TRAFFIC IMPACT STUDY

FOR

99 Houghton, LLC

Portion of Section 7, Township 31 South, Range 28 East, MDM

Zone Change and General Plan Amendment

Kern County, California

Job Number 06-012

Prepared for:

99 Houghton, LLC

June 2009
Revised November 2009

Prepared by:

Traffic Impact Study

99 Houghton, LLC

Portion of Section 7, Township 31 South, Range 28 East, MDM

Zone Change and General Plan Amendment

For:

99 Houghton, LLC

June 2009
Revised November 2009

Prepared by:

McIntosh & Associates
Land Surveying, Civil Engineering
2001 Wheelan Court
Bakersfield, CA 93309

Stephen Letsky, E.I.T.

11/30/09

Gregg Buckle, R.C.E. 41845

Table of Contents

I. Introduction

Introduction Page 1

Project Description Page 1

II. Summary of Traffic Impacts

Executive Summary of Impacts Page 1

III. Existing & Proposed Street Network

Existing & Proposed Street Network Page 8

IV. Traffic Projections

Existing Traffic Volumes-Traffic Counts Page 10

Year 2020 and Year 2035 Future Traffic Volumes Page 10

Traffic Model Calibration & Average Growth Page 12

Project Traffic Page 12

V. Traffic Analysis

Study Scope Page 14

Traffic Assignment Page 14

Level of Service Page 14

Traffic Analysis Page 15

VI. Warrant Analysis

Traffic Signal Warrant Page 16

VII. Mitigation

Criteria for Mitigation Page 19

Mitigation Page 19

VIII. Findings

Project's Share of Mitigation Page 21

Conclusions Page 21

List of Tables

Table 1:	Executive Summary of Impacts	Page 2
Table 2a:	Project Traffic - P.M. Peak Hour	Page 12
Table 2b:	Project Traffic - A.M. Peak Hour	Page 13
Table 2c:	Project Traffic - Average Weekday	Page 13
Table 3:	Signalized Intersections LOS	Page 14
Table 4:	Unsignalized Intersections LOS	Page 15
Table 5:	Level of Service for Highways	Page 15
Table 6:	Intersection Pro-Rata / Mitigation	Page 22
Table 7:	Intersection Level of Service	Page 32
Table 8:	Roadway Segment Analysis	Page 43
Table 9:	Roadway Segment Laneage	Page 46
Table 10:	Roadway Segment Analysis, Full GPA/ZC Build-Out Plus 2%Growth	Page 48

Figures

Figure 1:	Existing Peak Hour Turning Movements (PM)
Figure 1A:	Existing Peak Hour Turning Movements (AM)
Figure 2:	Year 2020 Future Peak Hour Turning Movements w/o Project (PM)
Figure 2A:	Year 2020 Future Peak Hour Turning Movements w/o Project (AM)
Figure 3:	Year 2035 Future Peak Hour Turning Movements w/o Project (PM)
Figure 3A:	Year 2035 Future Peak Hour Turning Movements w/o Project (AM)
Figure 4:	Total Project Generated Peak Hour Turning Movements (PM)
Figure 4A:	Total Project Generated Peak Hour Turning Movements (AM)
Figure 5:	Total Project Generated Peak Hour Turning Movements – Industrial (PM)
Figure 5A:	Total Project Generated Peak Hour Turning Movements – Industrial (AM)
Figure 6:	Total Project Generated Peak Hour Turning Movements – Commercial (PM)
Figure 6A:	Total Project Generated Peak Hour Turning Movements – Commercial (AM)
Figure 7:	Year 2020 Future Peak Hour Turning Movements with Project (PM)
Figure 7A:	Year 2020 Future Peak Hour Turning Movements with Project (AM)
Figure 8:	Year 2035 Future Peak Hour Turning Movements with Project (PM)
Figure 8A:	Year 2035 Future Peak Hour Turning Movements with Project (AM)
Figure 9:	KernCOG Base Year Traffic Model -Year 2006
Figure 10:	2035 KernCOG Traffic Model -Without Project Traffic, 2% Growth Rate
Figure 11:	2035 KernCOG Traffic Model -With Project Traffic, 2% Growth Rate
Figure 12:	2035 KernCOG Traffic Model -With Project Traffic, Full GPA/ZC Build-Out Plus 2% Growth

Appendices

A:	City of Bakersfield & County of Kern Project Lists
B:	HCM 2000: Two-Way Two-Lane Highway Segment Worksheets
C:	Intersection "HCM Level of Service" calculation computer printouts

I. Introduction

This traffic study has been prepared to evaluate future impacts on the surrounding roadway system due to projected traffic generated by the proposed multi-use development. The study is presented in support of a General Plan Amendment to urban land use designations and a consistent Zone Change.

