yeb	0.00	73	0.00	0.00	0.00	17.9	0.00	37.6	
Incr Delay (d2) s/yeh	0.0	0.3	0.0	0.0	0.0	33	0.0	3.4	
Initial O Delay (d3) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	
Control Delay (d) s/veh	0.0	7.6	0.0	0.0	0.0	21.2	0.0	41.0	
1st-Term O (O1) veh/ln	0.0	1.0	0.0	0.0	0.0	12.3	0.0	2.9	
$2nd_{Term} \cap (\Omega^2)$ yeb/in	0.0	0.1	0.0	0.0	0.0	0.8	0.0	0.2	
3rd-Term $O(O3)$ veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	
%ile Back of O Factor (f. B%)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	1.00	
% ile Back of Q (50%) veh/lp	0.00	1.00	0.00	0.0	0.00	12.1	0.00	3.1	
%ile Storage Patio (PO%)	0.0	0.21	0.0	0.0	0.0	0.14	0.0	1.57	
Initial O (Ob) veh	0.00	0.21	0.00	0.00	0.00	0.14	0.00	0.0	
Final (Residual) O (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (de) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat D (Ds) vob	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Can (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Initial O Clear Time (tc) h	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intersection Summary									
HCM 2010 Ctrl Delay		24.5							
HCM 2010 LOS		С							

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	≜t ≽		<u>5</u>	**	1		\$		5	î,	
Traffic Volume (vph)	155	1016	0	11	657	65	1	113	95	104	46	64
Future Volume (vph)	155	1016	0	11	657	65	1	113	95	104	46	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	165		0	250		145	0		0	0		50
Storage Lanes	1		0	1		1	0		0	1		0
Taper Length (ft)	80			0			25			25		-
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.938			0.914	
Flt Protected	0.950			0.950				0.999		0.950		
Satd, Flow (prot)	1770	3539	0	1770	3539	1583	0	1746	0	1770	1703	0
Flt Permitted	0.950			0.950				0.995		0 220		
Satd, Flow (perm)	1770	3539	0	1770	3539	1583	0	1739	0	410	1703	0
Right Turn on Red			Yes			Yes	-		Yes			Yes
Satd Flow (RTOR)						170		33			67	
Link Sneed (mnh)		55			35	110		45			45	
Link Distance (ft)		2858			2499			2180			1010	
Travel Time (s)		35.4			48.7			33.0			15 3	
Peak Hour Factor	0.83	00.4	0.92	0.35	0.0/	0 00	0.25	0.67	0.65	0.75	0.60	0.62
Adi Flow (yph)	187	1120	0.52	0.00	600	0.30	0.25	160	1/6	130	0.00	103
Shared Lane Traffic (%)	107	1123	0	31	099	12	4	109	140	159	11	105
Lana Group Flow (uph)	197	1120	٥	21	600	70	٥	310	٥	130	190	٥
	Drot	NA	0	Drot	099	Dorm	Dorm	515	0	139	NA	U
Distanted Disease	1	N/A G		FIUL	2	Feilii	Feim	N/A o		D.F +F	INA 4	
Protected Phases	1	0		5	2	2	Q	0		2	4	
Detector Deco	1	6		F	0	2	0	0		0	4	
Switch Dhose	1	0		5	2	2	0	0		1	4	
Switch Flidse	E 0	15.0		F 0	15.0	15.0	7.0	7.0		7.0	7.0	
Minimum Iniual (S)	5.0	15.0		5.0	15.0	15.0	1.0	1.0		1.0	1.0	
Minimum Split (s)	11.0	21.8		11.5	21.8	21.8	13.8	13.8		13.8	13.8	
Total Split (S)	20.0	45.0		20.0	45.0	45.0	25.0	25.0		20.0	45.0	
Total Split (%)	18.2%	40.9%		18.2%	40.9%	40.9%	22.1%	22.1%		18.2%	40.9%	_
Maximum Green (s)	14.0	38.2		13.5	38.2	38.2	18.2	18.2		13.2	38.2	
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.8	4.8		4.8	4.8	_
All-Red Time (s)	2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	_
Total Lost Time (s)	6.0	6.8		6.5	6.8	6.8		6.8		6.8	6.8	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min		None	C-Min	C-Min	None	None		None	None	
Act Effct Green (s)	13.6	51.3		7.5	40.7	40.7		18.2		29.3	36.1	
Actuated g/C Ratio	0.12	0.47		0.07	0.37	0.37		0.17		0.27	0.33	
v/c Ratio	0.85	0.68		0.26	0.53	0.10		1.01		0.57	0.30	
Control Delay	80.4	27.7		53.3	29.6	0.3		95.7		36.2	17.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
Total Delay	80.4	27.7		53.3	29.6	0.3		95.7		36.2	17.9	
LOS	F	С		D	С	A		F		D	В	
Approach Delay		35.2			27.9			95.7			25.9	
Approach LOS		D			С			F			С	

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

VHB

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2040 Build AM

Lane Group Queue Length 50th (ft) Queue Length 95th (ft) Internal Link Dist (ft) Turn Bay Length (ft) Base Capacity (vph) Starvation Cap Reducth Spillback Cap Reducth Spillback Cap Reductn Storage Cap Reductn Reduced v/c Ratio

Intersection Summary

Area Type: Cycle Length: 110 Actuated Cycle Length: Offset: 0 (0%), Referen Natural Cycle: 90 Control Type: Actuated-Maximum v/c Ratio: 1.0 Intersection Signal Dela Intersection Capacity U Analysis Period (min) 1 ~ Volume exceeds ca Queue shown is ma # 95th percentile volu

Splits and Phases: 3

Ø1	
20 s	
√ Ø5	
20 s	

0.0	0.0	0.0	0.0		0.0	0.0
6.8	6.5	6.8	6.8		6.8	6.8
Lag	Lead	Lag	Lag	Lag	Lag	Lead
3.0	3.0	3.0	3.0	3.0	3.0	3.0
Min	None	C-Min	C-Min	None	None	None
51.3	7.5	40.7	40.7		18.2	29.3
).47	0.07	0.37	0.37		0.17	0.27
.68	0.26	0.53	0.10		1.01	0.57
27.7	53.3	29.6	0.3		95.7	36.2
0.0	0.0	0.0	0.0		0.0	0.0
27.7	53.3	29.6	0.3		95.7	36.2
С	D	С	А		F	D
35.2		27.9			95.7	
D		С			F	

VHB

VHB

Appendix D

Safety Study			
n Boulevard &	Kinas	Fork	Rd

2040 Build AM

: US460/Pruden B	ouleval		ngs Fo	ork Ra								
	۶	-	\mathbf{F}	4	+	•	•	Ť	1	1	ŧ	~
ane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
ueue Length 50th (ft)	131	352		21	204	0		~211		71	57	
ueue Length 95th (ft)	#220	467		19	270	0		#227		96	57	
ternal Link Dist (ft)		2778			2419			2100			930	
urn Bay Length (ft)	165			250		145						
ase Capacity (vph)	225	1651		217	1309	692		315		280	635	
tarvation Cap Reductn	0	0		0	0	0		0		0	0	
pillback Cap Reductn	0	0		0	0	0		0		0	0	
torage Cap Reductn	0	0		0	0	0		0		0	0	
educed v/c Ratio	0.83	0.68		0.14	0.53	0.10		1.01		0.50	0.28	
tersection Summary												
rea Type:	Other											
ycle Length: 110												
ctuated Cycle Length: 110												
offset: 0 (0%), Referenced to	o phase 2:	WBT and	6:EBT, S	tart of Gre	een							
atural Cycle: 90												
ontrol Type: Actuated-Coo	rdinated											
laximum v/c Ratio: 1.01												
tersection Signal Delay: 39	9.0			In	tersectior	LOS: D	-					
tersection Capacity Utilizat	ion 72.8%			IC	CU Level o	of Service	С					
nalysis Period (min) 15												
Volume exceeds capacit	y, queue is	theoretic	ally infinit	e.								
Queue shown is maximul	m atter two	cycles.										
95th percentile volume e	xceeds cap	pacity, que	eue may	be longer	•							
Queue shown is maximul	m atter two	cycles.										
plits and Phases: 3: US4	60/Pruden	Boulevar	d & Kings	s Fork Rd								
<u>ک</u>	≜											
اھ 0 s	62 (R)					45	s 104					
							-					
▼Ø5 •	-106 (R)					20	*Ø7		7	Ø8		
U S 45	S					20	S		25 S			

3: US460/Pruden Bot	ety Stu ulevar	udy 'd & Ki	ngs Fo	ork Rd						204	0 Build	1 AM
			0									
	≯	→	\mathbf{F}	1	-	•	1	†	1	1	Ŧ	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ň	≜ t}		۲	^	1		4		1	f,	
Traffic Volume (veh/h)	155	1016	0	11	657	65	1	113	95	104	46	64
Future Volume (veh/h)	155	1016	0	11	657	65	1	113	95	104	46	64
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	187	1129	0	31	699	72	4	169	146	139	77	103
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	0
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	216	1704	0	49	1389	621	34	153	130	271	223	298
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
Prop Arrive On Green	0.12	0.48	0.00	0.03	0.39	0.39	0.17	0.17	0.17	0.08	0.31	0.31
Ln Grp Delay, s/veh	64.8	22.9	0.0	63.6	26.4	21.6	98.3	0.0	0.0	33.8	0.0	29.9
Ln Grp LOS	E	С		Е	С	С	F			С		С
Approach Vol, veh/h		1316			802			319			319	
Approach Delay, s/veh		28.8			27.4			98.3			31.6	
Approach LOS		С			С			F			С	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6	7	8			
Case No		2.0	3.0		4.0	2.0	4.0	1.2	8.0			
Phs Duration (G+Y+Rc), s		19.4	50.0		40.7	9.6	59.8	15.7	25.0			
Change Period (Y+Rc), s		6.0	6.8		6.8	6.5	6.8	6.8	6.8			
Max Green (Gmax), s		14.0	38.2		38.2	13.5	38.2	13.2	18.2			
Max Allow Headway (MAH), s		3.6	4.8		5.1	3.8	4.8	3.7	5.1			
Max Q Clear (g_c+l1), s		13.4	18.4		11.1	3.9	28.7	8.9	20.2			
Green Ext Time (g_e), s		0.0	12.1		2.9	0.0	7.0	0.1	0.0			
Prob of Phs Call (p_c)		1.00	1.00		1.00	0.61	1.00	0.99	1.00			
Prob of Max Out (p_x)		1.00	0.50		0.00	0.00	0.81	0.55	1.00			
Left-Turn Movement Data												
Assigned Mvmt		1				5		7	3			
Mvmt Sat Flow, veh/h		1774				1774		1774	7			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		724		3632		926			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		968		0		787			
Left Lane Group Data												
Assigned Mvmt		1	0	0	0	5	0	7	3			
Lane Assignment		(Prot)				(Prot)	(Pr/Pm)	L+T+R			

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Lanes in Grp	1	0	0	0	1	0	1	1	
Grp Vol (v), veh/h	187	0	0	0	31	0	139	319	
Grp Sat Flow (s), veh/h/ln	1774	0	0	0	1774	0	1774	1720	
Q Serve Time (g_s), s	11.4	0.0	0.0	0.0	1.9	0.0	6.9	5.7	
Cycle Q Clear Time (g_c), s	11.4	0.0	0.0	0.0	1.9	0.0	6.9	18.2	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	0	0	0	1060	1223	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	342	0	
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	20.2	18.2	
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.2	
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.01	
Lane Grp Cap (c), veh/h	216	0	0	0	49	0	271	318	
V/C Ratio (X)	0.87	0.00	0.00	0.00	0.63	0.00	0.51	1.00	
Avail Cap (c_a), veh/h	226	0	0	0	218	0	341	318	
Upstream Filter (I)	0.56	0.00	0.00	0.00	0.86	0.00	1.00	1.00	
Uniform Delay (d1), s/veh	47.4	0.0	0.0	0.0	52.9	0.0	32.3	46.8	
Incr Delay (d2), s/veh	17.3	0.0	0.0	0.0	10.7	0.0	1.5	51.5	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	64.8	0.0	0.0	0.0	63.6	0.0	33.8	98.3	
1st-Term Q (Q1), veh/ln	5.6	0.0	0.0	0.0	0.9	0.0	3.3	9.6	
2nd-Term Q (Q2), veh/In	1.0	0.0	0.0	0.0	0.1	0.0	0.1	4.5	
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	
%ile Back of Q (50%), veh/ln	6.6	0.0	0.0	0.0	1.1	0.0	3.4	14.2	
%ile Storage Ratio (RQ%)	1.02	0.00	0.00	0.00	0.11	0.00	0.09	0.17	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Middle Lane Crown Date									
	0		0		0				
Assigned MVmt	U	2	U	4	U	6	U	8	
Lane Assignment	0	1	0	0	0	1	0	0	
Laries In Grp	U	2	0	0	0	2	0	U	
Grp voi (v), ven/n	0	699	0	0	U	1129	0	0	
Grp Sat Flow (s), ven/n/in	0	1//0	U	0	0	1//0	0	0	
Q Serve Time (g_s), s	0.0	16.4	0.0	0.0	0.0	26.7	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	10.4	0.0	0.0	0.0	20.7	0.0	0.0	
Lane Grp Cap (c), ven/h	0	1389	0	0	0	1704	0	0	
V/C Ratio (X)	0.00	0.50	0.00	0.00	0.00	0.66	0.00	0.00	
Avail Cap (c_a), veh/h	0	1389	0	0	0	1704	0	0	
Upstream Filter (I)	0.00	0.86	0.00	0.00	0.00	0.56	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	25.3	0.0	0.0	0.0	21.7	0.0	0.0	
Incr Delay (d2), s/veh	0.0	1.1	0.0	0.0	0.0	1.2	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	26.4	0.0	0.0	0.0	22.9	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	8.1	0.0	0.0	0.0	13.0	0.0	0.0	

US 460 Corridor Safety Study

3: US460/Pruden Boulevard & Kings Fork Rd

US 460 Corridor Safety Study

2040 Build AM

2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f_B%) %ile Back of Q Factor (T_B%) %ile Back of Q (50%), veh/In %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h Right Lane Group Data

Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Prot RT Sat Flow (s_R), veh/h/ln Prot RT Eff Green (g_R), s Prop RT Outside Lane (P_R) Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (03), s/veh 1st-Term Q (Q1), veh/ln 2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f_B%) %ile Dack of Q (50%), veh/ln %ile Back of Q (50%), veh/In %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h

Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS

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3: US460/Pruden Boulevard & Kings Fork Rd

	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
	0.0	8.3	0.0	0.0	0.0	13.3	0.0	0.0	
	0.00	0.09	0.00	0.00	0.00	0.12	0.00	0.00	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
_	0	12	0	14	0	16	0	18	
	Ŭ	R	Ŭ	T+R	v	10	Ŭ	10	
	0	1	0	1	0	0	0	0	
	0	72	0	180	0	0	0	0	
	0	1583	0	1692	0	0	0	0	
	0.0	3.2	0.0	9.1	0.0	0.0	0.0	0.0	
	0.0	3.2	0.0	9.1	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.00	1.00	0.00	0.57	0.00	0.00	0.00	0.46	
	0	621	0	521	0	0	0	0	
	0.00	0.12	0.00	0.35	0.00	0.00	0.00	0.00	
	0	621	0	588	0	0	0	0	
	0.00	0.86	0.00	1.00	0.00	0.00	0.00	0.00	
	0.0	21.3	0.0	29.5	0.0	0.0	0.0	0.0	
	0.0	0.3	0.0	0.4	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	21.6	0.0	29.9	0.0	0.0	0.0	0.0	
	0.0	1.4	0.0	4.3	0.0	0.0	0.0	0.0	
	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
	0.0	1.5	0.0	4.3	0.0	0.0	0.0	0.0	
	0.00	0.26	0.00	0.12	0.00	0.00	0.00	0.00	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	_								
		36.8							
		D							

US 460 Corridor S	afety St	udy								204	40 Buil	d AM
4: Providence Roa	d/Lake	Prince	Drive	& US4	60/Pru	iden B	ouleva	ard				
	٦	+	*	4	Ļ	•	•	1	1	1	ţ	-
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	≜ 1≽		٦	^	1		\$			\$	
Traffic Volume (vph)	9	1041	77	6	651	78	44	25	15	118	35	4
Future Volume (vph)	9	1041	77	6	651	78	44	25	15	118	35	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	220		0	200		110	0		0	0		0
Storage Lanes	1		0	1		1	0		0	0		0
Taper Length (ft)	160			150			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.986				0.850		0.965			0.992	
Flt Protected	0.950			0.950				0.977			0.967	
Satd. Flow (prot)	1770	3490	0	1770	3539	1583	0	1756	0	0	1787	0
Flt Permitted	0.330			0.133				0.782			0.764	
Satd. Flow (perm)	615	3490	0	248	3539	1583	0	1406	0	0	1412	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15				131		18			3	
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		471			2858			1931			2337	
Travel Time (s)		5.8			35.4			29.3			35.4	
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Adj. Flow (vph)	18	1132	115	18	731	132	59	36	33	144	58	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	1247	0	18	731	132	0	128	0	0	214	0
Turn Type	D.P+P	NA		D.P+P	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases	2			6		2	8			4		
Detector Phase	1	6		5	2	2	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	11.8	21.8		11.8	21.8	21.8	13.3	13.3		13.8	13.8	
Total Split (s)	18.0	46.0		18.0	46.0	46.0	26.0	26.0		26.0	26.0	
Total Split (%)	20.0%	51.1%		20.0%	51.1%	51.1%	28.9%	28.9%		28.9%	28.9%	
Maximum Green (s)	11.2	39.2		11.2	39.2	39.2	19.7	19.7		19.2	19.2	
Yellow Time (s)	4.8	4.8		4.8	4.8	4.8	4.8	4.8		4.8	4.8	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Total Lost Time (s)	6.8	6.8		6.8	6.8	6.8		6.3			6.8	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						_
Lead-Lag Optimize?												
Venicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	_
Minimum Gap (s)	0.2	3.5		0.2	3.5	3.5	0.2	0.2		0.2	0.2	
Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	_
Time To Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Recall Mode	None	Min		None	Min	Min	None	None		None	None	_
Act Effect Green (s)	32.0	30.1		32.0	30.1	30.1		16.1			15.6	
Actuated g/C Ratio	0.50	0.47		0.50	0.47	0.47		0.25			0.24	
V/C Rdll0	0.04	0.70		0.07	12 5	0.10		0.55			0.0Z	
Oucue Delay	7.1	10.7		1.3	13.5	3.4		24.4			34.5	
Total Delay	0.0	10.7		0.0	12.5	0.0		0.0			0.0	
i otai Delay	7.1	10.7		1.3	13.5	3.4		Z4.4			34.3	

US 460 Corridor Safety Study 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

≯ - 🖌 Ţ ← ŧ 1 1 ۰ \rightarrow • \rightarrow 1 Lane Group LOS EBT EBL EBR WBT WBR NBL NBT SBT WBL Α В В С С 24.4 Approach Delay 18.5 11.8 34.5 Approach LOS В С С Queue Length 50th (ft) Queue Length 95th (ft) 3 167 3 81 0 32 66 6 364 178 5 72 108 Internal Link Dist (ft) 391 2778 1851 2257 Turn Bay Length (ft) 220 200 110 Base Capacity (vph) 537 2311 416 2338 1090 478 459 Starvation Cap Reductn 0 0 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 0.03 0.54 0.47 0.04 0.31 0.12 0.27 Reduced v/c Ratio

	iaij		
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Le	ngth: 64.4		
Natural Cycle: 65			
Control Type: Actu	ated-Uncoordinated		
Maximum v/c Rati	o: 0.76		
Intersection Signa	I Delay: 17.8	Intersection LOS: B	
Intersection Capa	city Utilization 55.1%	ICU Level of Service E	3
Analysis Period (n	nin) 15		

Splits and Phases: 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

▶ Ø1	∕ ø2	
18 s	46 s	26 s
√ Ø5		
18 s	46 s	26 s

2040 Build AM

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

Movement Lane Configurations Traffic Volume (veh/h) Future Volume (veh/h) Number Initial Q. veh Ped-Bike Adj (A_pbT) Parking Bus Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Opposing Right Turn In Cap, veh/h HCM Platoon Ratio Prop Arrive On Green Ln Grp Delay, s/veh Ln Grp LOS Approach Vol, veh/h Approach Delay, s/veh Approach LOS

Timer: Assigned Phs Case No Phs Duration (G+Y+Rc Change Period (Y+Rc), Max Green (Gmax), s Max Allow Headway (M Max Q Clear (g_c+l1), Green Ext Time (g_e), Prob of Phs Call (p_c) Prob of Max Out (p_x)

Left-Turn Movement D Assigned Mvmt Mvmt Sat Flow, veh/h

Through Movement Da Assigned Mvmt Mvmt Sat Flow, veh/h

Right-Turn Movement Assigned Mvmt Mvmt Sat Flow, veh/h

Left Lane Group Data Assigned Mvmt

Lane Assignment

VHB

Synchro 9 Report

2040 Build AM.syn

Synchro 9 Report 2040 Build AM.syn

VHB

Appendix D

US 460 Corridor Safety Study

2040 Bullu Alvi

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	1	† î•		2	- † †	1		\$			¢	
	9	1041	77	6	651	78	44	25	15	118	35	4
	9	1041	77	6	651	78	44	25	15	118	35	4
	1	6	16	5	2	12	3	8	18	7	4	14
	0	0	0	0	0	0	0	0	0	0	0	0
	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1863	1863	1900	1863	1863	1863	1900	1863	1900	1900	1863	1900
	18	1132	115	18	/31	132	59	30	33	144	58	12
	0.50	0.02	0.67	033	0.80	0.50	0.75	0.60	0.46	0 82	0.60	0 33
	0.00	0.92	0.07	0.55	0.09	0.09	0.75	0.09	0.40	0.02	0.00	0.55
fluence	Voc	2	2	Voc	2	2	Voc	2	2	Voc	2	2
nuence	377	1502	162	245	1736	777	18/	100	7/	271	81	15
	1 00	1 00	1 00	1 00	1 00	1.00	1 00	1 00	1 00	1 00	1 00	1 00
	0.02	0.49	0.49	0.02	0.49	0.49	0.17	0.17	0.17	0.17	0.17	0.17
	8.4	14.6	14.6	10.5	10.8	9.3	24.5	0.0	0.0	26.8	0.0	0.0
	A	В	В	B	B	A	C	0.0	0.0	C	0.0	0.0
		1265	_	_	881		-	128		-	214	
		14.5			10.5			24.5			26.8	
		В			В			С			С	
		1	0	2	4	5	6	7	0			
		1	2	<u> </u>	4	<u> </u>	0	/	0			
		1 1	20		4	5	0		ð 0 0			
		1.1	3.U 20.G		0.0	1.1	4.0		0.0			
), 5		6.8	50.0		10.1	6.8	50.0		10.1			
, 5		11.2	30.2		10.0	11.2	30.2		* 20			
IAH) s		3.6	47		5.0	3.6	47		5.0			
s (11), 3		2.3	10.6		10.1	2.3	19.7		6.3			
s		0.0	15.2		12	0.0	12.1		1.5			
•		0.28	1.00		1 00	0.28	1 00		1 00			
		0.00	0.42		0.22	0.00	0.58		0.04			
												_
ata		<u> </u>										
		1			/	5			3			
		1//4			1025	1//4			596			
ta												
			2		4		6		8			
			3539		467		3245		629			
Dete												
Jala			40				40		40			
			1582		14		320		18			
			1303		09		329		420			
		1	0	0	7	5	0	0	3			
		(Pr/Pm)			L+T+R	(Pr/Pm)			L+T+R			