This report recommends mitigation measures for intersections and street segments that fall below an acceptable level of service due to the impact of cumulative traffic both with and without the project. For every mitigation measure necessary, such as street improvements or signalization of an intersection, a proportionate share of the costs of these improvements has been identified for the project. The study evaluates the cumulative impact of projected future traffic and the addition of project traffic on existing and proposed roadway facilities after completion of the project. For analysis purposes it is assumed that full build-out of the project will occur by Year 2020. Analysis was performed at the assumed build-out year and at Year 2035 to determine required improvements and necessary mitigation to coincide with the horizon year of the established Phase IV update of the Metropolitan Bakersfield Regional Transportation Impact Fee program. The KernCOG traffic models used in the analysis included an estimated 2% growth rate from the base year 2006 through the Future Year 2035 scenario. This 2% growth reflects background traffic growth. A separate analysis is also provided that includes future cumulative traffic volumes from all known proposed future projects being considered by the local agencies. The projected future traffic volumes used in this cumulative analysis includes both the 2% annual growth to existing volumes and traffic projected to be generated by all proposed projects assuming full build-out of the current cumulative GPA/ZC project lists.

Project Description

The proposed project is the development of General Commercial (22 acres), Highway Commercial (25 acres), Light Industrial (110 acres), and Medium Industrial (159 acres). The project is generally located between Houghton Road to the south and DiGiorgio Road to the north with State Route 99 along the western edge and South Union Avenue along the eastern frontage. The site is further described as a portion of Section 7, Township 31 South, Range 28 East, M.D.M.; Kern County. The Assessor's Parcel Number (APN) for this proposed project is 185-140-06.

A mixture of existing land uses surrounds the project area. The majority of existing land use is designated by the County of Kern as Resource Intensive Agriculture (R-IA). A General Plan Amendment is requested to designate 110.0 acres as Light Industrial (LI), 159.0 acres as Service Industrial (SI), 25.0 acres as Highway Commercial (HC), and 22.0 acres as General Commercial (GC) with a concurrent zone change from Exclusive Agriculture (A) to 110.0 acres of Light Industrial (M-1), 159.0 acres of Medium Industrial (M-2), 25.0 acres of Highway Commercial (HC), and 22.0 acres of General Commercial (C-2).

II. Summary of Impacts

Executive Summary of Impacts

The following Table 1 summarizes the mitigation/improvements required due to the impacts of project generated traffic and background traffic growth. The table is separated into the various scenarios analyzed. It indicates the various improvements required due to future growth in background traffic for the analysis scenarios of "2020 without project" and "2035 without project". It also identifies mitigation measures required due to the addition of project generated traffic at these future year scenarios.

The following abbreviations are used throughout Table 1 : **NL** = Northbound Left; **NT** = Northbound Through; **NR** = Northbound Right; **EL** = Eastbound Left; **ET** = Eastbound Through; **ER** = Eastbound Right; **SL** = Southbound Left; **ST** = Southbound Through; **SR** = Southbound Right; **WL** = Westbound Left; **WT** = Westbound Through; **WR** = Westbound Right; **COB** = City of Bakersfield; **LOS** = Level of Service; **s/v** = seconds per vehicle in delay; **Overlap** = Provide overlapping phasing for right turn lane as indicated; **Restripe** = Revise the existing striping to reconfigure approach laneage.

II. Summary of Impacts

Table 1: Executive Summary of Impacts

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2020 without Project		
Signalization		
Hosking Avenue & South H Street	Provide Signal	Improvements reqd without Project
Hosking Avenue & South Union Avenue	Provide Signal	Improvements reqd without Project
East Panama Road & Cottonwood Road	Provide Signal	Improvements reqd without Project
Bear Mountain Boulevard/ State Route 223 & South Union Avenue	Provide Signal	Improvements reqd without Project
Intersection Improvements		
Panama Lane & South H Street	Add 1NL	Improvements reqd without Project
Panama Lane & Cottonwood Road	Add 1EL, 1WR, 1NT, 1SL & 1SR	Improvements reqd without Project
Hosking Avenue & State Route 99 Southbound Off Ramp	Add 1SR	Improvements reqd without Project
Hosking Avenue & State Route 99 Northbound Off Ramp	Add 1WT & 1NR	Improvements reqd without Project
Hosking Avenue & South H Street	Add 1EL, 1NR & 1SR; Restripe to add 1WL & 1WT	Improvements reqd without Project
Taft Highway/ State Route 119 & State Route 99 Southbound Off Ramp/ Compagnoni Street	Add 1ET to maintain existing LOS "D"	Improvements reqd without Project
Taft Highway/ State Route 119 & South H Street	Add 1ET & 1WT	Improvements reqd without Project

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2020 without Project (continued)		
Segment Improvements		
Taft Highway/ State Route 119/ East Panama Road – State Route 99 Southbound Off Ramp to Cottonwood Road	Improve to 4-lane, undivided	Improvements reqd without Project
South H Street – Panama Lane to Hosking Avenue	Improve to 4-lane, undivided	Improvements reqd without Project
Year 2020 with Project		
Signalization		
Houghton Road & State Route 99 Northbound Ramps	Provide Signal	Not Significant
Houghton Road & Chevalier Road	Provide Signal	Not Significant
Intersection Mitigation		
DiGiorgio Road & South Union Avenue	Add 1EL, 1WR & 1SR	Not Significant
Lamb Avenue/ Project Entrance # 1 & Chevalier Road	Provide All-Way Stop; Add 1ER, 1WL, 1NL, 1NR & 1SR	Not Significant
Houghton Road & State Route 99 Southbound Ramps/ Costajo Street	Add 2SL & Construct Striped Median for EB & WB Approaches	Not Significant
Houghton Road & State Route 99 Northbound Ramps	Add 1ET & 2WL	Not Significant
Houghton Road & Project Entrance # 4	Add 1ET, 1WT & 1SR	Not Significant

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2020 with Project (continued)		
Intersection Mitigation (continued)		
Houghton Road & Chevalier Road	Add 2EL, 1WL, 1WT, 1WR & 2SR ; Overlap SR Phase	Not Significant
Segment Mitigation		
Taft Highway/ State Route 119 – Wible Road to State Route 99 Southbound Off Ramp	Improve to 4-lane, undivided	Not Significant
DiGiorgio Road – Chevalier Road to South Union Avenue	Construct 2-lane, undivided	Not Significant
Lamb Avenue – Chevalier Road to South Union Avenue	Construct 2-lane, undivided	Not Significant
Houghton Road – State Route 99 Northbound On/Off Ramp to Chevalier Road	Improve to 4-lane, undivided	Not Significant
Chevalier Road – DiGiorgio Road to Houghton Road	Construct 2-lane, undivided	Not Significant
Year 2035 without Project		
Signalization		
Panama Lane & Cottonwood Road	Provide Signal	Improvements reqd without Project
Hosking Avenue & State Route 99 Southbound Off Ramp	Provide Signal	Improvements reqd without Project
Hosking Avenue & State Route 99 Northbound Off Ramp	Provide Signal	Improvements reqd without Project
Bear Mountain Boulevard/ State Route 223 & State Route 99 Northbound Ramps	Provide Signal	Improvements reqd without Project