Synchro 9 Report

2040 Build AM.syn

anes in Grp	1	0	0	1	1	0	0	1	2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	
rp Vol (v), veh/h	18	0	0	214	18	0	0	128	3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rp Sat Flow (s), veh/h/ln	1774	0	0	1581	1774	0	0	1651	%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
Serve Time (g_s), s	0.3	0.0	0.0	3.8	0.3	0.0	0.0	0.0	%ile Back of Q (50%), veh/ln	0.0	4.2	0.0	0.0	0.0	9.0	0.0	0.0	
ycle Q Clear Time (g_c), s	0.3	0.0	0.0	8.1	0.3	0.0	0.0	4.3	 %ile Storage Ratio (RQ%)	0.00	0.04	0.00	0.00	0.00	0.59	0.00	0.00	
erm LT Sat Flow (s_l), veh/h/ln	638	0	0	1353	444	0	0	1352	Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
hared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1786	0	0	0	1675	Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
erm LT Eff Green (g_p), s	31.8	0.0	0.0	11.3	31.8	0.0	0.0	11.3	Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
erm LT Serve Time (g_u), s	23.2	0.0	0.0	7.0	14.1	0.0	0.0	3.2	Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
erm LT Q Serve Time (g_ps), s	0.2	0.0	0.0	3.8	0.7	0.0	0.0	0.0	Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
ime to First Blk (g_f), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	2.3	Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
erve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	2.3	Right Lane Group Data									
rop LT Inside Lane (P_L)	1.00	0.00	0.00	0.67	1.00	0.00	0.00	0.46	Assigned Mumt	0	10	0	14	0	16	0	10	
ane Grp Cap (c), veh/h	377	0	0	367	245	0	0	368	Assigned MVIII	0	IZ D	0	14	U	10 T+D	0	10	
/C Ratio (X)	0.05	0.00	0.00	0.58	0.07	0.00	0.00	0.35		0	Г. 1	0	0	0	1+K	0	0	
vail Cap (c_a), veh/h	646	0	0	545	514	0	0	564	Gro Vol (v) voh/h	0	120	0	0	0	630	0	0	
pstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	Gip Voi (V), vei//ii	0	152	0	0	0	1005	0	0	
niform Delay (d1), s/veh	8.4	0.0	0.0	25.3	10.3	0.0	0.0	23.9	Grp Sat Flow (S), Ven/h/m	0	1000	0	0	0	177	0	0	
cr Delay (d2), s/veh	0.1	0.0	0.0	1.5	0.1	0.0	0.0	0.6	Q Serve Time (g_s), s	0.0	3.0	0.0	0.0	0.0	17.7	0.0	0.0	
itial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Cycle & Clear Time (g_c), s	0.0	3.0	0.0	0.0	0.0	17.7	0.0	0.0	
ontrol Delay (d), s/veh	8.4	0.0	0.0	26.8	10.5	0.0	0.0	24.5	Prot RT Sat Flow (s_R), ven/h/in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
st-Term Q (Q1), veh/In	0.2	0.0	0.0	3.6	0.2	0.0	0.0	2.0	Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.06	0.00	0.18	0.00	0.26	
d-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Lane Grp Cap (c), veh/h	0	777	0	0	0	885	0	0	
ile Back of Q Factor (f B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	V/C Ratio (X)	0.00	0.17	0.00	0.00	0.00	0.71	0.00	0.00	
ile Back of Q (50%), veh/ln	0.2	0.0	0.0	3.8	0.2	0.0	0.0	2.1	Avail Cap (c_a), veh/h	0	957	0	0	0	1090	0	0	
ile Storage Ratio (RQ%)	0.02	0.00	0.00	0.04	0.02	0.00	0.00	0.03	Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
itial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Uniform Delay (d1), s/veh	0.0	9.2	0.0	0.0	0.0	12.9	0.0	0.0	
nal (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	1./	0.0	0.0	
at Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
at Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Control Delay (d), s/veh	0.0	9.3	0.0	0.0	0.0	14.6	0.0	0.0	
at Cap (cs), veh/h	0	0	0	0	0	0	0	0	1st-Term Q (Q1), veh/ln	0.0	1.3	0.0	0.0	0.0	8.8	0.0	0.0	
itial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	
									3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Iddle Lane Group Data									%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
ssigned Mvmt	0	2	0	4	0	6	0	8	%ile Back of Q (50%), veh/ln	0.0	1.3	0.0	0.0	0.0	9.2	0.0	0.0	
ane Assignment		Т				Т			%ile Storage Ratio (RQ%)	0.00	0.31	0.00	0.00	0.00	0.60	0.00	0.00	
anes in Grp	0	2	0	0	0	1	0	0	Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rp Vol (v), veh/h	0	731	0	0	0	617	0	0	Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
rp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Serve Time (g_s), s	0.0	8.6	0.0	0.0	0.0	17.7	0.0	0.0	Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
ycle Q Clear Time (g_c), s	0.0	8.6	0.0	0.0	0.0	17.7	0.0	0.0	 Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
ane Grp Cap (c), veh/h	0	1736	0	0	0	868	0	0	Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
C Ratio (X)	0.00	0.42	0.00	0.00	0.00	0.71	0.00	0.00	Intersection Summary									
vail Cap (c_a), veh/h	0	2138	0	0	0	1069	0	0	HCM 2010 Ctrl Delay		14.7							
pstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	 HCM 2010 LOS		R							
niform Delay (d1), s/veh	0.0	10.6	0.0	0.0	0.0	12.9	0.0	0.0			5							
icr Delay (d2), s/veh	0.0	0.2	0.0	0.0	0.0	1.7	0.0	0.0	Notes									
itial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	* HCM 2010 computational engine re	equires equa	al clearan	ce times f	or the pha	ses cross	sing the b	arrier.		
ontrol Delay (d), s/veh	0.0	10.8	0.0	0.0	0.0	14.6	0.0	0.0	 									
t-Term Q (Q1), veh/In	0.0	4.2	0.0	0.0	0.0	8.6	0.0	0.0										

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard

	x 00400/	Tuuei	Douit	evalu		
	-	$\mathbf{\hat{z}}$	4	+	٩.	1
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	≜ †⊅			^		1
Traffic Volume (vph)	1159	0	0	738	0	2
Future Volume (vph)	1159	0	0	738	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	3539	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	0	0	3539	0	1611
Link Speed (mph)	55			55	25	
Link Distance (ft)	1965			471	1166	
Travel Time (s)	24.4			5.8	31.8	
Peak Hour Factor	0.96	0.92	0.92	0.95	0.25	0.25
Adj. Flow (vph)	1207	0	0	777	0	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1207	0	0	777	0	8
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
0 I I T II I I						

VHB

Control Type: Unsignalized Intersection Capacity Utilization 42.0% Analysis Period (min) 15

2040 Build AM

ICU Level of Service A

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard 2040 Build AM

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	_ ≜î ≽			^		1
Traffic Vol, veh/h	1159	0	0	738	0	2
Future Vol, veh/h	1159	0	0	738	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage	e, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	92	92	95	25	25
Heavy Vehicles, %	2	2	2	2	2	2
Mymt Flow	1207	0	0	777	0	8

Major/Minor	Major1	1	Major2	1	Minor1	
Conflicting Flow All	0	0	-	-	-	604
Stage 1	-		-	-	-	-
Stage 2	-		-	-	-	-
Critical Hdwy	-		-	-	-	6.94
Critical Hdwy Stg 1	-		-	-	-	-
Critical Hdwy Stg 2	-		-	-	-	-
Follow-up Hdwy	-		-	-	-	3.32
Pot Cap-1 Maneuver	-		0	-	0	441
Stage 1	-		0	-	0	-
Stage 2	-		0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	r-		-	-	-	441
Mov Cap-2 Maneuver	r-		-	-	-	-
Stage 1	-		-	-	-	-
Stage 2	-		-	-	-	-
Approach	FR	l.	W/R		NR	
HCM Control Dolov of	<u> </u>	, 1	0		12.2	
HCIVI CONTION Delay, S	5 0		U		13.3 D	
					Б	
Minor Lane/Major Mv	mt	NBLn1	EBT	EBR	WBT	
Capacity (veh/h)		441	-	-	-	
HCM Lane V/C Ratio		0.018	-	-	-	
HCM Control Delay (s	s)	13.3	-	-	-	
HCM Lane LOS		В	-	-	-	
HCM 95th %tile Q(vel	h)	0.1	-	-	-	

	٦	-	\mathbf{r}	1	-	•	•	†	1	1	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<u></u>	1	ľ	A			ا	1		\$	
Traffic Volume (vph)	4	768	20	24	494	0	26	3	74	1	0	1
Future Volume (vph)	4	768	20	24	494	0	26	3	74	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		340	400		0	0		300	0		0
Storage Lanes	0		1	1		0	0		1	0		0
Taper Length (ft)	25			125			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850		0.932	
Flt Protected		0.999		0.950				0.960			0.976	
Satd. Flow (prot)	0	3536	1583	1770	3539	0	0	1788	1583	0	1694	0
Flt Permitted		0.999		0.950				0.960			0.976	
Satd. Flow (perm)	0	3536	1583	1770	3539	0	0	1788	1583	0	1694	0
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		3402			5235			2230			2290	
Travel Time (s)		42.2			64.9			33.8			34.7	
Peak Hour Factor	0.38	0.89	0.80	0.68	0.90	0.92	0.41	0.25	0.34	0.25	0.92	0.25
Adj. Flow (vph)	11	863	25	35	549	0	63	12	218	4	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	874	25	35	549	0	0	75	218	0	8	0
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											

Control Type: Unsignalized Intersection Capacity Utilization 39.3% Analysis Period (min) 15 ICU Level of Service A

US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

2040 Build AM

Intersection Int Delay, s/veh Movement Lane Configurations Traffic Vol, veh/h Future Vol, veh/h Conflicting Peds, #/hr Sign Control F RT Channelized Storage Length Veh in Median Storage,

Grade, %

F

Peak Hour Factor Heavy Vehicles, % Mvmt Flow

Major/Minor Conflicting Flow All Stage 1 Stage 2 Critical Hdwy Critical Hdwy Sta 1 Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2

Approach HCM Control Delay, s 0.1

HCM LOS

Minor Lane/Major Mvm

Capacity (veh/h) HCM Lane V/C Ratio HCM Control Delay (s) HCM Lane LOS HCM 95th %tile Q(veh)

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Appendix D

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US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

5.2											
BL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	- 11	1	1	_ ≜ î≽			ŧ	1		\$	
4	768	20	24	494	0	26	3	74	1	0	1
4	768	20	24	494	0	26	3	74	1	0	1
0	0	0	0	0	0	0	0	0	0	0	0
ee	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
-	-	None	-	-	None	-	-	None	-	-	None
-	-	340	400	-	-	-	-	300	-	-	-
-	0	-	-	0	-	-	0	-	-	0	-
-	0	-	-	0	-	-	0	-	-	0	-
38	89	80	68	90	92	41	25	34	25	92	25
2	2	2	2	2	2	2	2	2	2	2	2
11	863	25	35	549	0	63	12	218	4	0	4

Major1		N	lajor2		I	Minor1		Ν	/linor2			
549	0	0	863	0	0	1229	1503	431	1078	1503	274	
-	-	-	-	-	-	884	884	-	619	619	-	
-	-	-	-	-	-	345	619	-	459	884	-	
4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94	
-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-	
-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-	
2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32	
1017	-	-	775	-	-	134	120	573	173	120	724	
-	-	-	-	-	-	307	362	-	443	478	-	
-	-	-	-	-	-	644	478	-	551	362	-	
	-	-		-	-							
1017	-	-	775	-	-	127	112	573	94	112	724	
-	-	-	-	-	-	127	112	-	94	112	-	
-	-	-	-	-	-	301	354	-	434	456	-	
-	-	-	-	-	-	612	456	-	323	354	-	
FR			W/R			NR			SB			
0.1			0.6		_	20.5			27.0			
0.1			0.0			29.0 D			27.0 D			

NBLn1 N	VBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
124	573	1017	-	-	775	-	-	166
0.608	0.38	0.01	-	-	0.046	-	-	0.048
71.2	15.1	8.6	-	-	9.9	-	-	27.8
F	С	Α	-	-	Α	-	-	D
3.1	1.8	0	-	-	0.1	-	-	0.2

US 460 Corridor S 7: Dominion Way	Safety Study & US 460/Windsor Boulevard	2040 Build AM	US 460 Corridor Safety Study 2040 Build AM 7: Dominion Way & US 460/Windsor Boulevard 2040 Build AM	US 460 Corridor Safety S 7: Dominion Way & US 46
	$\rightarrow \rightarrow \leftarrow \leftarrow \checkmark \land \land$		$\rightarrow \rightarrow \checkmark \checkmark \checkmark \checkmark$	
l ane Group				-+
ane Configurations				-
				Movement EBT
Future Volume (vph)	810 60 63 461 4 8		Internal Link Dist (ft) 629 3322 1125	Lane Configurations
ideal Flow (vphpl)			Turn Bay Length (ft) 180 325	Traffic Volume (veh/h) 810
Storage Length (ft)	180 325 0 0		Base Canacity (mb) 2452 1130 585 3247 376 350	Future Volume (veh/h) 810
Storage Lanes			Starvation Can Reductin 0 0 0 0 0 0 0	Number 2
Taper Length (ft)	225 25		Spillback Can Reductin 0 0 0 0 0 0 0	Initial Q, veh 0
ane Util Factor	0.95 1.00 1.00 0.95 1.00 1.00		Springer Cap Reductin 0 0 0 0 0 0	Ped-Bike Adj (A_pbT)
Frt	0.850 0.850 0.850		Reduced v/c Ratio 0.37 0.10 0.20 0.16 0.02 0.05	Parking Bus Adj 1.00
Elt Protected	0.000 0.950			Adj Sat Flow, veh/h/ln 1863
atd Flow (prot)	3539 1583 1770 3539 1770 1583		Intersection Summary	Adj Flow Rate, veh/h 900
-It Permitted	0.290 0.950		Area Type: Other	Adj No. of Lanes 2
Satd Flow (nerm)	3539 1583 540 3539 1770 1583		Cycle Length: 94	Peak Hour Factor 0.90
Right Turn on Red			Actuated Cycle Length: 94	Percent Heavy Veh, % 2
Satd Flow (RTOR)	100 18		Offset: 0 (0%), Referenced to phase 2:EBWB and 6:WBT, Start of Green	Opposing Right Turn Influence
ink Sneed (mph)	55 55 25		Natural Cycle: 50	Cap, veh/h 2386
ink Opeeu (mpn)	700 3402 1205		Control Type: Actuated-Coordinated	HCM Platoon Ratio 1.00
	8.8 42.2 32.0		Maximum v/c Ratio: 0.37	Prop Arrive On Green 0.67
Poak Hour Easter			Intersection Signal Delay: 5.3 Intersection LOS: A	Ln Grp Delay, s/veh 7.2
di Elow (unh)			Intersection Capacity Utilization 50.3% ICU Level of Service A	Ln Grp LOS A
uj. Flow (vpli)	900 109 117 524 6 16		Analysis Period (min) 15	Approach Vol, veh/h 1009
ana Croup Flow (upb)	000 100 117 504 9 19			Approach Delay, s/veh 7.0
	900 109 117 324 0 10		Splits and Phases: 7: Dominion Way & US 460/Windsor Boulevard	Approach LOS A
uni Type Protoctod Phases				Timor
Pormitted Phases			▼ Ø1	Timet.
latector Phase	2 2 1 6 1 1			Assigned Pris
Switch Phase	2 2 1 0 4 4		(6 (P))	Case No
Minimum Initial (c)	150 150 70 150 50 50			Change Devied (V, De) a
Minimum Solit (s)	21.5 21.5 16.0 21.5 11.0 11.0			Change Period (1+Rc), s
Total Split (s)				Max Green (Gmax), s
Total Split (8)	47.0 47.0 21.0 00.0 20.0 20.0 E0.00/ E0.00/ 20.20/ 70.20/ 27.70/ 27.70/			Max Allow Headway (MAH), S
				Max Q Clear (g_C+I1), s
(allow Time (c)	40.3 40.3 12.0 01.3 20.0 20.0			Green Ext Time (g_e), s
U Ded Time (s)				Prob of Phs Call (p_c)
ant Time Adjust (s)				Prod of Max Out (p_x)
LOST TIME AUJUST (S)				Left-Turn Movement Data
				Assigned Mymt
ead Log Optimize?	Lag Lag Lead			Mymt Sat Flow, veh/h
eau-Lay Optimize?	20 20 20 20 20 20			
enicle Extension (s)	3.0 3.0 3.0 3.0 3.0 3.0 3.0			Through Movement Data
	C-IMIN C-IMIN None C-IMIN None None			Assigned Mvmt
ACT Effect Green (S)	05.2 05.2 /U.9 80.3 0.1 0.1			Mvmt Sat Flow, veh/h
				Right-Turn Movement Data
	0.37 0.10 0.23 0.16 0.07 0.15			Assigned Mumt
Jontroi Delay	7.5 1.9 3.5 1.3 42.0 21.1			Assigned WVIII
ueue Delay				www.satriow, ven/n
otal Delay	7.5 1.9 3.5 1.3 42.0 21.1			Left Lane Group Data
US				Assigned Mvmt
pproach Delay	0.9 1./ 2/.5			Lane Assignment
pproach LOS	A A C			
		Synchro 9 Report	Sunchra Q Banart	
√HB		2040 Build AM.svn	VHB 2040 Build AM svn	VHB
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2040 Build AM

160 Corridor Safety Study ominion Way & US 460/Windsor Boulevard

→	\mathbf{r}	4	+	•	1				
EBT	EBR	WBL	WBT	NBL	NBR				
††	1	۳.	- † †	<u>۲</u>	1				
810	60	63	461	4	8				
810	60	63	461	4	8				_
2	12	1	6	7	14				
0	0	0	0	0	0				
1.00	1.00	1.00	1.00	1.00	1.00				
1062	1062	1062	1062	1062	1962				
000	1003	1003	52/	1003	1003				
2	105	1	2	1	10				
0.90	0.55	0.54	0.88	0.50	0 44				
2	2	2	2	2	2				
		Yes		Yes					
2386	1067	516	2976	47	42				
1.00	1.00	1.00	1.00	1.00	1.00				
0.67	0.67	0.07	0.84	0.03	0.03				
7.2	5.6	4.0	1.5	46.5	52.1				
Α	A	A	A	D	D				
1009			641	26					
7.0			2.0	50.4					
A			A	D					
	1	2	3	4	5	6	7	8	
	1	2		4		6			
	1.2	7.0		9.0		4.0			
	15.7	69.9		8.5		85.5			
	9.0	6.5		6.0		6.5			
	12.0	40.5		20.0		61.5			
	3.6	4./		4.0		4./			
	3.6	12.4		3.1		4.6			
	0.1	10.4		0.0		12.2			
	0.95	0.15		0.49		0.01			
	0.01	0.15		0.00		0.01			
	1	5		7					
	1774	0		1774					
		2		4		6			-
		3632		0		3632			
		10		14		10			_
		1583		14		0			
		1303		1303		0			
	1	5	0	7	0	0	0	0	_
((Pr/Pm)								
									_

US 460 Corridor Safety Study 2040 Build AM 7: Dominion Way & US 460/Windsor Boulevard 2040 Build AM

Lanes in Grp	1	0	0	1	0	0	0	0
Grp Vol (v), veh/h	117	0	0	8	0	0	0	0
Grp Sat Flow (s), veh/h/ln	1774	0	0	1774	0	0	0	0
Q Serve Time (g_s), s	1.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	1.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	556	0	0	1774	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	65.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	52.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	63.4	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Lane Grp Cap (c), veh/h	516	0	0	47	0	0	0	0
V/C Ratio (X)	0.23	0.00	0.00	0.17	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	616	0	0	377	0	0	0	0
Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	3.8	0.0	0.0	44.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	1.7	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	4.0	0.0	0.0	46.5	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
%ile Back of Q (50%), veh/ln	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mymt	0	2	0	4	0	6	0	0
Lane Assignment	5	T	5		2	T	-	2
Lanes in Grp	0	2	0	0	0	2	0	0
Grp Vol (v), veh/h	0	900	0	0	0	524	0	0
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0
Q Serve Time (q s), s	0.0	10.4	0.0	0.0	0.0	2.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	10.4	0.0	0.0	0.0	2.6	0.0	0.0
Lane Grp Cap (c), veh/h	0	2386	0	0	0	2976	0	0
V/C Ratio (X)	0.00	0.38	0.00	0.00	0.00	0.18	0.00	0.00
Avail Cap (c_a), veh/h	0	2386	0	0	0	2976	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	6.7	0.0	0.0	0.0	1.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	7.2	0.0	0.0	0.0	1.5	0.0	0.0
1st-Term Q (Q1), veh/In	0.0	5.0	0.0	0.0	0.0	1.2	0.0	0.0

2nd-Term Q (Q2), veh/In 0.0 0.2 0.0 0.0 0.0 0.1 0.0 0.0 3rd-Term Q (Q3), veh/In 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 %ile Back of Q Factor (f B%) 1.00 1.00 0.00 1.00 0.00 0.00 0.00 0.00 %ile Back of Q (50%), veh/In 0.0 5.2 0.0 0.0 0.0 1.3 0.0 0.0 %ile Storage Ratio (RQ%) 0.00 0.20 0.00 0.00 0.00 0.01 0.00 0.00 Initial Q (Qb), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Final (Residual) Q (Qe), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Delay (ds), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Q (Qs), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Cap (cs), veh/h 0 0 0 0 0 0 0 0 Initial Q Clear Time (tc), h 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Right Lane Group Data Assigned Mvmt 0 12 0 14 0 16 0 0 Lane Assignment Lanes in Gro 0 0 0 0 0 0 1 Grp Vol (v), veh/h 109 0 0 18 0 0 0 0 Grp Sat Flow (s), veh/h/ln 1583 0 1583 0 0 0 0 0 0.0 2.3 0.0 1.1 0.0 0.0 0.0 0.0 Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s 0.0 2.3 0.0 11 0.0 0.0 0.0 0.0 Prot RT Sat Flow (s_R), veh/h/li 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Prot RT Eff Green (g_R), s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Prop RT Outside Lane (P_R) Lane Grp Cap (c), veh/h 0 1067 0 42 0 0 0 0 0.00 0.10 0.00 0.43 0.00 0.00 0.00 0.00 V/C Ratio (X) Avail Cap (c_a), veh/h 0 1067 0 337 0 0 0 0 0.00 1.00 0.00 0.00 0.00 0.00 Upstream Filter (I) 0.00 1.00 Uniform Delay (d1), s/veh 0.0 5.4 0.0 45.1 0.0 0.0 0.0 0.0 Incr Delay (d2), s/veh 0.0 0.2 0.0 7.0 0.0 0.0 0.0 0.0 Initial Q Delay (d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 5.6 0.0 52.1 0.0 Control Delay (d), s/veh 0.0 0.0 0.0 1st-Term Q (Q1), veh/In 0.0 1.0 0.0 0.5 0.0 0.0 0.0 0.0 2nd-Term Q (Q2), veh/In 0.0 0.1 0.0 0.1 0.0 0.0 0.0 0.0 3rd-Term Q (Q3), veh/In 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/In 0.0 1.0 0.0 0.5 0.0 0.0 0.0 0.0 %ile Storage Ratio (RQ%) 0.00 0.14 0.00 0.01 0.00 0.00 0.00 0.00 Initial Q (Qb), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Final (Residual) Q (Qe), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Delay (ds), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Q (Qs), veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Sat Cap (cs), veh/h 0 0 0 0 0 0 0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Initial Q Clear Time (tc), h Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS 5.7 Α