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2035 without Project (continued)		
Intersection Improvements (continued)		
Panama Lane & South H Street	Add 1EL, 1WT, 1SL & 1SR	Improvements reqd without Project
Panama Lane & South Union Avenue	Add 1WT & 1NL; Restripe to add 1EL & 1ET	Improvements reqd without Project
Panama Lane & Cottonwood Road	Add 1WL & 1WT	Improvements reqd without Project
Hosking Avenue & State Route 99 Southbound Off Ramp	Add 2ET, 2WT & 1SL	Improvements reqd without Project
Hosking Avenue & South H Street	Add 1ET, 1NT, 1SL & 1ST	Improvements reqd without Project
Taft Highway/State Route 119 & Wible Road	Add 1ET & 1WT	Improvements reqd without Project
Taft Highway/State Route 119 & State Route 99 Southbound Off Ramp/ Compagnoni Street	Add 1SL to maintain existing LOS "D"	Improvements reqd without Project
Taft Highway/ State Route 119 & South H Street	Add 1EL, 1ET, 1WT, 1NL & 1SR	Improvements reqd without Project
Taft Highway/ State Route 119/ East Panama Road & South Union Avenue	Add 1ET, 1WT & 1WR	Improvements reqd without Project
State Route 99 Northbound Off Ramp & South H Street	Add 1EL	Improvements reqd without Project
Bear Mountain Boulevard/ SR 223 & State Route 99 Northbound Ramps	Add 2WL	Improvements reqd without Project
Bear Mountain Boulevard/ SR 223 & South Union Avenue	Add 1EL, 1ET & 1WL; Rephase EL & WL from "Permitted" to "Protected"	Improvements reqd without Project

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2035 without Project (continued)		
Segment Improvements		
Taft Highway/ State Route 119 – West of Wible Road	Improve to 4-lane, undivided	Improvements reqd without Project
Taft Highway/ State Route 119 – State Route 99 Southbound Off Ramp to South Union Ave	Improve to 4-lane, divided	Improvements reqd without Project
South H Street – Panama Lane to Hosking Avenue	Improve to 4-lane, divided	Improvements reqd without Project
South H Street – Hosking Avenue to Taft Highway/ State Route 119	Improve to 4-lane, undivided	Improvements reqd without Project
State Route 99 – Hosking Avenue Northbound Off/ Southbound On Ramp to Taft Highway/ State Route 119 Northbound On/ Southbound Off Ramp	Improve to 8-lane, freeway	Improvements reqd without Project
Year 2035 with Project		
Signalization		
Signalization is not required as mitigation		
Intersection Mitigation		
Hosking Avenue & South Union Avenue	Add 1EL & 1WL; Rephase EL & WL from "Permitted" to "Protected"	Not Significant
DiGiorgio Road & South Union Avenue	Provide All-Way Stop	Not Significant
Lamb Avenue & South Union Avenue	Add 1ER	Not Significant
Houghton Road/ Buena Vista Boulevard & South Union Avenue	Add 1EL	Not Significant

Analysis Scenario/Traffic Facility	**Improvement/Mitigation Measure**	**Level of Significance After Improvement/Mitigation**
Year 2035 with Project (continued)		
Segment Mitigation		
State Route 99 – Taft Highway/ State Route 119 Northbound Off/ Southbound On Ramp to Houghton Road Northbound On/ Southbound Off Ramp	Improve to 8-lane, freeway	Not Significant
South Union Avenue – North of Panama Lane	Improve to 6-lane, divided	Not Significant
Cottonwood Road – North of Panama Lane	Improve to 4-lane, undivided	Not Significant

III. Existing & Proposed Street Network

The following is a summary of existing and proposed streets that will serve the project and will be impacted to some extent from traffic generated by the development.

Panama Lane

Panama Lane is a designated east-west arterial west of the State Route 99 Southbound Off Ramp to east of Cottonwood Road in various stages of widening. Panama Lane currently exists as a six (6) lane, divided roadway from the west of State Route 99 Southbound Off Ramp to South H Street. It then continues east from South H Street as a four (4) lane, divided roadway to South Union Avenue. Panama Lane exists at a two (2) lane, undivided roadway from South Union Avenue to the east of Cottonwood Road.

Hosking Avenue

Hosking Avenue is a designated east-west arterial that exists as a two (2) lane, undivided roadway from west of State Route 99 to Cottonwood Road.

Taft Highway/ State Route 119/ East Panama Road

Taft Highway/ State Route 119 is a designated east-west expressway from west of Wible Road to State Route 99 and a designated arterial from State Route 99 to the east of Cottonwood Road. Taft Highway/ State Route 119 is aligned with East Panama Road to the east of South Union Avenue. Taft Highway/ State Route 119 currently exists as a two (2) lane, undivided roadway from west of Wible Road to South Union Avenue. East Panama Lane exists as a two (2) lane, undivided roadway from South Union Avenue to the east of Cottonwood Road.