US 460 Corridor Safety Study

7: Dominion Way & US 460/Windsor Boulevard

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Synchro 9 Report 2040 Build AM.syn

2040 Build AM

Appendix D

2040 Build PM

1: US 460/Pruden	Bouleva	udy ard & N	lorthfie	eld Driv	/e			2040 Bulla PM	1: US 460/Pruden I	Bouleva	rd & N	orthfie	ld Driv	/e		
	≯	→	F	+	×	1	4			≯	→	F	+	•	1	~
Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SBR		Lane Group	EBL	EBT	WBU	WBT	WBR	SBL	SB
ane Configurations	ľ	<u></u>	đ	<u>†</u> †	1	ľ	1		LOS	А	А		В	Α	E	
Traffic Volume (vph)	11	1558	0	1607	71	66	28		Approach Delay		4.1		16.2		40.8	
Future Volume (vph)	11	1558	0	1607	71	66	28		Approach LOS		А		В		D	
deal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900		Queue Length 50th (ft)	1	12		349	7	78	
Storage Length (ft)	305		125		195	0	155		Queue Lenath 95th (ft)	m2	50		627	18	82	
Storage Lanes	1		1		1	1	1		Internal Link Dist (ft)		457		2219		1226	
Taper Length (ft)	190		200		-	0			Turn Bay Length (ft)	305				195		15
ane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00		Base Capacity (vph)	217	2645		2472	1127	251	28
Frt					0.850		0.850		Starvation Can Reductn	0	0		0	0	0	
Fit Protected	0 950				0.000	0 950	0.000		Spillback Cap Reducto	0	0		0	0	0	
Satd Flow (prot)	1770	3530	1863	3530	1583	1770	1583		Storage Can Reductn	0	0		0	0	0	
Elt Permitted	0.050	0000	1000	0000	1000	0.950	1000		Reduced v/c Ratio	0 00	0.63		0.79	0 10	0.45	0.2
Satd Flow (perm)	0.000	3530	1863	3530	1583	1770	1583			0.03	0.00		0.75	0.10	0.40	0.2
Dight Turn on Pod	55	5555	1005	5555	Voc	1110	Voc		Intersection Summary							
Sold Flow (DTOD)					71		74		Area Type:	Other						
Salu. FIOW (RTOR)				FF	/1	05	74		Cycle Length: 110							
Link Speed (mpn)		50		200		1200			Actuated Cycle Length: 110							
		537		2299		1300			Offset: 86 (78%), Reference	d to phase	2:WBTU	and 6:EB	TL. Start	of Green		
Travel Time (s)	0.50	0.7	0.00	28.5	0.00	35.6	0.00		Natural Cycle: 90		-		,			
Peak Hour Factor	0.58	0.94	0.92	0.82	0.63	0.58	0.38		Control Type: Actuated-Coo	rdinated						
Adj. Flow (vph)	19	1657	0	1960	113	114	/4		Maximum v/c Ratio: 0.79	lanatoa						
Shared Lane Traffic (%)									Intersection Signal Delay: 1	22			In	tersection	LOS' B	
ane Group Flow (vph)	19	1657	0	1960	113	114	74		Intersection Capacity I Itiliza	tion 63.0%					f Service	R
Turn Type	pm+pt	NA	pm+pt	NA	Prot	Prot	Prot		Analysis Period (min) 15	0011 00.070						. 0
Protected Phases	1	6	5	2	2	7	4		m Volumo for 05th porcon	tilo quouo i	- motoroc	by upotr	oom cian	al		
Permitted Phases	6		2						III Volume for 95th percent	lie queue is	Sineleiel	by upsu	eann sign	ai.		
Detector Phase	1	6	5	2	2	7	4		Splits and Phases: 1: LIS	160/Drudor	Poulova	rd 8 Nort	hfiold Driv			
Switch Phase										400/F1006	Douleva			ve		
Vinimum Initial (s)	5.0	15.0	5.0	15.0	15.0	7.0	7.0		Ø1	Ø2 (R)						
Minimum Split (s)	13.3	23.3	9.5	34.9	34.9	14.4	14.4		18 s 69 s							
Total Split (s)	18.0	69.0	18.0	69.0	69.0	23.0	23.0		E Å							
Total Split (%)	16.4%	62.7%	16.4%	62.7%	62.7%	20.9%	20.9%		4 05	Ø6 (R)						
Maximum Green (s)	9.7	60.7	13.5	61.1	61.1	15.6	15.6		18 s 69 s							
Yellow Time (s)	4.8	4.8	3.5	4.8	4.8	4.0	4.0									
All-Red Time (s)	3.5	3.5	1.0	3.1	3.1	3.4	3.4									
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Total Lost Time (s)	8.3	8.3	4.5	7.9	7.9	7.4	7.4									
Lead/Lag	Lead	Laq	Lead	Laq	Laq											
Lead-Lag Optimize?		- 0		- 0	- 5											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0									
Recall Mode	None	C-Min	None	C-Min	C-Min	None	None									
Walk Time (s)		•		7.0	7.0											
Flash Dont Walk (s)				20.0	20.0											
Pedestrian Calls (#/br)				0	0											
Act Effet Green (s)	82.2	82.2		76.8	76.8	12 1	12 1									
Actuated a/C Patio	02.2	02.2		0.70	0.70	0.11	0 11									
la Ratio	0.75	0.75		0.70	0.70	0.11	0.11									
Control Dolov	0.12	0.05		16.0	2.10	0.09 E0 E	12 5									
Durana Delev	2.5	4.1		10.9	3.9	0.0	13.5									
Juede Delay	0.0	0.0		0.0	0.0	0.0	0.0									
otal Delay	2.5	4.1		16.9	3.9	58.5	13.5									

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2040 Build PM

US 460 Corridor Safety Study 1: US 460/Pruden Boulevard & Northfield Drive

HCM 2010 cannot analyze U-Turning movements.

2040 Build PM

US 460 Corridor S 2: US460/Pruden I	afety St Bouleva	udy rd & Re	ob's D	rive						204	40 Buil	d PM
	۶	+	*	4	ł	•	1	1	1	1	ţ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	3	4 12		5	44	1		ų	1		44	
Traffic Volume (vph)	6	1442	5	27	1520	140	8	8	39	35	1	7
Future Volume (vph)	6	1442	5	27	1520	140	8	8	39	35	1	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	400		175	0		50	0		0
Storage Lanes	1		0	1		1	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850			0.850		0.978	
Flt Protected	0.950			0.950				0.969			0.961	
Satd. Flow (prot)	1770	3536	0	1770	3539	1583	0	1805	1583	0	1751	0
Flt Permitted	0.950			0.950				0.816			0.746	
Satd. Flow (perm)	1770	3536	0	1770	3539	1583	0	1520	1583	0	1359	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				142			98		8	
Link Speed (mph)		35			35			25			30	
Link Distance (ft)		2499			463			411			171	
Travel Time (s)		48.7			9.0			11.2			3.9	
Peak Hour Factor	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
Adj. Flow (vph)	13	1487	8	46	1583	233	20	11	89	55	2	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	1495	0	46	1583	233	0	31	89	0	68	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases						2	8		8	4		
Detector Phase	1	6		5	2	2	8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	11.1	21.8		11.1	21.8	21.8	13.1	13.1	13.1	13.1	13.1	
Total Split (s)	20.0	60.0		20.0	60.0	60.0	30.0	30.0	30.0	30.0	30.0	
Total Split (%)	18.2%	54.5%		18.2%	54.5%	54.5%	27.3%	27.3%	27.3%	27.3%	27.3%	
Maximum Green (s)	13.9	53.2		13.9	53.2	53.2	23.9	23.9	23.9	23.9	23.9	
Yellow Time (s)	4.0	4.8		4.0	4.8	4.8	4.1	4.1	4.1	4.1	4.1	
All-Red Time (s)	2.1	2.0		2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.1	6.8		6.1	6.8	6.8		6.1	6.1		6.1	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Venicle Extension (s)	3.U	3.0 C Min		3.0	3.0 C Min	3.U	3.U	3.U	3.U	3.0	3.U	
Recall Mode	None			None	C-IVIIN	C-IVIIN	None	None	None	None	None	
Act Effect Green (S)	0.4	/ 0.5		0.0	85.Z	85.Z		10.5	10.5		10.5	
Actuated g/C Ratio	0.00	0.71		0.00	0.77	0.11		0.10	0.10		0.10	
V/C Rallo	0.13	0.59		0.35	0.00	0.19		0.22	0.37		0.50	
Control Delay	51.5	12.2		70.4	2.0	0.3		40.0	12.1		53.4	
Queue Delay	0.0	12.0		70.4	0.0	0.0		0.0	12.1		0.0 53 /	
	51.5	12.Z		70.4	2.0	0.3		40.0	12.1 P		- 55.4 D	
Approach Delay	U	12.6		C	3 A	А		21.2	В		52 A	
Approach LOS		12.0 R			J.4			21.5			00.4 D	
Approach LOO		U U			A			0			U	

US 460 Corridor S 2: US460/Pruden	IS 460 Corridor Safety Study 2040 Build PM : US460/Pruden Boulevard & Rob's Drive													
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Queue Length 50th (ft)	9	297		32	3	0		21	0		41			
Queue Length 95th (ft)	15	455		m42	103	1		40	0		38			
Internal Link Dist (ft)		2419			383			331			91			
Turn Bay Length (ft)	250			400		175			50					
Base Capacity (vph)	223	2525		223	2741	1258		330	420		301			
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	0.06	0.59		0.21	0.58	0.19		0.09	0.21		0.23			
Intersection Summary														
Area Type:	Other													
Cycle Length: 110														
Actuated Cycle Length: 11	0													
Offset: 48 (44%), Reference	ced to phase	2:WBT ar	nd 6:EBT	, Start of	Green									
Natural Cycle: 60														
Control Type: Actuated-Co	ordinated													
Maximum v/c Ratio: 0.59														
Intersection Signal Delay:	8.9			In	tersectior	n LOS: A								
Intersection Capacity Utiliz	ation 67.5%			IC	U Level o	of Service	С							
Analysis Period (min) 15														
m Volume for 95th perce	ntile queue is	s metered	by upstr	eam sign	al.									

Splits and Phases: 2: US460/Pruden Boulevard & Rob's Drive

∕ ∕	01			Ø4	
20 s		60 s	30)s	
1)5	►Ø6 (R)	4	¶ø8	
20 s		60 s	30	2 (

2040 Build PM

Movement Lane Configurations Traffic Volume (veh/h) Future Volume (veh/h) Number Initial Q, veh Ped-Bike Adj (A_pbT)

Parking Bus Adj Adj Sat Flow, veh/h/ln Adj Flow Rate, veh/h Adj No. of Lanes Peak Hour Factor Percent Heavy Veh, % Opposing Right Turn Infl Cap, veh/h HCM Platoon Ratio Prop Arrive On Green Ln Grp Delay, s/veh Ln Grp LOS Approach Vol, veh/h Approach Delay, s/veh Approach LOS

Timer: Assigned Phs Case No Phs Duration (G+Y+Rc), Change Period (Y+Rc), s Max Green (Gmax), s Max Allow Headway (MA Max Allow Headway (MA Max Q Clear (g_c+l1), s Green Ext Time (g_e), s Prob of Phs Call (p_c) Prob of Max Out (p_x)

Left-Turn Movement Dat Assigned Mvmt Mvmt Sat Flow, veh/h

Through Movement Data Assigned Mvmt Mvmt Sat Flow, veh/h

Right-Turn Movement Da

Assigned Mvmt Mvmt Sat Flow, veh/h

Left Lane Group Data Assigned Mvmt Lane Assignment

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Appendix D

US 460 Corridor Safety Study 2: US460/Pruden Boulevard & Rob's Drive

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	<u></u>	↑ Ъ	-	<u></u>	11	7	•	નું	7		- ()	-
	6	1442	5	27	1520	140	8	8	39	35	1	/
	0	1442	16	21	1520	140	8	8	39	35	1	14
	0	0	0	0	2	12	0	0	10	0	4	14
	1 00	0	1 00	1.00	0	1.00	1.00	0	1.00	1.00	0	1 00
	1.00	1 00	1.00	1.00	1 00	1.00	1.00	1 00	1.00	1.00	1 00	1.00
	1863	1863	1900	1863	1863	1863	1900	1863	1863	1900	1863	1900
	13	1487	8	46	1583	233	20	11	89	55	2	11
	1	2	0	1	2	1	0	1	1	0	1	0
	0.46	0.97	0.61	0.59	0.96	0.60	0.40	0.75	0.44	0.64	0.45	0.63
	2	2	2	2	2	2	2	2	2	2	2	2
uence	Yes			Yes			Yes			Yes		
	26	2560	14	61	2579	1154	133	62	133	133	9	16
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.01	0.71	0.71	0.03	0.73	0.73	0.08	0.08	0.08	0.08	80.0	0.08
	57.1	8.4	8.4	69.8	8.4	5.1	47.3	0.0	54.7	51.4	0.0	0.0
	E	1508	A	E	1862	А	U	120	U	D	68	
		8.8			0.5			52.8			51 /	
		0.0 A			0.0 A			02.0 D			D	
			-	_		_	-	-			D	
		1	2	3	4	5	6	7	8			
		1	2		4	5	6		8			
		2.0	3.0		8.0	2.0	4.0		15.2			
5		6.1	6.9		6.1	9.9	6.8		6.1			
5		13.9	53.2		23.9	13.9	53.2		23.9			
AH) s		3.8	5.0		4.8	3.8	5.0		4.8			
,, e		2.8	26.2		8.6	4.8	24.4		8.0			
		0.0	24.3		0.7	0.0	25.7		0.7			
		0.33	1.00		1.00	0.75	1.00		1.00			
		0.00	0.89		0.00	0.00	0.89		0.00			
a												
u		1			7	5			3			
		1774			878	1774			940			
					0.0				0.0			
3												
			2		4		0		8			
			3539		110		3610		/38			
ata												
			12		14		16		18			
			1583		191		19		1583			
_												
		1	0	0	7	5	0	0	3			
		(Prot)	3	J	L+T+R	(Prot)	5	3	L+T			
		(/				()						

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Laws in Gip 1 0 0 1 1 0 0 1 Gry MD (r), whith 13 0 0 14 0 0 1 Gry MD (r), whith 13 0 0 64 447 0 0 14 Gry MD (r), whith 0 0 64 24 0 0 15 Cycle Charmer (r, s. 0 <th< th=""><th>US 460 Corridor Safety St 2: US460/Pruden Bouleva</th><th>udy rd & Ro</th><th>ob's D</th><th>rive</th><th></th><th></th><th></th><th></th><th></th><th>2040 Build PM</th><th>US 460 Corridor Safety S 2: US460/Pruden Boulev</th><th>ard & Ro</th><th>ob's Di</th><th>ive</th><th></th><th></th><th></th><th></th><th></th><th>2040 Build PM</th><th>US 460 3: US460</th></th<>	US 460 Corridor Safety St 2: US460/Pruden Bouleva	udy rd & Ro	ob's D	rive						2040 Build PM	US 460 Corridor Safety S 2: US460/Pruden Boulev	ard & Ro	ob's Di	ive						2040 Build PM	US 460 3: US460
Operation () Operation () <th< th=""><th>anes in Gro</th><th>1</th><th>0</th><th>0</th><th>1</th><th>1</th><th>1</th><th>0</th><th>) 1</th><th></th><th>2nd-Term Q (Q2) veh/ln</th><th>0.0</th><th>0.4</th><th>0.0</th><th>0.0</th><th>0.0</th><th>0.2</th><th>0.0</th><th>0.0</th><th></th><th></th></th<>	anes in Gro	1	0	0	1	1	1	0) 1		2nd-Term Q (Q2) veh/ln	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0		
Display washin 1774 0 0 1772 0 0 1772 0 0 1772 0 0 1772 0 0 1772 0 0 1772 0 0 1772 0 0 1772 0 </td <td>Grn Vol (v) veh/h</td> <td>13</td> <td>0</td> <td>0</td> <td>68</td> <td>46</td> <td>1</td> <td>0</td> <td>) 31</td> <td></td> <td>3rd-Term Ω (Ω3) veh/ln</td> <td>0.0</td> <td>0.4</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.2</td> <td>0.0</td> <td>0.0</td> <td></td> <td>Lane Group</td>	Grn Vol (v) veh/h	13	0	0	68	46	1	0) 31		3 rd-Term Ω (Ω 3) veh/ln	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.0		Lane Group
Steve True (s, s), simple (s, s), s	Grn Sat Flow (s), veh/h/ln	1774	0	0	1179	1774		0) 1678		%ile Back of Q Eactor (f. B%)	0.00	1 00	0.00	1 00	0.00	1 00	0.00	1.00		Lane Config
Char Control) Serve Time (a, s) s	0.8	0.0	0.0	4.8	2.8	, 1 0	0 01	0 0 0		% le Back of Ω (50%) veh/ln	0.00	12.0	0.00	0.0	0.00	10.9	0.00	0.0		Traffic Volun
Discrete (g) with (n) 0	$(g_3), s$	0.0	0.0	0.0	6.6	2.0	2 0	0 0.) 18		%ile Storage Ratio (RO%)	0.0	0.77	0.0	0.0	0.0	0.11	0.0	0.0		Future Volur
Data of Large (a) with a constraint (a) solution (b) constraint (b) constraint (b) constraint (c) constraint (Norm $I T Sat Flow (c, l) woh/h/lp$	0.0	0.0	0.0	1315	2.0	<u>, </u>	0 0.	1/23		Initial O (Ob) veb	0.00	0.11	0.00	0.00	0.00	0.11	0.00	0.00		Ideal Flow (v
Same Life Grame (a) is not 0 0 <th< td=""><td>borod LT Sot Flow (S_I), veh/h/m</td><td>0</td><td>0</td><td>0</td><td>1315</td><td>0</td><td>)</td><td>0</td><td>J 1423</td><td></td><td>Final (Residual) O (Oe) veh</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td>Storage Len</td></th<>	borod LT Sot Flow (S_I), veh/h/m	0	0	0	1315	0)	0	J 1423		Final (Residual) O (Oe) veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Storage Len
Bin II Server Tring Ja B		0.0	0	0	0.0	0.0)	0 0			Sat Dolay (ds), shiph	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Storage Lan
Sind To Sum The UP is a set of a se	erni LT Ell Green (g_p), s	0.0	0.0	0.0	9.2	0.0		0 0.) 9.2		Sat Delay (us), siven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Taper Lengt
The bit Strip (b) 00	erm LT Serve Time (g_u), s	0.0	0.0	0.0	1.5	0.0		.0 0.0) 2.1		Sat Q (QS), Ven Sat Can (cs), veh/h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lane Util. Fa
The Price Price (D): Out O	erm LTQ Serve Time (g_ps), s	0.0	0.0	0.0	4.8	0.0		.0 0.0	0.0		laitial O Clear Time (ta) h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Frt
Set Inf. Park Large Park (2): 5: 4 O	me to First Bik (g_t), s	0.0	0.0	0.0	0.5	0.0	0 0	.0 0.0) 1.1		initial Q Clear Time (IC), fi	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Flt Protected
Op. 1 Single Op. 1 Number Op. 20 Number Op. 20 <td>erve Time pre Bik (g_fs), s</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.5</td> <td>0.0</td> <td>0 0</td> <td>.0 0.0</td> <td>) 1.1</td> <td></td> <td>Right Lane Group Data</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Satd Flow (r</td>	erve Time pre Bik (g_fs), s	0.0	0.0	0.0	0.5	0.0	0 0	.0 0.0) 1.1		Right Lane Group Data										Satd Flow (r
net of the Cond (X) 0.48 0.0 0.89 0.0 0.99 0.94 at Capic (X) 0.49 0.0	op LT Inside Lane (P_L)	1.00	0.00	0.00	0.81	1.00	0.0	0.0	0.65		Assigned Mymt	0	12	0	14	0	16	0	18		Elt Permitter
Patho (X) 0.49 0.00 0.44 0.07 0.00 0.00 0.16 Batham Fler(I) 0.24 0.00 0.00 1.00 0	ne Grp Cap (c), veh/h	26	0	0	158	61		0) 194		Lane Assignment		R				T+R		R		Satd Flow (r
all cape (a), which 224 0 0 337 224 0 0 399 form Desy (d), siven 0.0 0.00 100 0.00 0.00 0.00 100 0.00 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00 100 0.00	CRatio (X)	0.49	0.00	0.00	0.43	0.76	6 0.0	0.0	0.16		Lanes in Grp	0	1	0	0	0	1	0	1		Right Turn o
attems File (I)0.240.000.001.0	ail Cap (c_a), veh/h	224	0	0	337	224		0) 399		Grp Vol (v), veh/h	0	233	0	0	0 0	766	0 0	89		Sate Flow (I
Torm Delay (d), siveh 538 0.0 0.4 95.7 0.0 0.0 47.0 Delay (d), siveh 0.0 <	stream Filter (I)	0.24	0.00	0.00	1.00	1.00	0.0	0.0	0 1.00		Grp Sat Flow (s) veh/h/ln	0	1583	0	0	0	1859	0	1583		Link Spood
Cloby (d), siveh 3.4 0.0 0.0 1.8 1.7.1 0.0 0.0 0.4 Cloby (d), siveh 57.1 0.0 0.0 51.4 0.0	iform Delay (d1), s/veh	53.8	0.0	0.0	49.6	52.7	' 0	.0 0.) 47.0		O Serve Time (g, s) s	0.0	5.2	0.0	0.0	0.0	22.4	0.0	6.0		Link Opeeu (
Bit (D Aby (3), siveh 0.0 0.	r Delay (d2), s/veh	3.4	0.0	0.0	1.8	17.1	0	.0 0.	0.4		$(g_0), 0$	0.0	5.2	0.0	0.0	0.0	22.1	0.0	6.0		Travel Time
Introl Delay (d), syeh 57.1 0.0 0.0 67.3 0.0 47.3 Term Q (Q), yehn 0.0 0.0 2.0 1.4 0.0<	ial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0) 0	.0 0.	0.0		$O(C_{C_{C_{C_{C_{C_{C_{C_{C_{C_{C_{C_{C_{C$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Dook Hour F
Term (Q1), whin 0.4 0.0	ntrol Delay (d), s/veh	57.1	0.0	0.0	51.4	69.8	3 0	.0 0.) 47.3		Prot RT Sat Flow (S_R), veri/1/11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Peak Hour F
Term (Q2), veh/n 0.0 0.0 0.1 0.3 0.0 <td>Term Q (Q1), veh/ln</td> <td>0.4</td> <td>0.0</td> <td>0.0</td> <td>2.0</td> <td>1.4</td> <td>ι O</td> <td>.0 0.</td> <td>0.9</td> <td></td> <td>Prot RT Ell Green (g_R), s</td> <td>0.0</td> <td>1.00</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>1.00</td> <td></td> <td>Adj. Flow (Vp</td>	Term Q (Q1), veh/ln	0.4	0.0	0.0	2.0	1.4	ι O	.0 0.	0.9		Prot RT Ell Green (g_R), s	0.0	1.00	0.0	0.0	0.0	0.0	0.0	1.00		Adj. Flow (Vp
Term (Q(3), wehln 0.0 <td>Term Q (Q2), veh/In</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.1</td> <td>0.3</td> <td>3 0</td> <td>.0 0.</td> <td>0.0</td> <td></td> <td>Prop RT Outside Lane (P_R)</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>0.10</td> <td>0.00</td> <td>0.01</td> <td>0.00</td> <td>1.00</td> <td></td> <td>Shared Lane</td>	Term Q (Q2), veh/In	0.0	0.0	0.0	0.1	0.3	3 0	.0 0.	0.0		Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.10	0.00	0.01	0.00	1.00		Shared Lane
Back of C (SA): web/h 0.0 0.00 <th< td=""><td>Term Q (Q3), veh/In</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>) 0</td><td>.0 0.</td><td>0.0</td><td></td><td>Lane Grp Cap (c), veh/h</td><td>0</td><td>1154</td><td>0</td><td>0</td><td>0</td><td>1319</td><td>0</td><td>133</td><td></td><td></td></th<>	Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0) 0	.0 0.	0.0		Lane Grp Cap (c), veh/h	0	1154	0	0	0	1319	0	133		
Back of QC9N; veNh1 0.4 0.0 0.2 1.17 0.0 0.0 0.9 Storage Rato (RON); veNh1 0.0 0.00 <td>Back of Q Factor (f_B%)</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>1.00</td> <td>) 0.0</td> <td>0.0</td> <td>) 1.00</td> <td></td> <td>V/C Ratio (X)</td> <td>0.00</td> <td>0.20</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>0.58</td> <td>0.00</td> <td>0.67</td> <td></td> <td>Turn Type</td>	Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00) 0.0	0.0) 1.00		V/C Ratio (X)	0.00	0.20	0.00	0.00	0.00	0.58	0.00	0.67		Turn Type
Sprage Raio, (RCNs) 0.04 0.04 0.04 0.04 0.04 0.00 </td <td>Back of Q (50%), veh/ln</td> <td>0.4</td> <td>0.0</td> <td>0.0</td> <td>2.1</td> <td>1.7</td> <td>′ 0</td> <td>.0 0.</td> <td>0.9</td> <td></td> <td>Avail Cap (c_a), veh/h</td> <td>0</td> <td>1154</td> <td>0</td> <td>0</td> <td>0</td> <td>1319</td> <td>0</td> <td>344</td> <td></td> <td>Protected Pr</td>	Back of Q (50%), veh/ln	0.4	0.0	0.0	2.1	1.7	′ 0	.0 0.	0.9		Avail Cap (c_a), veh/h	0	1154	0	0	0	1319	0	344		Protected Pr
al (a) (b), wh 0.0	e Storage Ratio (RQ%)	0.04	0.00	0.00	0.49	0.11	0.0	0.0	0.06		Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.24	0.00	1.00		Permitted Pr
a) (Residual) Q (Qe), veh 0.0 <t< td=""><td>al Q (Qb), veh</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>) 0</td><td>.0 0.</td><td>0.0</td><td></td><td>Uniform Delay (d1), s/veh</td><td>0.0</td><td>4.8</td><td>0.0</td><td>0.0</td><td>0.0</td><td>7.9</td><td>0.0</td><td>48.9</td><td></td><td>Detector Pha</td></t<>	al Q (Qb), veh	0.0	0.0	0.0	0.0	0.0) 0	.0 0.	0.0		Uniform Delay (d1), s/veh	0.0	4.8	0.0	0.0	0.0	7.9	0.0	48.9		Detector Pha
Delay (s), siven 0.0 <td>al (Residual) Q (Qe), veh</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>) 0</td> <td>.0 0.</td> <td>0.0</td> <td></td> <td>Incr Delay (d2), s/veh</td> <td>0.0</td> <td>0.4</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.5</td> <td>0.0</td> <td>5.7</td> <td></td> <td>Switch Phas</td>	al (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0) 0	.0 0.	0.0		Incr Delay (d2), s/veh	0.0	0.4	0.0	0.0	0.0	0.5	0.0	5.7		Switch Phas
Q(Qa), veh 0.0	Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0) 0	.0 0.0	0.0		Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Minimum Init
Cap (cs), veh/h 0	Q (Qs), veh	0.0	0.0	0.0	0.0	0.0) 0	.0 0.	0.0		Control Delay (d), s/veh	0.0	5.1	0.0	0.0	0.0	8.4	0.0	54.7		Minimum Sp
Constraint Constraint <td>Cap (cs) veh/h</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>)</td> <td>0</td> <td>) ()</td> <td></td> <td>1st-Term Q (Q1), veh/In</td> <td>0.0</td> <td>2.2</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>11.3</td> <td>0.0</td> <td>2.6</td> <td></td> <td>Total Split (s</td>	Cap (cs) veh/h	0	0	0	0	0)	0) ()		1st-Term Q (Q1), veh/In	0.0	2.2	0.0	0.0	0.0	11.3	0.0	2.6		Total Split (s
Start Lob Min (b), in 0.0 0.	al O Clear Time (tc) h	0.0	0.0	0.0	0.0	0.0	0	0 0	0 0 0		2nd-Term Q (Q2), veh/In	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.2		Total Split (%
die Lane Group Data 0 2 0 4 0 6 0 8 igned Mvmt 0 2 0 4 0 6 0 8 essignment T T T		0.0	0.0	0.0	0.0	0.0			0.0		3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Maximum G
gned Mvmt 0 2 0 4 0 6 0 8 a Assignment T T T T T Wile Back of Q(50%), veh/ln 0.0 2.3 0.0 0.0 0.0 1.14 0.0 2.8 sin Grp 0 1 0 0 0 0 0 0 0 0 0 0.0 </td <td>lle Lane Group Data</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>%ile Back of Q Factor (f_B%)</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>1.00</td> <td></td> <td>Yellow Time</td>	lle Lane Group Data										%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00		Yellow Time
é Assignment T <t< td=""><td>igned Mvmt</td><td>0</td><td>2</td><td>0</td><td>4</td><td>0</td><td>)</td><td>6</td><td>8 (</td><td></td><td>%ile Back of Q (50%), veh/In</td><td>0.0</td><td>2.3</td><td>0.0</td><td>0.0</td><td>0.0</td><td>11.4</td><td>0.0</td><td>2.8</td><td></td><td>All-Red Time</td></t<>	igned Mvmt	0	2	0	4	0)	6	8 (%ile Back of Q (50%), veh/In	0.0	2.3	0.0	0.0	0.0	11.4	0.0	2.8		All-Red Time
sin Grp 0 2 0 0 1 0 0 Vol (v), veh/h 0 1583 0 0 729 0 0 Sat Flow (s), veh/h/ln 0 1770 0 0 0 729 0 0 Sat Flow (s), veh/h/ln 0 1770 0 0 0 770 0 0 Vol (v), veh/h 0 24.2 0.0 0.0 22.4 0.0 0	e Assignment		Т					Т			%ile Storage Ratio (RQ%)	0.00	0.34	0.00	0.00	0.00	0.12	0.00	1.44		Lost Time A
Vol (v), veh/h 0 1583 0 0 729 0 0 Sat Flow (s), veh/h/ln 0 1770 0 0 1770 0	es in Grp	0	2	0	0	0)	1) 0		Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Total Lost Ti
Sat Flow (s), veh/h/ln 0 1770 0 0 1770 0 0 0 erve Time (g, s), s 0.0 24.2 0.0	Vol (v), veh/h	0	1583	0	0	0) 72	9	0 0		Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lead/Lag
erve Time (g_s), s 0.0 24.2 0.0<	Sat Flow (s), veh/h/ln	0	1770	0	0	0) 177	0) ()		Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lead-Lag Op
le Q Clear Time (g_c), s 0.0 24.2 0.0 0.0 22.4 0.0 0.0 a Grp Cap (c), veh/h 0 2579 0 0 1255 0 0 Ratio (X) 0.00 0.61 0.00	erve Time (g s), s	0.0	24.2	0.0	0.0	0.0) 22	.4 0.0	0.0		Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Vehicle Exte
e Grp Cap (c), ve/l/h 0 2579 0 0 1255 0 0 Ratio (X) 0.00 0.61 0.00 0.00 0.00 0.58 0.00 0.00 I Cap (c_a), veh/h 0 2579 0 0 0 1255 0 0 I Cap (c_a), veh/h 0 2579 0 0 0 1255 0 0 I Cap (c_a), veh/h 0 2579 0 0 0 1255 0 0 I Cap (c_a), veh/h 0 2579 0 0 0 1255 0 0 orm Delay (d1), s/veh 0.0 1.00 0.00 0.00 0.00 0.00 Delay (d2), s/veh 0.0 1.1 0.0 0.0 0.0 0.0 0.0 I d2 Delay (d3), s/veh 0.0 1.1.7 0.0 0.0 0.0 0.0 0.0 I d2 Delay (d1), s/veh/h 0.0 11.7 0.0 0.0 0.0 0.0 0.0 I d2 Delay (d1), s/veh/h 0.0 11.7 0.0 0.0 <td>e Q Clear Time (g_c), s</td> <td>0.0</td> <td>24.2</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>) 22</td> <td>.4 0.</td> <td>0.0</td> <td></td> <td>Sat Cap (cs), veh/h</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td>Recall Mode</td>	e Q Clear Time (g_c), s	0.0	24.2	0.0	0.0	0.0) 22	.4 0.	0.0		Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0		Recall Mode
Ratio (X) 0.00 0.61 0.00 0.00 0.00 0.00 0.00 il Cap (c_a), veh/h 0 2579 0 0 1255 0 0 tream Filter (I) 0.00 1.00 0.00 0.00 0.24 0.00 0.00 orm Delay (d1), s/veh 0.0 7.3 0.0 0.0 0.0 0.0 Delay (d2), s/veh 0.0 1.1 0.0 0.0 0.0 0.0 0.0 al Q Delay (d3), s/veh 0.0 8.4 0.0 0.0 0.0 0.0 Totio Delay (d1), s/veh/n 0.0 11.7 0.0 0.0 10.7 0.0 0.0 Term Q (Q1), veh/ln 0.0 11.7 0.0 0.0 0.0 0.0	e Grp Cap (c), veh/h	0	2579	0	0	0) 125	5	0 0		Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Act Effct Gre
I Cap (c, a), veh/h 0 2579 0 0 1255 0 0 Irream Filter (I) 0.00 1.00 0.00 0.00 0.24 0.00 0.00 0.00 0.00 0.00 Delay (d1), s/veh 0.0 7.3 0.0 0.0 7.9 0.0 0.0 0.0 1.1 0.0 0.0 0.0 0.0 0.0 Delay (d2), s/veh 0.0 1.1 0.0 <t< td=""><td>Ratio (X)</td><td>0.00</td><td>0.61</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.5</td><td>8 0.0</td><td>0.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Actuated q/C</td></t<>	Ratio (X)	0.00	0.61	0.00	0.00	0.00	0.5	8 0.0	0.00												Actuated q/C
Iteram Filter (I) 0.00 1.00 0.00 0.00 0.00 0.00 0.00 0.00 Derm Delay (d1), s/veh 0.0 7.3 0.0 0.0 7.9 0.0 0.0 Delay (d2), s/veh 0.0 1.1 0.0 0.0 0.0 0.0 0.0 Id Q Delay (d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Irol Delay (d), s/veh 0.0 8.4 0.0 0.0 0.0 0.0 Ferm Q (Q1), veh/In 0.0 11.7 0.0 0.0 0.0 0.0	I Cap (c´a), veh/h	0	2579	0	0	0) 125	5) 0		Intersection Summary										v/c Ratio
Delay (d1), s/veh 0.0 7.3 0.0 0.0 7.9 0.0 0.0 0.0 10 0.0 11 0.0	ream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.2	4 0.0	0.00		HCM 2010 Ctrl Delay		11.5								Control Dela
Delay (d2), s/veh 0.0 1.1 0.0 0.0 0.5 0.0 0.0 al Q Delay (d3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 trol Delay (d3), s/veh 0.0 8.4 0.0 0.0 0.0 trol Delay (d3), s/veh 0.0 8.4 0.0 0.0 trol Delay (d1), s/veh/in 0.0 11.7 0.0 0.0	orm Delay (d1), s/veh	0.0	7.3	0.0	0.0	0.0) 7	.9 01	0.0		HCM 2010 LOS		В								Queue Delay
Label (d3), siveh 0.0	Delay (d2) s/veh	0.0	1.5	0.0	0.0	0.0) ()	5 0) 0.0												Total Delay
Incl Delay (d), siveh 0.0 0.0 0.0 0.0 0.0 0.0 Irol Delay (d), siveh 0.0 0.0 0.0 0.0 0.0 0.0 Term Q (Q1), veh/in 0.0 11.7 0.0 0.0 10.7 0.0	al O Delay (d3) s/veb	0.0	0.0	0.0	0.0	0.0	. 0) 0	0 0) 0.0												LOS
Term Q (Q1), veh/ln 0.0 11.7 0.0 0.0 10.7 0.0 0.0	trol Delay (d) s/veh	0.0	8.4	0.0	0.0	0.0) 8	4 0) 0.0												Approach D
	Term $\Omega(\Omega 1)$ veh/ln	0.0	11.7	0.0	0.0	0.0	. 0	7 0) 0.0												Annroach I (
Synchro 9 Report		0.0	. 1.7	0.0	0.0	0.0	. 10	0.	0.0	Synchro 9 Report										Synchro 9 Report	

VHB

2040 Build PM

Corridor Safety Study 0/Pruden Boulevard & Kings Fork Rd

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EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
٦	∱ Ъ		<u>۲</u>	- † †	7		4		٦	4Î	
120	1234	11	108	1189	200	6	142	31	94	84	105
120	1234	11	108	1189	200	6	142	31	94	84	105
1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
165		0	250		145	0		0	0		50
1		0	1		1	0		0	1		0
80	0.05	0.05	0	0.05	4.00	25	4.00	4.00	25	4.00	4.00
1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.050	0.999		0.050		0.850		0.977		0.050	0.918	
0.950	2526	0	0.950	2520	1502	0	1012	0	1770	1710	0
0.050	3330	U	0.050	3039	1000	0	0.040	0	0.250	1710	0
1770	3536	0	1770	3530	1583	0	1711	0	0.259	1710	0
1770	5550	Ves	1110	5555	Ves	0	1711	Ves	402	1710	Yes
	1	105			149		7	103		48	103
	55			35	110		45			45	
	2858			2499			2180			1010	
	35.4			48.7			33.0			15.3	
0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
145	1371	12	309	1265	222	24	212	48	125	140	169
145	1383	0	309	1265	222	0	284	0	125	309	0
Prot	NA		Prot	NA	Perm	Perm	NA		D.P+P	NA	
1	6		5	2			8		7	4	
	-				2	8	-		8		
1	6		5	2	2	8	8		7	4	
F 0	45.0		F 0	45.0	45.0	7.0	7.0		7.0	7.0	
5.0	15.0		5.0	15.0	15.0	12.0	12.0		12.0	12.0	
25.0	Z1.0 58.0		25.0	21.0 58.0	21.0 58.0	28.0	28.0		14.0	13.0	
20.0%	16.1%		20.0%	16.4%	16.4%	20.0	20.0		11.0%	42.0	
19.0	51.2		18.5	51.2	51.2	22.4 /0	22.4 /0		72	35.2	
4 0	4.8		4 0	4.8	4.8	4.8	4.8		4.8	4.8	
2.0	2.0		2.5	2.0	2.0	2.0	2.0		2.0	2.0	
0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
6.0	6.8		6.5	6.8	6.8		6.8		6.8	6.8	
Lead	Lag		Lead	Lag	Lag	Lag	Lag		Lead		
	Ŭ					, in the second s	, in the second s				
3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
None	C-Min		None	C-Min	C-Min	None	None		None	None	
15.0	51.0		18.5	55.0	55.0		21.2		28.6	35.4	
0.12	0.41		0.15	0.44	0.44		0.17		0.23	0.28	
0.68	0.96		1.18	0.81	0.28		0.96		0.67	0.60	
68.5	52.0		160.6	36.3	9.1		94.2		55.2	37.9	
0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	
68.5	52.0		160.6	36.3	9.1		94.2		55.2	37.9	
E	D		F	D	A		F Of O		E	U 40.0	
	53.0			54.3			94.2			42.9	
	U			U			F			U	

US 460 Corridor Sa 3: US460/Pruden B	afety Stu oulevar	udy d & Ki	ngs Fo	ork Rd						204	0 Build	d PM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	114	562		~299	463	34		225		78	183	
Queue Length 95th (ft)	164	#722		124	588	93		231		108	158	
Internal Link Dist (ft)		2778			2419			2100			930	
Turn Bay Length (ft)	165			250		145						
Base Capacity (vph)	269	1448		261	1555	779		295		186	519	
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	0.54	0.96		1.18	0.81	0.28		0.96		0.67	0.60	
Intersection Summary												
Area Type: (Other											
Cycle Length: 125												
Actuated Cycle Length: 125												
Offset: 0 (0%), Referenced to	o phase 2:	NBT and	6:EBT, S	tart of Gre	een							
Natural Cycle: 130												
Control Type: Actuated-Coor	rdinated											
Maximum v/c Ratio: 1.18												
Intersection Signal Delay: 55	5.6			In	tersectior	n LOS: E						
Intersection Capacity Utilizat	ion 83.4%			IC	U Level o	of Service	E					
Analysis Period (min) 15												
 Volume exceeds capacit 	y, queue is	theoretic	ally infinit	e.								
Queue shown is maximur	m after two	cycles.										
# 95th percentile volume e	xceeds cap	pacity, que	eue may	be longer								
Queue shown is maximur	m after two	cycles.										
Onlite and Diseases 201104	CO/D	Deuleure										
Splits and Phases: 3: US4	bu/Pruden	Bonievau	a & Kings	s Fork Rd								
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US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	A1⊅		۲	† †	1		\$		۲	¢Î	
Traffic Volume (veh/h)	120	1234	11	108	1189	200	6	142	31	94	84	105
Future Volume (veh/h)	120	1234	11	108	1189	200	6	142	31	94	84	105
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	145	1371	12	309	1265	222	24	212	48	125	140	169
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	1	1	0
Peak Hour Factor	0.83	0.90	0.92	0.35	0.94	0.90	0.25	0.67	0.65	0.75	0.60	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	172	1473	13	263	1644	735	47	230	50	235	217	262
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
Prop Arrive On Green	0.10	0.41	0.41	0.15	0.46	0.46	0.17	0.17	0.17	0.06	0.28	0.28
Ln Grp Delay, s/veh	62.2	46.9	46.6	159.8	30.7	21.7	72.6	0.0	0.0	40.8	0.0	42.4
Ln Grp LOS	E	D	D	F	С	С	E			D		D
Approach Vol, veh/h		1528			1796			284			434	
Approach Delay, s/veh		48.2			51.8			72.6			41.9	
Approach LOS		D			D			E			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6	7	8			
Case No		2.0	3.0		4.0	2.0	4.0	1.2	8.0			
Phs Duration (G+Y+Rc), s		18.1	64.9		42.0	25.0	58.0	14.0	28.0			
Change Period (Y+Rc), s		6.0	6.8		6.8	6.5	6.8	6.8	6.8			
Max Green (Gmax), s		19.0	51.2		35.2	18.5	51.2	7.2	21.2			
Max Allow Headway (MAH), s		3.6	4.8		5.1	3.8	4.8	3.7	5.1			
Max Q Clear (g_c+l1), s		12.0	39.2		22.0	20.5	47.5	9.2	22.2			
Green Ext Time (g_e), s		0.2	10.6		2.8	0.0	3.5	0.0	0.0			
Prob of Phs Call (p_c)		0.99	1.00		1.00	1.00	1.00	0.99	1.00			
Prob of Max Out (p_x)		0.04	0.92		0.15	1.00	1.00	1.00	1.00			
Left-Turn Movement Data												
Assigned Mvmt		1				5		7	3			
Mvmt Sat Flow, veh/h		1774				1774		1774	91			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		770		3595		1358			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		929		31		295			
Left Lane Group Data												
Assigned Mvmt		1	0	0	0	5	0	7	3			
Lane Assignment		(Prot)				(Prot)		(Pr/Pm)	L+T+R			

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Synchro 9 Report 2040 Build PM.syn

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2040 Build PM

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Appendix D

US 460 Corridor Safety Study 3: US460/Pruden Boulevard & Kings Fork Rd

2040 Build PM

Lanes in Grp	1	0	0	0	1	0	1	1	
Grp Vol (v), veh/h	145	0	0	0	309	0	125	284	
Grp Sat Flow (s), veh/h/ln	1774	0	0	0	1774	0	1774	1743	
Q Serve Time (g_s), s	10.0	0.0	0.0	0.0	18.5	0.0	7.2	12.3	
Cycle Q Clear Time (g_c), s	10.0	0.0	0.0	0.0	18.5	0.0	7.2	20.2	
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	0	0	0	1115	1087	
Shared LT Sat Flow (s sh), veh/h/ln	0	0	0	0	0	0	375	0	
Perm LT Eff Green (g p), s	0.0	0.0	0.0	0.0	0.0	0.0	23.2	21.2	
Perm LT Serve Time (q u), s	0.0	0.0	0.0	0.0	0.0	0.0	1.0	15.2	
Perm LT Q Serve Time (g ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	
Serve Time pre Blk (g fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	
Prop LT Inside Lane (P L)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.08	
Lane Grp Cap (c) veh/h	172	0	0	0	263	0	235	327	
V/C Ratio (X)	0.84	0.00	0.00	0.00	1,18	0.00	0.53	0.87	
Avail Cap (c, a), veh/h	270	0	0	0	263	0	235	327	
Upstream Filter (I)	0.48	0.00	0.00	0.00	0.79	0.00	1.00	1.00	
Uniform Delay (d1), s/veh	55.5	0.0	0.0	0.0	53.3	0.0	38.5	51.3	
Incr Delay (d2), s/veh	67	0.0	0.0	0.0	106.6	0.0	2.3	21.3	
Initial Q Delay (d3) s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d) s/veh	62.2	0.0	0.0	0.0	159.8	0.0	40.8	72.6	
1st-Term Q (Q1) veh/ln	4.9	0.0	0.0	0.0	9.0	0.0	3.5	97	
2nd-Term Q (Q2) veh/ln	0.3	0.0	0.0	0.0	7.8	0.0	0.0	1.9	
3rd-Term Q (Q3) veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	
%ile Back of Q (50%), veh/ln	5.2	0.0	0.0	0.0	16.8	0.0	3.6	11.6	
%ile Storage Ratio (RQ%)	0.81	0.00	0.00	0.00	1.71	0.00	0.10	0.14	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	11.6	0.0	0.0	0.0	
Sat Delay (ds), s/yeh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned MVMt	U	2	U	4	U	6	U	ð	
Lane Assignment	0		0	0	0	1	0	0	
	0	1005	U	0	0	675	0	U	
Grp voi (v), ven/n	0	1205	0	0	0	0/5	0	0	
Grp Sat Flow (s), ven/n/in	0	1//0	U	0	0	1//0	0	0	
Q Serve Time (g_s), s	0.0	37.2	0.0	0.0	0.0	45.5	0.0	0.0	
Cycle Q Clear Time (g_c), s	0.0	37.2	0.0	0.0	0.0	45.5	0.0	0.0	
Lane Grp Cap (c), ven/n	0	1644	0	0	0	725	0	0	
	0.00	0.77	0.00	0.00	0.00	0.93	0.00	0.00	
Avail Cap (c_a), veh/h	0	1644	0	0	0	725	0	0	
Upstream Filter (I)	0.00	0.79	0.00	0.00	0.00	0.48	0.00	0.00	
Uniform Delay (d1), s/ven	0.0	27.9	0.0	0.0	0.0	35.2	0.0	0.0	
Incr Delay (d2), s/veh	0.0	2.8	0.0	0.0	0.0	11./	0.0	0.0	
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	0.0	30.7	0.0	0.0	0.0	46.9	0.0	0.0	
1st-Term Q (Q1), veh/In	0.0	18.1	0.0	0.0	0.0	22.1	0.0	0.0	

Synchro 9 Report

2040 Build PM.syn

US 460 Corridor Safety Study 2040 3: US460/Pruden Boulevard & Kings Fork Rd						2040 Build PM	US 460 Corridor S 4: Providence Roa	afety St d/Lake	udy Prince	Drive	& US4	60/Pru	iden B	ouleva	ırd		204	0 Build	d PM			
											٨	+	\mathbf{i}	4	t	×	•	t	1	1	Ļ	4
2nd-Term Q (Q2), veh/ln	0.0	0.6	0.0	0.0	0.0	2.4	0.0	0.0		Lane Group	FRI	FRT	FRR	WRI	WRT	WRR	NRI	NRT	NRR	SBI	SBT	SBR
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lane Configurations	100	A1.	LDIX	K		#	NDL	1101 	NDIX			
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00		Traffic Volume (uph)	11	1221	60	26	1108	129	100	38	11	70	63	9
%ile Back of Q (50%), veh/In	0.0	18.7	0.0	0.0	0.0	24.5	0.0	0.0		Future Volume (vph)	11	1231	60	20	1100	130	100	30	11	70	63	0
%ile Storage Ratio (RQ%)	0.00	0.20	0.00	0.00	0.00	0.23	0.00	0.00		Ideal Flow (vphpl)	1000	1000	1000	1000	1000	1000	100	1000	1000	100	1000	1000
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Storage Length (ft)	220	1300	1300	200	1300	110	1300	1300	1300	1300	1300	1300
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Storage Lanes	1		0	200		1	0		0	0		0
Sat Delay (ds), s/ven	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Taper Length (ft)	160		U	150			25		U	25		v
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lane Litil Eactor	1.00	0.95	0.95	1.00	0.95	1 00	1 00	1.00	1.00	1 00	1.00	1 00
Sat Cap (cs), ven/n	0	0	0	0	0	0	0	0		Edite Otil: 1 detoi	1.00	0.00	0.00	1.00	0.50	0.850	1.00	0.985	1.00	1.00	0.985	1.00
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Fit Protected	0 950	0.001		0 950		0.000		0.000			0.981	
Right Lane Group Data										Satd Flow (prot)	1770	3507	0	1770	3530	1583	0	1780	0	0	1800	0
Assigned Mymt	0	12	0	14	0	16	0	18		Elt Permitted	0 119	0007	U	0.084	0000	1000	U	0.652	U	Ŭ	0 793	Ŭ
Lane Assignment		R		T+R		T+R				Satd Flow (perm)	222	3507	0	156	3539	1583	0	1196	0	0	1455	0
Lanes in Grp	0	1	0	1	0	1	0	0		Right Turn on Red			Yes			Yes	Ŭ		Yes	Ű	1100	Yes
Grp Vol (v), veh/h	0	222	0	309	0	708	0	0		Satd Flow (RTOR)		10				129		5			5	
Grp Sat Flow (s), veh/h/ln	0	1583	0	1699	0	1857	0	0		Link Speed (mph)		55			55	120		45			45	
Q Serve Time (q s), s	0.0	10.9	0.0	20.0	0.0	45.5	0.0	0.0		Link Distance (ft)		471			2858			1931			2337	
Cycle Q Clear Time (g c), s	0.0	10.9	0.0	20.0	0.0	45.5	0.0	0.0		Travel Time (s)		5.8			35.4			29.3			35.4	
Prot RT Sat Flow (s R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Prot RT Eff Green (g R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Adi Flow (vph)	22	1338	90	79	1346	234	133	55	24	85	105	24
Prop RT Outside Lane (P R)	0.00	1.00	0.00	0.55	0.00	0.02	0.00	0.17		Shared Lane Traffic (%)						201						
Lane Grn Can (c) veh/h	0	735	0	478	0	761	0	0		Lane Group Flow (vph)	22	1428	0	79	1346	234	0	212	0	0	214	0
V/C Ratio (X)	0.00	0.30	0.00	0.65	0.00	0.93	0.00	0.00		Turn Type	D.P+P	NA	-	D.P+P	NA	Perm	Perm	NA	-	Perm	NA	
Avail Cap (c, a) veh/h	0.00	735	0.00	478	0.00	761	0.00	0.00		Protected Phases	1	6		5	2			8			4	
Upstream Filter (I)	0.00	0.79	0.00	1.00	0.00	0.48	0.00	0.00		Permitted Phases	2			6		2	8			4		
Uniform Delay (d1) s/veh	0.0	20.8	0.0	39.4	0.0	35.2	0.0	0.0		Detector Phase	1	6		5	2	2	8	8		4	4	
Incr Delay (d2), s/veh	0.0	0.8	0.0	3.0	0.0	11.3	0.0	0.0		Switch Phase												
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	7.0	7.0		7.0	7.0	
Control Delay (d), s/veh	0.0	21.7	0.0	42.4	0.0	46.6	0.0	0.0		Minimum Split (s)	11.8	21.8		11.8	21.8	21.8	13.3	13.3		13.8	13.8	
1st-Term Q (Q1) veh/ln	0.0	47	0.0	94	0.0	23.2	0.0	0.0		Total Split (s)	16.0	67.0		16.0	67.0	67.0	27.0	27.0		27.0	27.0	
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.4	0.0	2.4	0.0	0.0		Total Split (%)	14.5%	60.9%		14.5%	60.9%	60.9%	24.5%	24.5%		24.5%	24.5%	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Maximum Green (s)	9.2	60.2		9.2	60.2	60.2	20.7	20.7		20.2	20.2	
%ile Back of Q Factor (f B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00		Yellow Time (s)	4.8	4.8		4.8	4.8	4.8	4.8	4.8		4.8	4.8	
%ile Back of Q (50%), veh/In	0.0	4.9	0.0	9.8	0.0	25.6	0.0	0.0		All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	1.5	1.5		2.0	2.0	
%ile Storage Ratio (RQ%)	0.00	0.86	0.00	0.26	0.00	0.24	0.00	0.00		Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0			0.0	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Total Lost Time (s)	6.8	6.8		6.8	6.8	6.8		6.3			6.8	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Lead-Lag Optimize?		Ŭ		Yes	Ŭ	Ŭ						
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0		Minimum Gap (s)	0.2	3.5		3.0	3.5	3.5	0.2	0.2		0.2	0.2	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Time Before Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
										Time To Reduce (s)	0.0	20.0		0.0	20.0	20.0	0.0	0.0		0.0	0.0	
Intersection Summary										Recall Mode	None	Min		None	Min	Min	None	None		None	None	
HCM 2010 Ctrl Delay		50.9								Act Effct Green (s)	53.8	45.7		51.1	51.6	51.6		21.2			20.6	
HCM 2010 LOS		D								Actuated g/C Ratio	0.59	0.50		0.56	0.57	0.57		0.23			0.23	
										v/c Ratio	0.09	0.81		0.37	0.67	0.25		0.75			0.64	
										Control Delay	6.6	23.2		12.4	16.0	5.5		54.9			45.9	

Synchro 9 Report

Queue Delay

Total Delay

VHB

VHB

2040 Build PM.syn

0.0 0.0

6.6 23.2

0.0 0.0 0.0

12.4 16.0

5.5

2040 Build PM

54.9

0.0

0.0

45.9

US 460 Corridor Safety Study

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	А	С		В	В	А		D			D	
Approach Delay		23.0			14.3			54.9			45.9	
Approach LOS		С			В			D			D	
Queue Length 50th (ft)	4	363		16	221	22		119			117	
Queue Length 95th (ft)	7	463		11	395	29		#182			139	
Internal Link Dist (ft)		391			2778			1851			2257	
Turn Bay Length (ft)	220			200		110						
Base Capacity (vph)	297	2426		260	2466	1142		287			341	
Starvation Cap Reductn	0	0		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	0.07	0.59		0.30	0.55	0.20		0.74			0.63	

Intersection Summary Area Type: Other Cycle Length: 110 Actuated Cycle Length: 91 Natural Cycle: 80 Control Type: Actuated-Uncoordinate Maximum v/c Ratio: 0.81 Intersection Signal Delay: 22.2 Intersection Capacity Utilization 58.50 Analysis Period (min) 15 # 95th percentile volume exceeds of Queue shown is maximum after tw

Splits and F	110365.	4. FIUVILIENCE
▶ Ø1		∮ _ø2
16 s		67 s
√ Ø5		
16 s		67 s

Synchro 9 Report 2040 Build PM.syn

VHB

D-54 | ROUTE 460 SAFETY AND OPERATIONS STUDY

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

2040 Build PM

ed	
	Intersection LOS: C
%	ICU Level of Service B
capacity, queue may be long	jer.
wo cycles.	

Splits and Phases: 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

27 s	
✓ Ø8	
27 s	

US 460 Corridor Safety Study	2040 Build PM
4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard	

	≯	-	$\mathbf{\hat{z}}$	1	+	•	٩.	Ť	1	1	Ŧ	~
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦.	↑ ĵ≽		<u>۲</u>	- 11	1		4			4	
Traffic Volume (veh/h)	11	1231	60	26	1198	138	100	38	11	70	63	8
Future Volume (veh/h)	11	1231	60	26	1198	138	100	38	11	70	63	8
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q, 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	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	22	1338	90	79	1346	234	133	55	24	85	105	24
Adj No. of Lanes	1	2	0	1	2	1	0	1	0	0	1	0
Peak Hour Factor	0.50	0.92	0.67	0.33	0.89	0.59	0.75	0.69	0.46	0.82	0.60	0.33
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	216	1857	125	249	2031	909	204	72	28	154	167	34
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
Prop Arrive On Green	0.02	0.55	0.55	0.05	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Ln Grp Delay, s/veh	11.8	18.2	18.3	14.4	14.9	10.5	44.1	0.0	0.0	38.9	0.0	0.0
Ln Grp LOS	В	В	В	В	В	В	D			D		
Approach Vol, veh/h		1450			1659			212			214	
Approach Delay, s/veh		18.2			14.3			44.1			38.9	
Approach LOS		В			В			D			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs		1	2		4	5	6		8			
Case No		1.1	3.0		8.0	1.1	4.0		8.0			
Phs Duration (G+Y+Rc), s		9.0	62.7		25.6	11.2	60.5		25.6			
Change Period (Y+Rc), s		6.8	6.8		6.8	6.8	6.8		* 6.8			
Max Green (Gmax), s		9.2	60.2		20.2	9.2	60.2		* 21			
Max Allow Headway (MAH), s		3.6	4.7		5.1	3.6	4.7		5.1			
Max Q Clear (g_c+l1), s		2.5	27.5		14.3	3.8	30.9		18.3			
Green Ext Time (g_e), s		0.0	24.8		1.2	0.1	22.8		0.6			
Prob of Phs Call (p_c)		0.45	1.00		1.00	0.88	1.00		1.00			
Prob of Max Out (p_x)		0.00	0.72		0.76	0.12	0.75		1.00			
Left-Turn Movement Data												
Assigned Mvmt		1			7	5			3			
Mvmt Sat Flow, veh/h		1774			531	1774			744			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			3539		863		3367		372			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1583		176		226		143			
Left Lane Group Data												
Assigned Mvmt		1	0	0	7	5	0	0	3			
Lane Assignment		(Pr/Pm)			L+T+R	(Pr/Pm)			L+T+R			

Lanes in Grp	1	0	0	1	1	0	0	1	
Grp Vol (v), veh/h	22	0	0	214	79	0	0	212	
Grp Sat Flow (s), veh/h/ln	1774	0	0	1570	1774	0	0	1259	
Q Serve Time (g_s), s	0.5	0.0	0.0	0.0	1.8	0.0	0.0	4.0	
Cycle Q Clear Time (g_c), s	0.5	0.0	0.0	12.3	1.8	0.0	0.0	16.3	
Perm LT Sat Flow (s_l), veh/h/ln	323	0	0	1341	373	0	0	1281	
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1525	0	0	0	1136	
Perm LT Eff Green (q p), s	55.9	0.0	0.0	18.8	53.7	0.0	0.0	18.8	
Perm LT Serve Time (q u), s	30.4	0.0	0.0	2.6	24.8	0.0	0.0	6.6	
Perm LT Q Serve Time (g ps), s	1.9	0.0	0.0	0.0	7.8	0.0	0.0	4.0	
Time to First Blk (g_f), s	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.8	
Serve Time pre Blk (g fs), s	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.8	
Prop LT Inside Lane (P L)	1.00	0.00	0.00	0.40	1.00	0.00	0.00	0.63	
Lane Grp Cap (c), veh/h	216	0	0	355	249	0	0	304	
V/C Ratio (X)	0.10	0.00	0.00	0.60	0.32	0.00	0.00	0.70	
Avail Cap (c a), veh/h	342	0	0	377	337	0	0	331	
Upstream Filter (I)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
Uniform Delay (d1), s/veh	11.6	0.0	0.0	36.4	13.7	0.0	0.0	38.3	
Incr Delay (d2), s/veh	0.2	0.0	0.0	2.4	0.7	0.0	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	
Control Delay (d), s/veh	11.8	0.0	0.0	38.9	14.4	0.0	0.0	44.1	
1st-Term Q (Q1), veh/ln	0.2	0.0	0.0	5.3	0.9	0.0	0.0	5.5	
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.5	
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
%ile Back of Q Factor (f B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	
%ile Back of Q (50%), veh/ln	0.3	0.0	0.0	5.6	0.9	0.0	0.0	6.0	
%ile Storage Ratio (RQ%)	0.03	0.00	0.00	0.06	0.12	0.00	0.00	0.08	
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Middle Lane Group Data									
Assigned Mymt	0	2	0	4	0	6	0	8	
Lane Assignment		T				T			
Lanes in Grp	0	2	0	0	0	1	0	0	
Grp Vol (v), veh/h	0	1346	0	0	0	702	0	0	
Grp Sat Flow (s), veh/h/ln	0	1770	0	0	0	1770	0	0	
Q Serve Time (q s), s	0.0	25.5	0.0	0.0	0.0	28.7	0.0	0.0	
Cycle Q Clear Time (g c), s	0.0	25.5	0.0	0.0	0.0	28.7	0.0	0.0	
Lane Grp Cap (c), veh/h	0	2031	0	0	0	976	0	0	
V/C Ratio (X)	0.00	0.66	0.00	0.00	0.00	0.72	0.00	0.00	
Avail Cap (c a), veh/h	0	2189	0	0	0	1094	0	0	
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
Uniform Delay (d1), s/veh	0.0	14.3	0.0	0.0	0.0	16.2	0.0	0.0	
Incr Delay (d2), s/veh	0.0	0.7	0.0	0.0	0.0	2.0	0.0	0.0	
$(a_1), (a_2), (a_3)$	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

0.0 14.9 0.0 0.0 0.0 18.2 0.0 0.0

0.0 12.3 0.0 0.0 0.0 13.8 0.0 0.0

VHB

Synchro 9 Report 2040 Build PM.syn Control Delay (d), s/veh 1st-Term Q (Q1), veh/In

VHB

Synchro 9 Report 2040 Build PM.syn

US 460 Corridor Safety Study 2040 Build PM 4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

US 460 Corridor Safety Study

2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f_ %ile Back of Q (50%), ve %ile Storage Ratio (RQ% Initial Q (Qb), veh Final (Residual) Q (Qe), Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc),

Right Lane Group Data Assigned Mvmt Lane Assignment

Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/li Q Serve Time (g_s), s Cycle Q Clear Time (g_c Prot RT Sat Flow (s_R), Prot RT Eff Green (g_R) Prop RT Outside Lane (F Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/vel Incr Delay (d2), s/veh Initial Q Delay (d3), s/vel Control Delay (d), s/veh 1st-Term Q (Q1), veh/ln 2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q3), veh/ln %ile Back of Q Factor (f_ %ile Back of Q (50%), ve %ile Storage Ratio (RQ% Initial Q (Qb), veh Final (Residual) Q (Qe), Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc),

Intersection Summary HCM 2010 Ctrl Delay HCM 2010 LOS

Notes

VHB

Appendix D

4: Providence Road/Lake Prince Drive & US460/Pruden Boulevard

2040 Build PM

1	0.0	0.2	0.0	0.0	0.0	0.6	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	
eh/In	0.0	12.5	0.0	0.0	0.0	14.4	0.0	0.0	
%)	0.00	0.12	0.00	0.00	0.00	0.95	0.00	0.00	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
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	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	0	0	0	0	0	0	0	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0	12	0	14	0	16	0	18	1
		R				T+R			
	0	1	0	0	0	1	0	0	
	0	234	0	0	0	726	0	0	
n	0	1583	0	0	0	1823	0	0	
	0.0	7.2	0.0	0.0	0.0	28.9	0.0	0.0	
c), s	0.0	7.2	0.0	0.0	0.0	28.9	0.0	0.0	
veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
, S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
P_R)	0.00	1.00	0.00	0.11	0.00	0.12	0.00	0.11	
	0	909	0	0	0	1006	0	0	
	0.00	0.26	0.00	0.00	0.00	0.72	0.00	0.00	
	0	979	0	0	0	1127	0	0	
	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
h	0.0	10.4	0.0	0.0	0.0	16.3	0.0	0.0	
	0.0	0.1	0.0	0.0	0.0	2.0	0.0	0.0	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	10.5	0.0	0.0	0.0	18.3	0.0	0.0	
	0.0	3.1	0.0	0.0	0.0	14.3	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
D0/)	0.0	1.00	0.0	1.00	0.0	1.00	0.0	1.00	
_D %)	0.00	1.00	0.00	1.00	0.00	14.0	0.00	1.00	
	0.0	J.∠ 0.73	0.0	0.0	0.0	14.9	0.0	0.0	
/0)	0.00	0.75	0.00	0.00	0.00	0.90	0.00	0.00	
veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1011	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
		40.0							
		19.2							
		В							

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

US 460 Corridor S 5: Woodlawn Dr &	afety Stu US460/	udy Pruder	n Boule	evard			2040 Build PM
	→	¥	4	+	٩	1	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	A⊅					1	
Traffic Volume (vph)	1297	2	0	1347	0	2	
Future Volume (vph)	1297	2	0	1347	0	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt						0.865	
Flt Protected							
Satd. Flow (prot)	3539	0	0	3539	0	1611	
Flt Permitted							
Satd. Flow (perm)	3539	0	0	3539	0	1611	
Link Speed (mph)	55			55	25		
Link Distance (ft)	1965			471	1166		
Travel Time (s)	24.4			5.8	31.8		
Peak Hour Factor	0.96	0.92	0.92	0.95	0.25	0.25	
Adj. Flow (vph)	1351	2	0	1418	0	8	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1353	0	0	1418	0	8	
Sign Control	Free			Free	Stop		
Intersection Summary							
Area Type:	Other						
Control Type: Unsignalized							
Intersection Capacity Utilization	ation 45.9%			IC	U Level	of Service	A
Analysis Period (min) 15							

US 460 Corridor Safety Study 5: Woodlawn Dr & US460/Pruden Boulevard

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	A 1.		,	**		1
Traffic Vol. veh/h	1297	2	0	1347	٥	2
Future Vol. veh/h	1297	2	0	1347	0	2
Conflicting Pede #/hr	1237	0	0	1047	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	1100	None	TICC	None	Jup	None
Storago Longth	-	NULLE	-	NULLE	-	
Voh in Modian Storag	- 	-	-	-	-	0
Crode %	e, # 0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	92	92	95	25	25
Heavy Vehicles, %	2	2	2	2	2	2
NVMT FIOW	1351	2	0	1418	0	ð
Major/Minor	Major1	Ν	Major2	1	Minor1	
Conflicting Flow All	0	0	-	-	-	677
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwv	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-		-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-			-		3.32
Pot Can-1 Maneuver	-	-	0	-	0	395
Stane 1	_	_	0	_	0	000
Stage 7	-	-	0	-	0	-
Diateon blocked %	-	-	U	-	U	-
May Cap 1 Manautro	-	-		-		205
Nov Cap-1 Maneuver	-	-	-	-	-	395
wov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay	0		0		14.3	
HCM LOS	v		v		B	
					-	
Minor Lane/Major Mvr	nt	NBLn1	EBT	EBR	WBT	
Capacity (veh/h)		395	-	-	-	
HCM Lane V/C Ratio		0.02	-	-	-	
HCM Control Delay (s)	14.3	-	-	-	
HCM Lane LOS		В	-	-	-	
HCM 95th %tile Q(veh	1)	0.1	-	-	-	
	·/	0.1				

US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

	٦	-	\mathbf{i}	•	-	*	•	1	1	1	Ŧ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		<u>†</u> †	1	ľ	≜1 ≱			ę	1		\$	
Traffic Volume (vph)	1	586	49	69	1032	4	21	2	43	0	0	3
Future Volume (vph)	1	586	49	69	1032	4	21	2	43	0	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		340	400		0	0		300	0		0
Storage Lanes	0		1	1		0	0		1	0		0
Taper Length (ft)	25			125			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.999				0.850		0.865	
Flt Protected				0.950				0.959				
Satd. Flow (prot)	0	3539	1583	1770	3536	0	0	1786	1583	0	1611	0
Flt Permitted				0.950				0.959				
Satd. Flow (perm)	0	3539	1583	1770	3536	0	0	1786	1583	0	1611	0
Link Speed (mph)		55			55			45			45	
Link Distance (ft)		3402			5235			2230			2290	
Travel Time (s)		42.2			64.9			33.8			34.7	
Peak Hour Factor	0.38	0.89	0.80	0.68	0.90	0.92	0.41	0.25	0.34	0.25	0.92	0.25
Adj. Flow (vph)	3	658	61	101	1147	4	51	8	126	0	0	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	661	61	101	1151	0	0	59	126	0	12	0
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											

Area Type: Other Control Type: Unsignalized Intersection Capacity Utilization 62.8% Analysis Period (min) 15

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ICU Level of Service B

US 460 Corridor Safety Study 6: Old Suffolk Rd & US 460/Windsor Boulevard

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Intersection												
Int Delay, s/veh	5											
Movement	FBI	FBT	FBR	WBI	WBT	WBR	NBI	NBT	NBR	SBI	SBT	SBR
Lane Configurations	202	**	1	1	<u>۸</u> ۴			4	1	002	4	0.0.1
Traffic Vol. veh/h	1	586	49	69	1032	4	21	2	43	٥	0	3
Future Vol. veh/h	1	586	49	69	1032	4	21	2	43	0	0	3
Conflicting Peds. #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	340	400	-	-	-	-	300	-	-	-
Veh in Median Storage	e.# -	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	38	89	80	68	90	92	41	25	34	25	92	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	658	61	101	1147	4	51	8	126	0	0	12
Major/Minor	Major1		1	Major2		1	Minor1		M	/linor2		
Conflicting Flow All	1151	0	0	658	0	0	1440	2018	329	1690	2016	576
Stage 1	-	-	-	-	-	-	664	664	-	1352	1352	-
Stage 1 Stage 2	-	-	-	-	-	-	664 776	664 1354	-	1352 338	1352 664	-
Stage 1 Stage 2 Critical Hdwy	4.14	-	-	- - 4.14	-	-	664 776 7.54	664 1354 6.54	- - 6.94	1352 338 7.54	1352 664 6.54	- - 6.94
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1	4.14	-	-	- - 4.14	-	-	664 776 7.54 6.54	664 1354 6.54 5.54	- 6.94	1352 338 7.54 6.54	1352 664 6.54 5.54	- 6.94
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2	4.14	-	•	- 4.14 -	-	-	664 776 7.54 6.54 6.54	664 1354 6.54 5.54 5.54	- 6.94 -	1352 338 7.54 6.54 6.54	1352 664 6.54 5.54 5.54	- 6.94 -
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy	4.14	-	-	- 4.14 - 2.22	-		664 776 7.54 6.54 6.54 3.52	664 1354 6.54 5.54 5.54 4.02	- 6.94 - 3.32	1352 338 7.54 6.54 6.54 3.52	1352 664 6.54 5.54 5.54 4.02	- 6.94 - 3.32
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver	4.14 - 2.22 603	-	-	- 4.14 - 2.22 926	-		664 776 7.54 6.54 6.54 3.52 93	664 1354 6.54 5.54 5.54 4.02 58	6.94 - 3.32 667	1352 338 7.54 6.54 6.54 3.52 61	1352 664 6.54 5.54 5.54 4.02 58	- 6.94 - 3.32 460
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1	4.14 2.22 603	-	-	- 4.14 - 2.22 926			664 776 7.54 6.54 6.54 3.52 93 416	664 1354 6.54 5.54 5.54 4.02 58 456	- 6.94 - 3.32 667	1352 338 7.54 6.54 6.54 3.52 61 158	1352 664 6.54 5.54 5.54 4.02 58 217	- 6.94 - 3.32 460
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2	4.14 	-		- 4.14 - 2.22 926 -		· · · · ·	664 776 7.54 6.54 6.54 3.52 93 416 356	664 1354 6.54 5.54 5.54 4.02 58 456 216	- 6.94 - 3.32 667	1352 338 7.54 6.54 6.54 3.52 61 158 650	1352 664 6.54 5.54 5.54 4.02 58 217 456	6.94 - 3.32 460
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, %	4.14 2.22 603			- 4.14 - 2.22 926 -	- - - - - - - - - - - - - - - -	· · · · · · ·	664 776 7.54 6.54 3.52 93 416 356	664 1354 6.54 5.54 5.54 4.02 58 456 216	6.94 - 3.32 667 -	1352 338 7.54 6.54 6.54 3.52 61 158 650	1352 664 6.54 5.54 5.54 4.02 58 217 456	- 6.94 - 3.32 460 -
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver	4.14 2.22 603 -			- 4.14 - 2.22 926 - - 926		· · · · · · · · · · · · · · · · · · ·	664 776 7.54 6.54 3.52 93 416 356 83	664 1354 6.54 5.54 4.02 58 456 216 51	- 6.94 - 3.32 667 - -	1352 338 7.54 6.54 3.52 61 158 650 40	1352 664 5.54 5.54 4.02 58 217 456 51	- 6.94 - 3.32 460 - 460
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver	4.14 2.22 603 - 603			- 4.14 - 2.22 926 - - 926 -		· · · · · · · · · · · · · · · · · · ·	664 776 7.54 6.54 3.52 93 416 356 83 83	664 1354 6.54 5.54 5.54 4.02 58 456 216 51 51	6.94 - 3.32 667 - 667	1352 338 7.54 6.54 3.52 61 158 650 40 40	1352 664 6.54 5.54 5.54 4.02 58 217 456 51 51	6.94
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1	4.14 2.22 603 - 603			- 4.14 - 2.22 926 - 926 - 926		· · · · · · · · · · · · · · · · · · ·	664 776 7.54 6.54 3.52 93 416 356 83 83 83 413	664 1354 6.54 5.54 5.54 4.02 58 456 216 51 51 452	6.94 - 3.32 667 - 667 -	1352 338 7.54 6.54 3.52 61 158 650 40 40 157	1352 664 6.54 5.54 5.54 4.02 58 217 456 51 51 193	6.94 - 3.32 460 - 460 -
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2	4.14 2.22 603 - 603 -			- 4.14 - 2.22 926 - - 926 - -		· · · · · · · · · · · · · · · · · · ·	664 776 7.54 6.54 3.52 93 416 356 83 83 413 309	664 1354 6.54 5.54 4.02 58 456 216 51 51 452 192	6.94 - 3.32 667 - 667 -	1352 338 7.54 6.54 3.52 61 158 650 40 40 157 513	1352 664 6.54 5.54 5.54 4.02 58 217 456 51 51 193 452	- 6.94 - 3.32 460 - - - 460 -
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2	4.14 - 2.22 603 - 603 -			- 4.14 - 2.22 926 - - 926 - -	-	· · · · · · · · · · · · · · · · · · ·	664 776 7.54 6.54 6.54 3.52 93 416 356 83 83 413 309	664 1354 6.54 5.54 4.02 58 456 216 51 51 51 452 192	- 6.94 - 3.32 667 - - 667 - -	1352 338 7.54 6.54 3.52 61 158 650 40 40 157 513	1352 664 6.54 5.54 4.02 58 217 456 51 51 51 193 452	- 6.94 - 3.32 460 - - 460 -
Stage 1 Stage 2 Critical Hdwy Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2 Approach	- 4.14 - 2.22 603 - - 603 - - - EB			- 4.14 - 2.22 926 - 926 - - - -			664 776 7.54 6.54 3.52 93 416 356 83 83 413 309 NB	664 1354 6.54 5.54 4.02 58 456 216 51 51 452 192	- 6.94 - 3.32 667 - 667	1352 338 7.54 6.54 6.54 3.52 61 158 650 40 40 40 157 513 SB	1352 664 6.54 5.54 4.02 58 217 456 51 51 193 452	- 6.94 - 3.32 460 - - 460 -
Stage 1 Stage 2 Critical Hdwy Stg 1 Critical Hdwy Stg 1 Critical Hdwy Stg 2 Follow-up Hdwy Pot Cap-1 Maneuver Stage 1 Stage 2 Platoon blocked, % Mov Cap-1 Maneuver Mov Cap-2 Maneuver Stage 1 Stage 2 Approach HCM Control Delay, s	- 4.14 - 2.22 603 - - 603 - - - - - EB 0			- 4.14 - 2.22 926 - 926 - 926 - - - - - - -			664 776 7.54 6.54 3.52 93 416 356 83 83 413 309 NB 51.7	664 1354 6.54 5.54 5.54 4.02 58 456 216 51 51 452 192	- 6.94 - 3.32 667 - - 667 -	1352 338 7.54 6.54 6.54 3.52 61 158 650 40 40 157 513 SB 13	1352 664 5.54 5.54 5.54 4.02 58 217 456 51 51 51 193 452	- 6.94 - 3.32 460 - - - -

Minor Lane/Major Mvmt	NBLn1 N	IBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	77	667	603	-	-	926	-	-	460
HCM Lane V/C Ratio	0.769	0.19	0.004	-	-	0.11	-	-	0.026
HCM Control Delay (s)	137.2	11.7	11	-	-	9.4	-	-	13
HCM Lane LOS	F	В	В	-	-	А	-	-	В
HCM 95th %tile Q(veh)	3.7	0.7	0	-	-	0.4	-	-	0.1

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VHB

US 460 Corridor Sa 7: Dominion Way &	fety Stu US 460	ıdy)/Wind	lsor Bo	oulevar	d
	→	7	4	+	•
Long Croup	EDT	EDD	\A/DI	W/DT	NDI

	-	\mathbf{r}	4	-	1	1
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	^	1	ň	≜ ↑	5	1
Traffic Volume (vph)	649	3	1	1062	18	17
Future Volume (vph)	649	3	1	1062	18	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		200	330		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			200		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0,950		0,950	
Satd Flow (prot)	3539	1583	1770	3539	1770	1583
Flt Permitted	0000	1000	0.370	0000	0.950	1000
Satd Flow (perm)	3539	1583	689	3539	1770	1583
Right Turn on Red	0000	Yes	005	0000	1110	Yes
Satd Flow (RTOR)		5				30
Link Sneed (mnh)	55	5		55	25	59
Link Opeeu (mpn)	700			3402	1205	
	8.9			12 2	32.0	
Dook Hour Footor	0.0	0.55	0.54	42.2	0.50	0.44
reak nour racion	0.90	0.05	0.04	1207	0.00	0.44
ruj. Flow (vpil) Sharad Lana Traffia (%)	121	5	2	1207	30	29
Lano Group Flow (uph)	704	E	0	1007	26	20
Lane Group Flow (vpf)	121	Dorra		1207	J0 Drat	J9 Drot
Turri Type	INA O	Perm	U.P+P	NA	PIOT	PIOT
Protected Phases	2	0	1	6	4	4
Permitted Phases	<u>^</u>	2	2	<u>^</u>	,	
Detector Phase	2	2	1	6	4	4
Switch Phase	45.0	45.0	= ^	45.0	5.0	5.0
Minimum Initial (s)	15.0	15.0	7.0	15.0	5.0	5.0
Minimum Split (s)	21.5	21.5	16.0	21.5	11.5	11.5
Total Split (s)	47.0	47.0	21.0	68.0	26.0	26.0
Total Split (%)	50.0%	50.0%	22.3%	72.3%	27.7%	27.7%
Maximum Green (s)	40.5	40.5	12.0	61.5	20.0	20.0
Yellow Time (s)	5.5	5.5	5.0	5.5	3.0	3.0
All-Red Time (s)	1.0	1.0	4.0	1.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	9.0	6.5	6.0	6.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	, in the second s					
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.5	3.5	0.2	3.5	0.2	0.2
Time Before Reduce (s)	25.0	25.0	0.0	25.0	0.0	0.0
Time To Reduce (s)	15.0	15.0	0.0	15.0	0.0	0.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effct Green (s)	74.5	74.5	72.1	77.7	7.4	7.4
Actuated g/C Ratio	0.79	0.79	0.77	0.83	0.08	0.08
v/c Ratio	0.26	0.00	0.00	0.41	0.26	0.24
Control Delay	4.6	4.0	3.0	3.5	44.6	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	4.0	3.0	3.5	44.6	16.0
i olai Delay	4.0	4.0	3.0	3.5	44.0	10.9

2040 Build PM

US 460 Corridor 7: Dominion Way

Lane Group LOS

Approach Delay Approach LOS Queue Length 50th (ft) Queue Length 95th (ft) Internal Link Dist (ft) Turn Bay Length (ft) Base Capacity (vph) Starvation Cap Reductn Soillback Cap Reductn Spillback Cap Reductn Storage Cap Reductn Reduced v/c Ratio

Intersection Summary

Area Type: Cycle Length: 94 Actuated Cycle Length: 94 Offset: 0 (0%), Referenced Natural Cycle: 50 Control Type: Actuated-Co Maximum v/c Ratio: 0.41 Intersection Signal Delay: 4 Intersection Capacity Utiliz Analysis Period (min) 15

Splits and Phases: 7: Do

Ø1	
21 s	
+	
Ø6 (R)	
68 s	

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Appendix D

Sat &	fety Stu US 460	udy D/Wind	lsor Bo	oulevar	ď		2040 Build PM
	+	*	4	Ļ	<	۲	
	EBT	EBR	WBL	WBT	NBL	NBR	
	А	А	А	А	D	В	
	4.6			3.5	30.2		
	А			А	С		
	45	0	0	92	21	0	
	141	2	1	134	27	3	
	629			3322	1125		
		200	330				
	2803	1255	673	2923	376	367	
	0	0	0	0	0	0	
	0	0	0	0	0	0	
	0	0	0	0	0	0	
	0.26	0.00	0.00	0.41	0.10	0.11	
0	ther						
4							
d to	phase 2:	EBWB an	d 6:WBT,	Start of 0	Green		
oorc	linated						
: 4.9				In	tersectior	LOS: A	
zatio	on 43.9%			IC	U Level o	of Service A	4
Domi	nion Way	& US 46)/Windsoi	Bouleva	rd		
	- - 0	2 (R)					▲ ₩Ø4
	47 s						26 s
	•						

Movement EBT Lane Configurations ↑↑ Traffic Volume (veh/h) 649 Future Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj Parking Bus Adj 1.00 Adj Staf Flow, veh/h/ln 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Approach Vol, veh/h 726 Approach Vol, veh/h 726 Approach LOS A	EBR 3 3 12 0 1.00 1.00 1.00 1.00 1.00 1.00 1.00	WBL 1 1 1 1 1 0 1.00 1.00 1.00 1.00 1.63 2	★ WBT ↑↑ 1062 1062 6 0 1.00 1.00 1.862	NBL 18 18 18 7 0 100	NBR 7 17 17 14 0				Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln	1 2 1774	0	0 0	1 36	0	0	0 0	0 0	
Movement EBT Lane Configurations ↑↑ Traffic Volume (veh/h) 649 Future Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj Parking Bus Adj 1.00 Adj Sat Flow, veh/h/ln 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Vol, veh/h 726 Approach LOS A	EBR EBR 3 3 3 2 12 0 1.00 1	WBL 1 1 1 1 0 1.00 1.00 1.00 1863 2	★ WBT 1062 1062 6 0 1.00 1.00 1862	NBL 18 18 7 0 100	NBR 17 17 17 14				Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln	1 2 1774	0	0	1 36	0	0	0 0	0 0	
Movement EBT Lane Configurations ↑↑↑ Lane Configurations ↑↑↑ Traffic Volume (veh/h) 649 Future Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 In Grp Delay, s/veh 4.8 In Grp LOS A Approach Vol, veh/h 726 Approach LOS A	EBR 3 3 3 2 12 0 1.00	WBL 1 1 1 1 0 1.00 1.00 1863 2	WBT 1062 1062 6 0 1.00 1862	NBL 18 18 7 0 1 00	NBR 17 17 14				Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln	2 1774	0	0	36	0	0	0	0	
Movement EBT Lane Configurations ↑↑ Traffic Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A	EBR 3 3 3 12 0 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 2.12 1.00 1.0	WBL 1 1 1 0 1.00 1.00 1863 2	WBT 1062 1062 6 0 1.00 1862	NBL 18 18 7 0 1.00	NBR 7 17 17 14				Gro Sat Flow (s), veh/h/ln	1774	0	0	1774	~				
Lane Configurations ↑↑ Traffic Volume (veh/h) 649 Future Volume (veh/h) 649 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	7 3 3 12 0 1.00 1.00 1.00 1.00 1.00 3 1863 5 1 0.55 2 2	1 1 1 0 1.00 1.00 1863 2	↑↑ 1062 1062 6 0 1.00	18 18 18 7 0 1 00	ř 17 17 14						U	U	1//4	0	0	0	0	
Traffic Volume (veh/h) 649 Future Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Peacht Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A Approach LOS A	3 3 12 12 0 1.00 1.00 1.00 1.00 1.863 5 2 1 0.55 2	1 1 0 1.00 1.00 1863 2	1062 1062 6 0	18 18 7 0	17 17 14				Q Serve Time (g_s), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	
Future Volume (veh/h) 649 Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 2 Peak Hour Factor 0.90 2 0.90 Percent Heavy Veh, % 2 2 0pposing Right Turn Influence Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 1.07 2.00 In Grp Delay, s/veh 4.8 1.01 2.05 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A A A	3 12 0 1.00 1.00 1.00 1.863 5 2 1 0.55 2	1 1 0 1.00 1.00 1863 2	1062 6 0 1.00	18 7 0 1 00	17 14				Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	
Number 2 Initial Q, veh 0 Ped-Bike Adj (A_pbT) 100 Adj Sat Flow, veh/h/ln 1863 Adj Sat Flow, veh/h/ln 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8	2 12 0 0 1.00 1.00 1863 5 2 1 0.55 2 2	1 0 1.00 1.00 1863 2	6 0 1.00	7 0 1.00	14				Perm LT Sat Flow (s_I), veh/h/ln	725	0	0	1774	0	0	0	0	
Initial Q, veh 0 Ped-Bike Adj (A_pbT) 9 Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow, veh/h/In 1863 Adj Flow, veh/h/In 1863 Adj Flow, veh/h/In 1863 Adj Flow, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	0 1.00 1.00 1863 5 1863 5 1 0.55 2 2	0 1.00 1.00 1863 2	0	0	0				Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0	
Ped-Bike Adj (A_pbT) Parking Bus Adj 1.00 Adj Sat Flow, veh/h/ln 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A	1.00 1.00 1863 5 1 0.55 2	1.00 1.00 1863 2	1.00	1 00	U				Perm LT Eff Green (g_p), s	69.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Parking Bus Adj 1.00 Adj Sat Flow, veh/h/In 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence 2 Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Approach Vol, veh/h 726 Approach LOS A Approach LOS A	1.00 1863 5 1 0.55 2	1.00 1863 2	1.00	1.00	1.00				Perm LT Serve Time (g_u), s	61.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj Sat Flow, veh/h/in 1863 Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence Cap, veh/h Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A	1863 5 1 0.55 2	1863 2	1000	1.00	1.00				Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Adj Flow Rate, veh/h 721 Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence 2 Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	5 1 0.55 2	2	1003	1863	1863				Time to First Blk (g_f), s	0.0	67.8	0.0	0.0	0.0	0.0	0.0	0.0	
Adj No. of Lanes 2 Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A Approach LOS A	1 0.55 2		1207	36	39				Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Peak Hour Factor 0.90 Percent Heavy Veh, % 2 Opposing Right Turn Influence 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach LOS A	0.55 2	1	2	1	1				Prop LT Inside Lane (P_L)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Percent Heavy Veh, % 2 Opposing Right Turn Influence 2555 Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	2	0.54	0.88	0.50	0.44				Lane Grp Cap (c), veh/h	555	0	0	81	0	0	0	0	
Opposing Right Turn Influence Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A		2	2	2	2				V/C Ratio (X)	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	
Cap, veh/h 2555 HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A		Yes		Yes					Avail Cap (c_a), veh/h	775	0	0	377	0	0	0	0	
HCM Platoon Ratio 1.00 Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	1143	555	2907	81	72				Upstream Filter (I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	
Prop Arrive On Green 0.72 Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	1.00	1.00	1.00	1.00	1.00				Uniform Delay (d1), s/veh	3.4	0.0	0.0	43.7	0.0	0.0	0.0	0.0	
Ln Grp Delay, s/veh 4.8 Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	0.72	0.00	0.82	0.05	0.05				Incr Delay (d2), s/veh	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	
Ln Grp LOS A Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	3.7	3.4	2.7	47.5	50.0				Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Approach Vol, veh/h 726 Approach Delay, s/veh 4.8 Approach LOS A	A	Α	Α	D	D				Control Delay (d), s/veh	3.4	0.0	0.0	47.5	0.0	0.0	0.0	0.0	
Approach Delay, s/veh 4.8 Approach LOS A	i		1209	75					1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	
Approach LOS A			2.7	48.8					2nd-Term Q (Q2), veh/In	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
			А	D					3rd-Term Q (Q3), veh/In	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	0	2		-	0	7	0	%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
		2	3	4	5	0	1	0	%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
Assigned Phs	1	2		4		6			%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
	1.2	7.0		9.0	0	4.0			Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Phs Duration (G+Y+Rc), s	9.4	74.3		10.3	8	3.7			Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change Period (Y+Rc), s	9.0	6.5		6.0	0	0.5			Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max Green (Gmax), s	12.0	40.5		20.0	6	1.5			Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Max Allow Headway (MAH), s	3.0	4.7		4.0		4.7			Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0	
Max Q Clear (g_c+l1), s	2.0	8.7		4.3	1	0.7			Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Green Ext Time (g_e), s	0.0	15.7		0.1	1	8.9			Middle Lane Croup Date					_	_			
Prob of Phs Call (p_c)	0.05	1.00		0.86	1	.00			Middle Lane Group Data		0							
Prob of Max Out (p_x)	0.00	0.28		0.00	0	.11			Assigned Mvmt	0	2	0	4	0	6	0	0	
Left-Turn Movement Data									Lane Assignment	0		0	0	-		0	•	
Assigned Mymt	1	5		7					Lanes in Grp	0	2	0	0	0	2	0	0	
Mymt Sat Flow, yeh/h	1774	0		1774					Grp Vol (v), ven/h	0	721	0	0	0	1207	0	0	
		Ū							Grp Sat Flow (s), veh/h/ln	0	1//0	0	0	0	1//0	0	0	
Through Movement Data									Q Serve Time (g_s), s	0.0	6.7	0.0	0.0	0.0	8./	0.0	0.0	
Assigned Mvmt		2		4		6			Cycle Q Clear Time (g_c), s	0.0	b./	0.0	0.0	0.0	ŏ./	0.0	0.0	
Mvmt Sat Flow, veh/h		3632		0	36	532			Lane Grp Cap (c), veh/h	0	2555	0	0	0	2907	0	0	
Right-Turn Movement Data									V/C Ratio (X)	0.00	0.28	0.00	0.00	0.00	0.42	0.00	0.00	
Assigned Mymt		10	_	14		16		_	Avail Cap (c_a), veh/h	0	2555	0	0	0	2907	0	0	
Assigned WWIIL		1582		14		0			Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	
www.catriow, ven/n		1000		1000		U			Uniform Delay (d1), s/veh	0.0	4.6	0.0	0.0	0.0	2.3	0.0	0.0	
Left Lane Group Data									Incr Delay (d2), s/veh	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0	
Assigned Mymt	1	5	0	7	0	0	0	0	 Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Lane Assignment		5	-									~ -	~ -				~ ~	

VHB

Synchro 9 Report 2040 Build PM.syn

VHB

VHB

Synchro 9 Report

2040 Build PM.syn

2nd-Term Q (Q2), veh/In	
3rd-Term Q (Q3), veh/In	
%ile Back of Q Factor (f_B%)	
%ile Back of Q (50%), veh/In	
%ile Storage Ratio (RQ%)	
Initial Q (Qb), veh	
Final (Residual) Q (Qe), veh	
Sat Delay (ds), s/veh	
Sat Q (Qs), veh	
Sat Cap (cs), veh/h	
Initial Q Clear Time (tc), h	

Right Lane Group Data Assigned Mvmt Lane Assignment Lanes in Grp Grp Vol (v), veh/h Grp Sat Flow (s), veh/h/ln Q Serve Time (g_s), s Cycle Q Clear Time (g_c), s Prot RT Sat Flow (s_R), veh/h/ln Prot RT Eff Green (g_R), s Prop RT Outside Lane (P_R) Prop RT Outside Lane (P_R Lane Grp Cap (c), veh/h V/C Ratio (X) Avail Cap (c_a), veh/h Upstream Filter (I) Uniform Delay (d1), s/veh Incr Delay (d2), s/veh Initial Q Delay (d3), s/veh Control Delay (d1), s/veh 1st-Term Q (Q1), veh/ln 2nd-Term Q (Q2), veh/ln 3rd-Term Q (Q2), veh/ln %ile Back of Q Factor (f_B%) %ile Back of Q (50%), veh/ln %ile Storage Ratio (RQ%) Initial Q (Qb), veh Final (Residual) Q (Qe), veh Sat Delay (ds), s/veh Sat Q (Qs), veh Sat Cap (cs), veh/h Initial Q Clear Time (tc), h Intersection Summary

HCM 2010 LOS

HCM 2010 Ctrl Delay

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2040 Build PM

0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
0.0	3.3	0.0	0.0	0.0	4.2	0.0	0.0	
0.00	0.13	0.00	0.00	0.00	0.03	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0	40	0	- 44	0	40	0		
U	12 P	U	14 D	U	16	U	U	
0	- к 1	0	г. 1	0	0	0	0	
0	5	0	39	0	0	0	0	
0	1583	0	1583	0	0	0	0	
0.0	0.1	0.0	2.3	0.0	0.0	0.0	0.0	
0.0	0.1	0.0	2.3	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
0	1143	0	72	0	0	0	0	
0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	
0	1143	0	337	0	0	0	0	
0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	
0.0	3.6	0.0	43.9	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
0.0	3.7	0.0	50.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	
0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	
0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5.2							
	A							

Appendix E

CONTENTS

Signal Warrant Screening

Appendix E

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E.1 Existing Traffic Signal Warrant Screening

This report details the findings of a high level traffic signal warrant screening on the Route 460/Windsor Boulevard and Old Suffolk Road intersection, to determine whether a signal would be warranted for the existing conditions.

Evaluation of the need for a traffic signal at an intersection requires the examination of various factors such as traffic volumes, traffic flow and progression, and overall safety of the intersection to determine if a traffic signal would be warranted. Screening of the peak hour and four-hour volume checks for the existing conditions were included in this evaluation.

This traffic signal warrant screening includes high level signal warrant analysis.

E.1.1 Methodology

Signal warrant screening was performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD). Existing fourteen-hour turning movement counts were collected at the study intersection on Tuesday, May 16th, 2017 and were used for this high level signal warrant screening.

Warrant Analysis Results E.1.2

Warrant 2 – Four Hour Vehicular Volume E.1.2.1

Warrant 2, Four-Hour Vehicular Volume, is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. A traffic signal is warranted based on Warrant 2 if "the plotted points representing the vehicles per hour on the major street and the minor street fall above the applicable curve."

Considering 55 MPH posted speed limit on Route 460/Windsor Boulevard, Figure E-1 was used to screen warrant 2. The highest four-hour volumes were selected based on the minor street highest volumes recorded in fourteen-hour counts, then the major street both approaches volumes were calculated. The following table 2 represents the highest four-hour volumes that were used to screen this warrant.

Table E.1.

Existing Conditions - Four Hour Vehicular Volumes.

Time Period	Major Street Volumes (both approaches)	Minor Street Volume (Higher Volume Approach)
6:00-7:00 AM	964	99
4:00-5:00 PM	1291	59
5:00-6:00 PM	1370	65
6:00-7:00 PM	868	99

The plotted points represent vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only). The four highest hour volumes at the study intersection plotted on the following figure showed that only two points exceed the threshold of 80 vehicles per hour (VPH) for two or more lanes on major street and two and more lanes on minor street.

The plotted points represent vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only). Both morning and evening peak hour volumes fall below the curve for the geometric combination as shown in Figure E-2. Therefore, this warrant is not satisfied.

Warrant 2 is not satisfied.



approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Existing Conditions - Warrant 2 Summary.

Figure E.1.

E.1.1.2 Warrant 3 – Peak Hour

Warrant 3, Peak Hour, "is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street." The Peak Hour warrant is met when "the plotted point representing the vehicles per hour on the major street and the minor street for one hour fall above the applicable curve" or based on the following conditions:

- ♦ The total stopped time delay experienced by the traffic on one minorstreet approach controlled by a stop sign equals or exceeds: 4 vehiclehours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
- ♦ The volume on the same minor-street approach equals or exceeds 75 vehicles per hour for one lane or 100 vehicles per hour for two lanes, and
- The total entering volume during the hour meets or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

Considering 55 MPH posted speed limit on Route 460/Windsor Boulevard, Figure E-2 was used to screen warrant 3. The following Table E.2 represents peak hour volumes that were used to screen this warrant.

Figure E.2. Existing Conditions - Warrant 3 Summary.

E.1.3 Conclusions

Table E.2.

Time Pe

6:15-7:

4:45-5:

MINOR

HIGHER-

VOLUME

VPH

The performed high level signal warrant screening for the existing conditions at the intersection of Route 460/Windsor Boulevard and Old Suffolk Road showed that under existing conditions, the subject intersection does not meet two signal traffic warrants outlined by the MUTCD and used in this signal warrant screening:

Therefore, traffic signal installation is not recommended at the subject intersection based on the findings of the performed signal warrant screening.

Appendix E

Warrant 3 is not satisfied.

Existing Conditions - Peak Hour Volumes.

riod	Major Street Volumes (both approaches)	Minor Street Volume (Higher Volume Approach)
15	1042	92
45	1385	59



(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant 2 - Four-Hour Vehicular Volume - is not satisfied;

♦ Warrant 3 - Peak Hour - is not satisfied.

E.2 2040 Build Traffic Signal Warrant Screening

This report details the findings of a high level traffic signal warrant screening on the Route 460/Windsor Boulevard & Old Suffolk Road intersection, to determine whether a signal would be warranted in the future under 2040 Build conditions.

Evaluation of the need for a traffic signal at an intersection requires the examination of various factors such as traffic volumes, traffic flow and progression, and overall safety of the intersection to determine if a traffic signal would be warranted. Screening of the peak hour and four-hour volume checks for the 2040 Build conditions were included in this evaluation.

This traffic signal warrant screening includes high level signal warrant analysis.

E.2.1 Methodology

Signal warrant screening was performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD). Existing fourteen-hour turning movement counts were collected at the study intersection on Tuesday, May 16th, 2017. One percent (1%) growth rate was used for the major road (Route 460/Windsor Boulevard) and half of a percent (0.5%) growth rate was used for the minor street (Old Suffolk Road) to calculate future volumes to be used for this high level signal warrant screening.

E.2.2 Warrant Analysis Results

Warrant 2 – Four Hour Vehicular Volume E.2.2.1

Warrant 2, Four-Hour Vehicular Volume, is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. A traffic signal is warranted based on Warrant 2 if "the plotted points representing the vehicles per hour on the major street and the minor street fall above the applicable curve."

Considering 55 MPH posted speed limit on Route 460/Windsor Boulevard, Figure 4C-2 was used to screen warrant 2. The highest four-hour volumes were selected based on the minor street highest volumes recorded during fourteenhour counts, then the major street both approaches volumes were calculated. One percent growth rate was used on a major street and half percent growth rate was used on a minor street to calculate volumes for 2040 Build conditions for this signal warrant screening. The following table E.3. represents the highest four-hour volumes that were used to screen this warrant.

The plotted points represent vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only). The four highest hour volumes at the study intersection plotted on the following figure showed that only two points exceed the threshold of 80 vehicles per hour (VPH) for two or more lanes on major street and two and more lanes on minor street. Therefore, this warrant is not satisfied.

Warrant 2 is not satisfied.

Table E.3.

Existing Conditions - Four Hour Vehicular Volumes.

Time Peri	iod Ma	ajor Street Volumes both approaches)	Minor Street Volume (Higher Volume Approach)
6:00-7:00	AM	1212	111
4:00-5:00	PM	1623	66
5:00-6:00	PM	1722	73
6:00-7:00	PM	1091	124

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)





Existing Conditions - Warrant 2 Summary.

E.2.2.2 Warrant 3 – Peak Hour

Warrant 3, Peak Hour, "is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street." The Peak Hour warrant is met when "the plotted point representing the vehicles per hour on the major street and the minor street for one hour fall above the applicable curve" or based on the following conditions:

- ♦ The total stopped time delay experienced by the traffic on one minorstreet approach controlled by a stop sign equals or exceeds: 4 vehiclehours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
- ♦ The volume on the same minor-street approach equals or exceeds 75 vehicles per hour for one lane or 100 vehicles per hour for two lanes, and
- The total entering volume during the hour meets or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

Considering 55 MPH posted speed limit on US 460/Windsor Boulevard, Figure E.3. was used to screen warrant 3. Existing peak hour volumes were used to calculated projected 2040 Build scenario volumes with added one percent (1%) growth rate on the major street (Route 460/Burden Boulevard) and half percent (0.5%) growth rate on the minor street (Old Suffolk Road). The following table E.4. represents peak hour volumes that were used to screen this warrant.

The plotted points represent vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only). Morning peak hour volume falls above the curve, while evening peak hour volume falls below the curve for the geometric combination as shown in Figure E.4. Therefore, this warrant is not satisfied.

Table E.4.

Time Period
6:15-7:15
4:45-5:45



Figure E.4. Existing Conditions - Warrant 3 Summary.

E.2.3 Conclusions

The performed high level signal warrant screening for the 2040 Build conditions at the intersection of US 460/Windsor Boulevard and Old Suffolk Road showed that if traffic growth happens as projected, the subject intersection does not meet two signal traffic warrants outlined by the MUTCD and used in this signal warrant screening:

Therefore, traffic signal installation is not recommended at the subject intersection based on the findings of the performed signal warrant screening.

Warrant 3 is not satisfied.

Minor Street Volume Major Street Volumes (Higher Volume (both approaches) Approach) 1310 103 1741 66

Existing Conditions - Peak Hour Vehicular Volumes.

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



♦ Warrant 2 - Four-Hour Vehicular Volume - is not satisfied;

Warrant 3 - Peak Hour - is not satisfied.

Appendix F

CONTENTS

Growth Rate



YEAR 2009



Appendix F

YEAR 2040

Appendix F



Appendix G

CONTENTS

HSM Extended Spreadsheet

Appendix G

		PROJECT SAFETY PERFORMANCE SUMMARY REPORT
General Information		
Project Name	U.S. Route 460 Safety Study	
Project Description	Corridor Safety Analysis	
Reference Number	39955.29	
Analyst	Christine Braden	
Agency/Company	VHB, Inc.	
Contact Email	cbraden@vhb.com	
Contact Phone	757-233-3227	
Date Completed	01/24/18	Years of crash data incorporated into the analysis: 0
PROJECT SUMMARY		



		Total Crashes/yr (KABCO)		Fata	l and Injury Crash (KABC)	es/yr	Property	y Damage Only Cr (PDO)	ashes/yr
Project Element	Predicted average crash frequency N _{predicted (KABCO)}	Expected average crash frequency N _{expected (KABCO)}	Potential for Improvement	Predicted average crash frequency N _{predicted (KABC)}	Expected average crash frequency N _{expected (KABC)}	Potential for Improvement	Predicted average crash frequency N _{predicted (O)}	Expected average crash frequency N _{expected (O)}	Potential for Improvement
INDIVIDUAL SEGMENTS									
Segment 1	2.0	0.5	0.0	1.1	0.3	0.0	0.9	0.2	0.0
Segment 2	7.6	1.5	0.0	4.2	0.8	0.0	3.4	0.7	0.0
Segment 3	5.3	0.5	0.0	2.9	0.3	0.0	2.4	0.2	0.0
Segment 4	5.3	2.3	0.0	3.0	1.3	0.0	2.3	1.0	0.0
Segment 5	5.0	1.6	0.0	2.9	0.9	0.0	2.2	0.7	0.0
Segment 6	8.2	5.0	0.0	4.7	2.9	0.0	3.5	2.1	0.0
Segment 7	4.7	3.0	0.0	2.7	1.7	0.0	2.0	1.3	0.0
Segment 8	17.3	10.5	0.0	9.9	6.0	0.0	7.4	4.5	0.0
Segment 9	5.6	3.5	0.0	3.2	2.0	0.0	2.4	1.5	0.0
INDIVIDUAL INTERSECTIONS									
Intersection 1	13.8	1.8	0.0	6.0	0.8	0.0	7.8	1.0	0.0
Intersection 2	15.3	2.6	0.0	6.5	1.1	0.0	8.8	1.5	0.0
Intersection 3	20.9	5.3	0.0	8.0	2.0	0.0	12.9	3.3	0.0
Intersection 4	16.3	2.6	0.0	6.8	1.1	0.0	9.6	1.5	0.0
Intersection 5	1.8	3.4	1.6	0.7	1.3	0.6	1.1	2.1	1.0
Intersection 6	2.2	1.5	0.0	1.0	0.7	0.0	1.2	0.8	0.0
Intersection 7	3.3	4.1	0.8	1.5	1.8	0.4	1.8	2.3	0.5
Intersection 8	2.9	1.2	0.0	1.1	0.5	0.0	1.8	0.8	0.0
Intersection 9	8.2	1.0	0.0	3.9	0.5	0.0	4.3	0.5	0.0
COMBINED (sum of column)	145.8	52.0	0.0	70.1	26.0	0.0	75 7	26.1	0.0

PROJECT SUMMARY -- Site-Specific EB Method Summary Results for Rural Multilane Roads

Crash severity level	N predicted(PROJECT) Predicted average crash frequency - Average safety performance of projects	N expected (PROJECT) Expected average crash frequency - Actual long-term safety	N potential for improvement (PROJECT) Potential for Safety Improvement
	consisting of similar elements (anticipated average crashes/yr)	(anticipated average crashes/yr)	(anticipated average crashes/yr)
Fatal and injury (KABC)	70.1	26.0	N/A
Property damage only (PDO)	75.7	26.1	N/A
Total (KABCO)	145.8	52.0	N/A

HSM1 Extended Spreadsheet for Part C Chapter 11 v.9.1

Discussion of Results

Given the potential effects of project characteristics on safety performance, results indicate that: 1. It is anticipated that the project will, on average, experience 52 crashes per year (26 fatal and injury crashes per year; and 26.1 property damage only crashes per year).

2. A similar project is anticipated, on average, to experience 145.8 crashes per year (70.1 fatal and injury crashes per year; and 75.7 property damage only crashes per year).

Federal law 23 USC § 409 prohibits the discovery or admission into evidence of "reports, surveys, schedules, lists, or data" compiled or collected for the purpose of highway safety improvement projects that might qualify for federal safety improvement funding.

NOTE: Northfield Drive intersection and Dominion Way intersections are 3-leg signalized intersections and are currently modeled as a 4-leg signalized intersection, HSM does not have an SPF for 3-leg signalized.

Appendix G

ROUTE 460 SAFETY AND OPERATIONS STUDY | G-3

Appendix G



Appendix H

CONTENTS Site Specific Cost Appendix H

Site Specific Cost Estimate.

		Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7	Location 8	Location 9	Location 10	Location 11
	Signage		\$803		\$503							
	Pavement Markings	\$11,909	\$14,006	\$13,522	\$19,612	\$7,541						
Tier	Signal	\$792	\$792	\$792	\$792							
	Other	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$166	\$332	\$166	\$166
	Total	\$12,867	\$15,767	\$14,480	\$21,073	\$7,707	\$166	\$166	\$166	\$332	\$166	\$166
	Signage	\$500	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660	\$660
	Pavement Markings	\$1,016	\$964	\$871	\$554	\$7,541						
ierz	Signal			\$2,600	\$2,600							
F	Other											
	Total	\$1,516	\$1,624	\$4,131	\$3,814	\$8,201	\$660	\$660	\$660	\$660	\$660	\$660
	Signage			\$7,920	\$7,920	\$7,920			\$7,920			
	Pavement Markings					\$832						
	Signal											
	Other			\$15,000	\$600			\$5,280				
	Mill and Overlay*	\$562,800	\$609,000	\$504,000	\$634,200	\$168,000						
	Install Turn Lane(s)					\$179,000		\$236,000	\$358,000			
ier 3	Install Acceleration Lane(s)					\$203,000		\$203,000	\$507,500		\$812,000	\$406,000
⊢	Pave Driveway Apron						\$6,000		\$23,000	\$12,000		
	Roadway Lighting	\$20,000				\$20,000						
	Widen Shoulder & Add Guardrail					\$52,026						
	Widen Shoulder	\$52,034					\$104,068			\$104,068		
	Realign Intersection							\$154,532				
	Total	\$634,834	\$609,000	\$526,920	\$642,720	\$630,778	\$110,068	\$598,812	\$896,420	\$116,068	\$812,000	\$406,000

Note: 1) Systemic improvements from the templates are not included separately in this estimate. They are accounted for in the systemic cost estimate.

2) Right of way and utility relocations are not included in these estimates.

3) Full depth pavement replacement may be necessary, but is not included in the cost.

*Does not include new pavement markings - those are accounted for above in Tier 1 and Tier 2.

Appendix H

Appendix H

Appendix I

CONTENTS

Long Term Cost Estimate





Pay Items Unit TONS 16,080 8.0 TONS 16,080 ASPHALT PAVEMENT - 9" (Widen EB and WB lanes 5' to accon AGGREGATE BASE - 10" (Widen EB and WB Shoulder to TONS 16,080 AGGREGATE BASE - 12"(Widen EB and WB lanes 5' to accommodate median barrie TONS 16,080 8,040 MEDIAN BARRIER (MB-LF IMPACT ATTENUATOR (TL EA EXCAVATION (For roadway construction CY 16.080 SELECT MATERIAL (Roadside fill and dir 16,080 CY SAW (LF 16.080 DEMOLITION OF PAVEMEN SY 16,080 1.0 4" YELLOW PAVEMENT MARKING LINE (So LF 16,080 4" WHITE PAVEMENT MARKING LINE (So 16,080 4" WHITE PAVEMENT MARKING LINE (Dasi LF 16.080 ERADICATION OF PAVEMENT MARKING LF 16,080 2" TOPSOIL (Sideslop 16,080 ACRE CLEAR ACRE 1,350 SIGNAL SYSTEM (Shirley Holland Commerce Pa EA STORMWATER MANAGEMENT (Approx. 5 acres of additional impervio LS



Project #	39955.29
Sheet:	2 of 6
Date:	4/30/2018
Date:	

Computations				
	Project: Location:	US 460 Safety Study Isle of White, VA	Project # Sheet:	39955.29 3 of 6
	Calculated by:	BEM	Date:	4/30/2018
- juhh	Checked by:		Date:	
	Title:	Planning Level Cost Estimates		

		Alte	rnative 3								
	Constr	uct VDOT	GS-1 Typ	ical Secti	on						
Assumptions: 4,040' of new roadway construction, 4 lane divided w/ 0' depressed median, 12' lanes, 4' left shoulder, and ' right shoulder from Lovers Ln to Suffolk City line. " asphalt pavement depth, 10" aggregate base (right houlders) " asphalt pavement depth, 12" aggregate base (travel ane, left shoulder) Remove entire existing roadway tural principal arterial functional classification bitched roadway section Jitlity relocation cost have been captured in this estimate ROW cost have not been captured in this estimate		Suny ROJECT AR	LEIP-SAWUIght	Suffolk	Newport News	Poqueser	en Norfolk tt)		Urginib Bea		
sy flame	Linit	Length (ft)	Width (ft)	Denth (ft)	Fector	% Occurring	Quantity	-	Unit Cost	TOTA	1
ASPHALT PAVEMENT - 6" (8' right shoulders	TONS	16,080	8.0	0.50	0.07407	70 Goodining	4,764	\$	90.00	\$ 4	428,800
ASPHALT PAVEMENT - 9" (28' travels lanes and left shoulders	TONS	16,080	28.0	0.75	0.07407		25,013	\$	90.00	\$2,3	251,200
AGGREGATE BASE - 10" (8' right shoulders	TONS	16,080	8.0	0.83	0.07407		7,941	\$	42.00	\$: \$:1/	333,511
MEDIAN CROSSOVER	EA	-	-	-	-		4	\$	18,000.00	\$ 1,-	72,000
RIGHT TURN LANE	EA	-	-	-	-		3	\$	45,000.00	\$	135,000
LEFT TURN LANE (Single) EA	-	-	-			3	\$	50,000.00	\$	150,000
EXCAVATION (For roadway construction	CY	16,080	28.0	1.50	0.03704		25,013	\$	30.00	\$	750,400
EXCAVATION (Median) CY	8,040	40.0	3.50	0.03704		20,844	\$	31.00	\$ (546,178
SELECT MATERIAL (Roadside fill and ditch	CY CY	16,080	5.0	1.00	0.03704		2,978	\$	70.00	\$ 1	208,444
DEMOLITION OF PAVEMENT (5 lane section DEMOLITION OF PAVEMENT (4 lane section	SY SY	2,720	48.0	-	0.11111		35,467	\$	7.00	\$	101.547
OBSCURING ROADWAY (5 lane section) UNIT	5,320	60.0	-	0.00100		319	\$	300.00	\$	95,760
OBSCURING ROADWAY (4 lane section) UNIT	2,720	48.0	-	0.00100		131	\$	300.00	\$	39,168
4" YELLOW PAVEMENT MARKING LINE (Solid		16,080	-	-	1		16,080	\$	1.50	\$	24,120
4" WHITE PAVEMENT MARKING LINE (Solid 4" WHITE PAVEMENT MARKING LINE (Dashed		16,080	-	-	1	25%	4 020	\$	1.50	۵ ۶	6 030
2" TOPSOIL (Sideslope) ACRE	16,080	10	-	0.00002		3.69	\$	32,000.00	\$	118,127
2" TOPSOIL (Median) ACRE	8,040	40	-	0.00002		7.38	\$	32,000.00	\$ 2	236,253
	ACRE	1,350	20	-	0.00002		0.62	\$	40,000.00	\$	24,793
SIGNAL SYSTEM (Shirley Holland Commerce Park DRAINAGE (Structures and pipes	LA IS	-	-	-	-		1.00	\$	88.000 00	⊳ (\$	88,000
STORMWATER MANAGEMENT (Approx. 3 acres of additional impervious	LS	-	-	-	-		1	\$	400,000.00	\$4	400,000
					SL	JBTOTAL A	-			\$ 8,4	46,998
	er.							-			
PRIVATE UTILITY RELOCATION (From PCES) LS	-	-	-	-		1	\$	656,937.00	\$ (-
					SL	JBTOTAL B			1	\$ 6	56,937
						TAL A				t 400	240.01
			MAINTENANC	E OF TRAFFIC 5	% SUBTOTAL A						,349.91
			MISCELLANEO	DUS ITEMS 25%	SUBTOTAL A					\$ 2,111	,749.56
		-		SUBTOTAL	. C (Excludes	Subtotal B)		_	:	\$ 11,4	03,448
TOTAL COST											
			MOBILIZATION		LC D/Evolution	Oubtatel D			-	5 1,140	,344.76
				SUBIDIAL	. D (EXCIUDES	SUDIOTAI B)			8	12,5	13,792
			CONST. FNG	13.25% & CONT	IG. 10% SUBTOTA	LD			9	5 2 947	.791.20
• • • • • • •				SUBTOTAL	. E (Excludes	Subtotal B)				\$ 15.4	91,584
S 17 850 (000										
Ψ 17,000,			PRELIMINARY	ENGINEERING	13.5% SUBTOTAL I	D				\$ 1,693	,411.97
• • • • • • • • • • • • • • • • • • • •			PRELIMINARY GRAND	TOTAL CC	13.5% SUBTOTAL I OST (Includes	∍ Subtotal B)					\$ 1,693 \$ 17,8

Computations Project: US 460 Safety Study Location: Suffolk, VA Calculated by: BEM Checked by: Title: Planning Level Cost Estimates Alternative 1 Widening of both east and westbound shoulders to 8' Assumptions: $25,580^{\prime}$ of widening paved shoulder 8' , from Suffolk City line to Northfield Dr. 6" asphalt pavement depth, 10" aggregate base Rural principal arterial functional classification Ditched roadway section No milling of adjacent lane Utility relocation cost have been captured in this estimate ROW cost have not been captured in this estimate
 Unit
 Length (ft)
 Width (ft)
 Depth (ft)
 Factor
 % Occurring
 Quentity
 Unit Cost

 TONS
 51,160
 9.0
 0.50
 0.07407
 17.053
 \$ 90.0
 LT PAVEMENT - 6" (Widen EB and WB S TONS 51,160 9.0 AGGREGATE BASE - 10" (Widen EB and WB Shoulder to TONS 51,160 9.0 EXCAVATION (For Roadway Constru CY 51,160 9.0 SELECT MATERIAL (Roadside fill and d CY 51,160 5.0 SAW C LF 51,160 DEMOLITION OF PAVEM SY 51,160 1.0 4" YELLOW PAVEMENT MARKING LINE (S 51,160 4" WHITE PAVEMENT MARKING LINE (S LF 51 160 4" WHITE PAVEMENT MARKING LINE (Das LF 51,160 2" TOPSOIL (Sides ACRE 51,160 10 CLEA ACRE 1,250 8 STORMWATER MANAGEMENT (Approx. 9.5 acres of additional imp LS PUBLIC UTILITY RELOCATION (From PC LS ROW & Utilities PRIVATE UTILITY RELOCATION (From PC EROSION MAINTENA MISCELLA

MOBILIZAT CONST. EN TOTAL COST 21,460,000 \$ PRELIMINA GRAN TOTAL

	0.50	0.07407		17,053	\$ 90.00	\$	1,534,800
	0.83	0.07407		28,422	\$ 42.00	\$	1,193,733
	1.17	0.03704		19,896	\$ 30.00	\$	596,867
	1.00	0.03704		9,474	\$ 70.00	\$	663,185
	-	-		51,160	\$ 3.00	\$	153,480
	-	0.11111		5,684	\$ 6.00	\$	34,107
	-	1		51,160	\$ 1.50	\$	76,740
	-	1		51,160	\$ 1.50	\$	76,740
	-	1	25%	12,790	\$ 1.50	\$	19,185
	-	0.00002		11.74	\$ 32,000.00	\$	375,831
	-	0.00002		0.23	\$ 40,000.00	\$	9,183
	-	-		1	\$ 1,500,000.00	\$	1,500,000
	-	-	-	1	\$ 2,819,231.00	\$	2,819,231
		SL	IBTOTAL A			\$	9,053,082
	-	-	-	-	\$ -		
	-		-	1	\$ 3,010,961.00	\$	3,010,961
							2 212 224
		30	BIUIALB			\$	3,010,961
	SEDIMENT COM	VTROL 5% SUBTOT				۶ ۶	452,654.08
ANE	SEDIMENT CON	NTROL 5% SUBTOT % SUBTOTAL A				s s	452,654.08 452,654.08
ANC ANC	SEDIMENT CON E OF TRAFFIC 54 DUS ITEMS 25%	NTROL 5% SUBTOT % SUBTOTAL A SUBTOTAL A	AL A			\$ \$ \$ \$	452,654.08 452,654.08 2,263,270.41
ANE ANC	D SEDIMENT COP E OF TRAFFIC 5° DUS ITEMS 25% : SUBTOTAL	NTROL 5% SUBTOT % SUBTOTAL A SUBTOTAL A C (Excludes	TAL A Subtotal B)			\$ \$ \$ \$	452,654.08 452,654.08 2,263,270.41 12,221,660
	D SEDIMENT COP E OF TRAFFIC 5° DUS ITEMS 25% 3 SUBTOTAL	NTROL 5% SUBTOT % SUBTOTAL A SUBTOTAL A C (Excludes	Subtotal B)			⇒ S S S S	452,654.08 452,654.08 2,263,270.41 12,221,660
	SEDIMENT COM E OF TRAFFIC 5 SUBTOTAL SUBTOTAL	NTROL 5% SUBTOT & SUBTOTAL A SUBTOTAL A C (Excludes LC D (Excludes	Subtotal B)			\$ \$ \$ \$ \$	452,654.08 452,654.08 2,263,270.41 12,221,660 1,222,166.02 13,443,826
	D SEDIMENT CO E OF TRAFFIC 5' JUS ITEMS 25% : SUBTOTAL I 10% SUBTOTAL SUBTOTAL	NTROL 5% SUBTOT % SUBTOTAL A SUBTOTAL A C (Excludes LC D (Excludes	ALA Subtotal B) Subtotal B)			\$ \$ \$ \$ \$	452,654.08 452,654.08 2,263,270.41 12,222,166.02 1,222,166.02 13,443,826
ANE ANC ANEC	D SEDIMENT COM E OF TRAFFIC 5' JUS ITEMS 25% : SUBTOTAL I 10% SUBTOTAL SUBTOTAL	NTROL 5% SUBTOTAL A % SUBTOTAL A C (Excludes - LC D (Excludes - D (Excludes -	Subtotal B)			> S S S S S S S S S S S	452,654.08 452,654.08 2,263,270.41 12,222,166.02 13,443,826 3,024,860.90
ANE ANC ANEC	D SEDIMENT CON E OF TRAFFIC 5' DUS ITEMS 25% SUBTOTAL I 10% SUBTOTAL SUBTOTAL 12.5% & CONTIC SUBTOTAL	NTROL 5% SUBTOTAL A SUBTOTAL A C (Excludes C (Excludes D (Excludes 3. 10% SUBTOTAL E (Excludes	Subtotal B)			\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	452,654.08 452,654.08 2,263,270.41 12,222,166.02 13,443,826 3,024,860.90 16,468,687
ANE ANC ANEC TION	SEDIMENT COM E OF TRAFFIC 5' DUS ITEMS 25% SUBTOTAL I 10% SUBTOTAL SUBTOTAL 12.5% & CONTIC SUBTOTAL ENGINEERING	NTROL 5% SUBTOTAL A SUBTOTAL A C (Excludes C (Excludes D (Excludes 3. 10% SUBTOTAL E (Excludes 12% SUBTOTAL D	Subtotal B) Subtotal B) Subtotal B) Subtotal B)			> S S S S S S S S S S S S S S	452,654.08 452,654.08 2,263,270.41 12,221,660 1,222,166.02 13,443,828 3,024,860.90 16,468,687 1,976,242.45
	SEDIMENT COM E OF TRAFFIC 5' JUS ITEMS 25% I SUBTOTAL I 10% SUBTOTAL SUBTOTAL I 2.5% & CONTIC SUBTOTAL ENGINEERING TOTAL CO	VIROL 5% SUBTOTAL A SUBTOTAL A C (Excludes D (Excludes S. 10% SUBTOTAL E (Excludes 12% SUBTOTAL D ST (Includes	ALA Subtotal B) Subtotal B) Subtotal B) Subtotal B)			> S S S S S S S S S S S S S S S S S S S	452,654.08 452,654.08 2,263,270.41 12,221,660 1,222,166.02 13,443,826 3,024,860.90 16,468,687 1,976,242,45 21,456,000



Project #	39955.29
Sheet:	4 of 6
Date:	4/30/2018
Date:	

Computations									
	Project:	US 460 Safety S	Study			Project #	39955.29		
	Calculated by:	BEM				Date:	7/15/2018		
vhb.	Checked by: Title:	Planning Level	Cost Estimates			Date:			
		Alterna	tive 2						
Widening of both east and wes	tbound lar	nes to 11',	shoulder	s to 8', and	d Installatio	on of Medi	an Barrier		
Assumptions:	10	1	\mathcal{I}	X		Mar Sta			
25,580' of widening paved shoulder to 8' in EB and WB directions, from Suffolk City line to Northfield Dr.		Surry	{ کې	R		Jacob Contraction			é
6" asphalt pavement depth, 10" aggregate base (Shoulders)					Newport	F			
25,580' of widening roadway by 5' in EB and WB direction to accommodate concrete median barrier, from Suffolk City	SES.			m	5 2	hampu	J		
line to Northfield Dr. 9" asphalt pavement depth, 12" aggregate base (travel lane)					ALL I	×_1	Norfolk		
Rural principal arterial functional classification		3	sle of Wight		YZ C	Jon Z	174 ×	R AN	T.
Existing lane widths are 11' (no widening of lanes)	E AF	5				3.37-7	h	7	
No milling of adjacent lane Utility relocation cost have been captured in this estimate	1	400				Portsmot		Virginia B	each
ROW cost have <u>not</u> been captured in this estimate	کم ا		ΔT	CHAN SI	and and and	Sec. 1		A	N. T
	J.		<u>s</u>	uffolk		17	Martin N		9. × 12
	2	1.00	58	" And		Ches	sapeake		
	Y							Sylan	14
	T				D			•	TE MILES
Construction	Unit	Length (ft)	Width (ft)	Depth (ft)	Factor	% Occurring	Quantity	Unit Cost	TOTAL
ASPHALT PAVEMENT - 5' (Widen EB and WB Shoulder to 8' ASPHALT PAVEMENT - 9" (Widen EB and WB lanes 5' to accommodate median barrier	TONS	51,160	6.0	0.50	0.07407		15, 159	\$ 90.00 \$ 90.00	\$ 1,364,26 \$ 1,534,80
AGGREGATE BASE - 10" (Widen EB and WB Shoulder to 8" AGGREGATE BASE - 12" (Widen EB and WB lanes 5' to accommodate median barrie	TONS	51,160 51,160	8.0	0.83	0.07407		25,264 22,738	\$ 42.00 \$ 42.00	\$ 1,061,09 \$ 954.98
MEDIAN BARRIER (MB-7D)	LF	25,580	-	-	-		25,580	\$ 75.00	\$ 1,918,50
IMPACT ATTENUATOR (TL-3) EXCAVATION (For roadway construction	EA CY	- 51,160	- 9.0	- 1.17	- 0.03704		50 19,896	\$ 12,000.00 \$ 30.00	\$ 600,00 \$ 596,86
SELECT MATERIAL (Roadside fill and ditch	CY	51,160	5.0	1.00	0.03704		9,474	\$ 70.00	\$ 663,18
SAW CUT DEMOLITION OF PAVEMENT	LF SY	51,160 51,160	- 1.0	-	- 0.11111		51,160 5,684	\$ 3.00 \$ 6.00	\$ 153,48 \$ 34,10
4" YELLOW PAVEMENT MARKING LINE (Solid	LF	51,160	-	-	1		51,160	\$ 1.50	\$ 76,74
4" WHITE PAVEMENT MARKING LINE (Solid 4" WHITE PAVEMENT MARKING LINE (Dashed	LF	51,160 51,160	-	-	1	25%	51,160 12 790	\$ 1.50 \$ 1.50	\$ 76,74 \$ 19.18
		51,100	-		3	2070	153 /80	a 0.75	\$ 115.11
ERADICATION OF FAVEMENT MARKINGS	LF	51,100	-		0		155,400	\$ 0.75	÷ 115,11
	ACRE	51,160	10	-	0.00002		11.74	\$ 0.75 \$ 32,000.00	\$ 375,83
ENDICATION OF ENVENIENT MARKINGS 2" TOPSOIL (Side slope CLEARING SIGNAL SYSTEM (Rob's Dr, Lake Prince Dr	ACRE ACRE EA	51,160 51,250	- 10 8 -	-	0.00002	_	11.74 0.23 2.00	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00	\$ 375,83 \$ 9,18 \$ 1,200,00
2 "YOPSOIL (Side slope CLEARING SIGNAL SYSTEM (Rob's Dr, Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious	ACRE ACRE EA LS	51,160 1,250 -	- 10 8 - -	-	0.00002 0.00002 - -	-	11.74 0.23 2.00 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00	\$ 375,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00
ENGLIGATION OF PAREMENT MARKINGS 2° TOPSOIL (Side slope CLEARING SIGNAL SYSTEM (Rob's Dr., Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS	51,160 1,250 - - -	- 10 8 - - -	- - - -	0.00002 0.00002 - - - -		11.74 0.23 2.00 1 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00 \$ 2,819,231.00	\$ 375,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00 \$ 2,819,23 \$ 15,573,300
2* TOPSOIL SITE AVAILABLE 2* TOPSOIL (Side signal SIGNAL SYSTEM (Rob's Dr., Lake Prince Dr. STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES RCW & Utilities	LF ACRE ACRE EA LS LS	51,160 51,160 1,250 - - -	- 10 8 - -	-	0.00002 0.00002 - - - SI	JBTOTAL A	11.74 0.23 2.00 1 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00 \$ 2,819,231.00	\$ 375,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00 \$ 2,819,23 \$ 15,573,308
CERALICATION OF PAVENIENT INMANING 2" TOPSOIL (Side slope CLEARING SIGNAL SYSTEM (Rob's Dr., Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE EA LS LS LS LS	51,160 51,160 1,250 - - -	- 10 8 - - - -		0.00002 0.00002 - - - SI	JBTOTAL A	11.74 0.23 2.00 1 1 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00 \$ 2,819,231.00 \$ 3,010.961.00	\$ 375,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00 \$ 2,819,23 \$ 15,573,308 \$ 3,010,96
CERUICATION OF PARENERI I MARAINAS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Robs Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS LS	51,160 51,160 1,250 - - - - -	- 10 8 - - - -	- - - - - -	0.00002 0.00002 - - - SI - - -	JBTOTAL A	10,400 0.23 2.00 1 1 1 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00 \$ 2,819,231.00 - - \$ 3,010,961.00	\$ 3,010,961 \$ 3,010,910 \$ 3,010,910 \$ 3,010,910 \$ 3,010,910 \$ 3,010,910 \$ 3,010,910 \$ 3,010,910 \$ 3,0
2* TOPSOIL (Side signed 2* TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Robs Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities ROW & Utilities	LF ACRE ACRE EA LS LS LS LS LS	51,160 51,250 - - - - -	- 10 8 - - -	- - - - - -	0.00002 0.00002 - - - - St	JBTOTAL A	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 32,000.00 \$ 40,000.00 \$ 2,000,000.00 \$ 2,819,231.00 \$ 3,010,961.00	\$ 3,010,96
CLAURICATION OF PARENERI IN MARKINGS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS LS	51,160 1,250 - - -	- 10 8 - - - - - -		0.00002 0.00002 - - - - SI - - SI	JBTOTAL A	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 32,000,00 \$ 40,000,00 \$ 2,000,000,00 \$ 2,000,000,00 \$ 2,819,231,00 \$ 3,010,961,00	\$ 775,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00 \$ 2,819,23 \$ 15,573,300 \$ 3,010,96 \$ 3,010,96
CLEARING OF PARENERI I MARANAGE 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS LS	51,160 1,250 - - - -	- 10 8 - - - - - - - MAINTENANCI MISCELLANEC	O SEDIMENT COI O F TRAFFIC 5'	0.00002 0.00002 - - - - - SI - - - - - - - - - - - - -	JBTOTAL A JBTOTAL B	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 32,000,00 \$ 40,000,00 \$ 2,000,000,00 \$ 2,819,231,00 \$ 3,010,961,00	3 375,83 \$ 375,83 \$ 9,18 \$ 1,200,00 \$ 2,000,00 \$ 2,819,23 \$ 15,573,300 \$ 3,010,96 \$ 3,010,966 \$ 778,665,4 \$ 3,883,326,9
CLEARING CONCENTENT INMANINGS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS	51,160 1,250 - - - -		SEDIMENT COI OF TRAFFIC 5' OUS ITEMS 25% SUBTOTAL	0.00002 0.00002 - - - SI - - SI NTROL 5% SUBTO % SUBTOTAL A SUBTOTAL A C (Excludes	JBTOTAL A JBTOTAL B JBTOTAL B JALA Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 22,000,00 \$ 40,000,00 \$ 2,000,000,00 \$ 2,000,000,00 \$ 2,819,231,00 \$ 3,010,961,00	5 778,665.4 5 778,665.4 5 3,010,96 5 3,010,96 5 778,665.4 5 778,665.4 5 778,665.4 5 3,893,326.9 5 21,023,966
EPOLICATION OF PAVENIENT IMMANINGS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS LS	51,160 1,250 - - - - -	- 10 10 8 		0.00002 0.00002 - - - - - - SI - - - - SI - - - - - SI - - - -	JBTOTAL A JBTOTAL B JBTOTAL B JBTOTAL B Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 22,000,00 \$ 40,000.00 \$ 2000,000.00 \$ 2,819,231.00 - \$ 3,010,961.00	5 778,665,4 5 778,665,4 5 778,665,4 5 778,665,4 5 778,665,4 5 78,665,4 5 78,665,4 5 3,893,326,9 5 2,102,396,5 5 2,102
EPOLICATION OF PAVENIENT IMMANINGS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS	51,160 1,250 - - - -	- 10 10 8 	SEDIMENT COL SEDIMENT COL SUBTOTAL	0.00002 0.00002 - - - - SI - - SI NTROL 5% SUBTO % SUBTOTAL A SUBTOTAL A SUBTOTAL A C (Excludes L C D (Excludes	JBTOTAL A JBTOTAL B JBTOTAL B Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 22,000,00 \$ 40,000.00 \$ 600,000.00 \$ 2,000,000.00 \$ 2,819,231.00 - \$ 3,010,961.00	5 778,665,4 5 778,665,4 5 778,665,4 5 778,665,4 5 778,665,4 5 78,665,4 5 2,102,396,5 5 2,
EPOLICATION OF PAVENIENT IMMANINAS 2" TOPSOIL (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS	51,160 1,250 - - - - -	- 10 10 8 	SEDIMENT COL CONTRACTICS SUBTOTAL 10% SUBTOTAL SUBTOTAL	0.0002 0.0002 - - - - - - - SI - - - - SI - - - - - SI - - - -	JBTOTAL A JBTOTAL B JBTOTAL B Subtotal B)	11.74 0.23 2.00 1 1 1	\$ 0.75 \$ 32,000,00 \$ 40,000,00 \$ 600,000,00 \$ 2,000,000,00 \$ 2,819,231,00 - \$ 3,010,961,00	5 778,665,4 5 778,665,4 5 2,000,00 5 2,819,23 5 15,573,308 5 3,010,96 5 3,010,96 5 778,665,4 5 778,665,4 5 3,893,326,9 5 2,102,396,5 5 2,102,396,
EPAGLICATION OF PAYLEMENT MANANINGS 2" TOPSOLI (Side single CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS LS	51,160 1,250 - - - - -	- 10 10 8 		0.00002 0.00002 - - - - SI - - SI NTROL 5% SUBTOTAL A SUBTOTAL A SUBTOTAL A C (Excludes L C D (Excludes 3.10% SUBTOTAL	JBTOTAL A JBTOTAL B JBTOTAL B Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 22,000,00 \$ 40,000,00 \$ 2000,000,00 \$ 2,000,000,00 \$ 2,819,231,00 - \$ 3,010,961,00	5 778,665.4 5 778,665.4 5 778,665.4 5 778,665.4 5 778,665.4 5 778,665.4 5 2,102,396.5 5 2,203,431.5 5 2
EPAULICATION OF PAVELIENT MANARAGE 2" TOPSOLI (Side signed CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Prince Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES PRIVATE UTILITY RELOCATION (From PCES	LF ACRE ACRE EA LS LS LS LS	51,160 1,250 - - - -	- 10 10 8 		0.00002 0.00002 - - - - - - - - - - SI NTROL 5% SUBTOTAL A SUBTOTAL A SUBTOTAL A C (Excludes L C D (Excludes 3.10% SUBTOTAL	JBTOTAL A JBTOTAL B JBTOTAL B Subtotal B) Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 22,000,00 \$ 40,000.00 \$ 2000,000.00 \$ 2,000,000.00 \$ 2,819,231.00 - \$ 3,010,961.00	5 778,655,4 5 3,010,96 5 2,819,23 5 3,010,96 5 3,010,96 5 778,665,4 5 778,665,4 5 3,893,326,9 5 2,102,396,5 5 2,102,396,5 5 2,102,396,5 5 2,102,396,5 5 2,03,431,5 5 2,8,329,794
CLEARING CONCEPTION FOR CONCENTION OF PARTICULAR INFORMATIONS 2° TOPSOLI (Side single of CLEARING SIGNAL SYSTEM (Rob's Dr. Lake Phrine Dr STORMWATER MANAGEMENT (Approx. 15 acres of additional impervious PUBLIC UTILITY RELOCATION (From PCES ROW & Utilities RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES RIGHT OF WAY PRIVATE UTILITY RELOCATION (From PCES STOTTAL COST STOTTAL COST STOTAL COST	LF ACRE ACRE EA LS LS LS LS	51,160 1,250 - - - - -	- 10 10 8 	- -	0.0002 0.0002 - - - - - - - - - - SI NTROL 5% SUBTOTAL A SUBTOTAL A SUBTOTAL A C (Excludes L C D (Excludes 3. 10% SUBTOTAL D	JBTOTAL A JBTOTAL B JBTOTAL B Subtotal B) Subtotal B)	11.74 0.23 2.00 1 1 1 1	\$ 0.75 \$ 32,000,00 \$ 40,000,00 \$ 2,000,000,00 \$ 2,000,000,00 \$ 2,819,231,00 - - \$ 3,010,961,00	 5 (10,10) 5 (375,83) 5 (375,83) 5 (3,000,00) 5 (2,819,23) 5 (3,010,96) 5 (2,01,96) 5 (2,01,97) 5 (3,399,575,20)



udy	Project #	39955.29	
	Sheet:	6 of 6	
	Date:	4/30/2018	
	Date:		

0 Length (ft) Width (ft) Depth (ft) Factor % Occurring Quantity Unit Cost TOTAL 0.50

					-		-	.,
28.0	0.75	0.07407		39,791	\$	90.00	\$	3,581,200
8.0	0.83	0.07407		25,264	\$	42.00	\$	1,061,096
28.0	1.00	0.07407		53,055	\$	42.00	\$	2,228,302
-	-	-		15	\$	18,000.00	\$	270,000
-	-	-		4	\$	45,000.00	\$	180,000
-	-	-		8	\$	50,000.00	\$	400,000
- 28.0	- 1 50	-		70 592	\$ 6	20.00	9 6	2 287 467
20.0	3.50	0.03704		66 319	ŝ	30.00	ş	2,387,407
60.0	-	0.11111		39 133	ŝ	6.00	\$	234 800
48.0	-	0 11111		105 120	\$	7.00	\$	735 840
60.0	-	0.00100		352	\$	300.00	\$	105 660
48.0	-	0.00100		946	\$	300.00	ŝ	283.824
-	-	1		51,160	\$	1.50	\$	76,740
-	-	1		51,160	\$	1.50	\$	76,740
-	-	1	25%	12,790	\$	1.50	\$	19,185
10	-	0.00002		11.74	\$	32,000.00	\$	375,831
40	-	0.00002		23.49	\$	32,000.00	\$	751,662
20	-	0.00002		1.69	\$	40,000.00	\$	67,401
-	-	-	-	3.00	\$	600,000.00	\$	1,800,000
-	-	-		1	\$	275,000.00	\$	275,000
-	-	-		1	\$	2,500,000.00	\$	2,500,000
-	-	-		1	\$	2,819,231.00	\$	2,819,231
		SU	BTOTAL A				\$	24,350,120
-	-	-	-	- 1	\$	-	\$	2 010 061
-	-	- 91		I	Ş	3,010,901.00	э Ф	3,010,901
							Ψ	3,010,801
ROSION AND	SEDIMENT CON	NTROL 5% SUBTOT	AL A				\$	1,217,506.02
MAINTENANCE OF TRAFFIC 5% SUBTOTAL A							\$	1,217,506.02
MISCELLANEOUS ITEMS 25% SUBTOTAL A						\$	6,087,530.08	
	SUBTOTAL	C (Excludes	Subtotal B)				\$	32,872,662
			-					
MOBILIZATION	10% SUBTOTA	LC					\$	3,287,266.24
	SUBTOTAL	D (Excludes	Subtotal B)				\$	36,159,929
CONST. ENG.	12.5% & CONTIC	G. 10% SUBTOTAL	D				\$	8,135,983.95
	SUBTOTAL	E (Excludes	Subtotal B)				\$	44,295,913
RELIMINARY	ENGINEERING	12% SUBTOTAL D					\$	5,315,509.52
GRAND	I OTAL CO	SI (includes	Subtotal B)				\$	52,623,000

Appendix J

CONTENTS

Systemic Cost

Appendix J

Systemic Cost Estimate Summary	Total Cost
"Template 1 - 4-LEG (2-Way Stop Controlled), Unseparated (for 2 Intersections)"	
Tier 1	\$132,215.81
Tier 2	\$17,315.79
Tier 3	\$21,141.44
"Template 3 - 3-LEG (1-Way Stop Controlled), Unseparated (for 5 Intersections)"	
Tier 1	\$145,446.03
Tier 2	\$34,520.36
Tier 3	\$38,279.60
"Template 7 - Signalized - No Median (for 2 Intersections)"	
Tier 1	\$139,256.33
Tier 2	\$14,971.33
Tier 3	\$30,198.49
"Template 8 - Signalized - Median (for 3 Intersections)"	
Tier 1	\$345,257.76
Tier 2	\$73,544.18
Tier 3	\$32,536.94
"Template 9 - Corridor - No Median (1 mile segment) (for 6.3 miles)"	
Tier 1	\$496,178.63
Tier 2	\$378,465.19
Tier 3	\$276,400.15
"Template 11 - Curve - No Median (for 2 curves)"	
Tier 1	\$35,137.35
Tier 2	\$-
Tier 3	\$209,727.76

Appendix J