Curnow Road

Curnow Road is a designated east-west collector that currently exists as a two (2) lane, undivided roadway from west of South Union Avenue to Cottonwood Road.

DiGiorgio Road

DiGiorgio Road is a designated east-west arterial that currently exists as a two (2) lane, undivided roadway from South Union Avenue to the east of Cottonwood Road. DiGiorgio Road will be constructed in the future along the project's frontage and from the future Chevalier Road to South Union Avenue. DiGiorgio Road will provide direct access to the project site via the project's northern frontage.

Lamb Avenue

Lamb Avenue is a designated east-west collector that currently exists as a two (2) lane, undivided roadway to the east of South Union Avenue. Lamb Avenue will be constructed in the future within the project boundary from Chevalier Road to South Union Avenue, and it will serve as direct access to the project site via several entrances on both the north and south sides of Lamb Avenue.

Mugsy Avenue

Mugsy Avenue is a designated east-west local roadway that currently exists as a two (2) lane, undivided roadway from South Union Avenue to east of South Union Avenue. Mugsy Avenue will provide direct access to the project site via several entrances within the project's interior.

III. Existing & Proposed Street Network (continued)

Houghton Road/ Buena Vista Boulevard

Houghton Road is a designated east-west arterial that currently exists as a two (2) lane, undivided roadway from west of Stine Road to South Union Avenue. Houghton Road is aligned with Buena Vista Boulevard at South Union Avenue and becomes Buena Vista Boulevard to the east of South Union Avenue. Buena Vista Boulevard is a designated east-west arterial that currently exists as a two (2) lane, undivided roadway from South Union Avenue to east of Adobe Road. Houghton Road will front the project's southern boundary and provide direct access to the project site via entrances on the project's southern frontage.

Shafter Road

Shafter Road is a designated east-west collector that currently exists as a two (2) lane, undivided roadway from Chevalier Road to South Union Avenue. Shafter Road then becomes a designated arterial to the east of South Union Avenue, and it exists as a two (2) lane, undivided roadway to the east of South Union Avenue.

Kaiser Lane

Kaiser Lane is a designated east-west collector that currently exists as a two (2) lane, undivided roadway from Chevalier Road to South Union Avenue.

Bear Mountain Boulevard/ State Route 223

Bear Mountain Boulevard/ State Route 223 is a designated east-west arterial that currently exists as a two (2) lane, undivided roadway from west of Costajo Street to east of South Union Avenue.

Stine Road

Stine Road is a designated north-south arterial that currently exists as a two (2) lane, undivided roadway from north of Houghton Road to south of Houghton Road.

Wible Road

Wible Road is a designated north-south arterial that currently exists as a two (2) lane, undivided roadway from north of Taft Highway/ State Route 119 to south of Houghton Road.

South H Street

South H Street is a designated north-south arterial that currently exists in various stages of widening. South H Street currently exists as a four (4) lane, divided roadway to the north of Panama Lane, and it continues southerly from Panama Lane to south of Houghton Road as a two (2) lane, undivided roadway. South H Street is aligned with Curnow Road to the south of Taft Highway/ State Route 119, but it realigns with its original alignment on the west side of State Route 99 to the south of Curnow Road.

State Route 99

State Route 99 is a designated north-south freeway that currently exists as a six (6) lane, divided roadway from north of Panama Lane to south of Bear Mountain Boulevard/ State Route 223. The freeway right-of-way will serve as the western boundary of the project site.

III. Existing & Proposed Street Network (continued)

Chevalier Road

Chevalier Road is a designated north-south collector that currently exists as a two (2) lane, undivided roadway from Houghton Road to Kaiser Lane. Chevalier Road will be constructed in the future within the project boundary from DiGiorgio Road to Houghton Road. Chevalier Road will provide direct access to the project via several entrances within the project's interior.

South Union Avenue/ State Route 99 Business

South Union Avenue/ State Route 99 Business is a designated north-south arterial that currently exists as a four (4) lane, divided roadway from north of Panama Lane to south of Bear Mountain Boulevard/ State Route 223. This roadway will provide direct access to the project site via entrances along the project's eastern frontage.

Cottonwood Road

Cottonwood Road is a designated north-south arterial that currently exists as a two (2) lane, undivided roadway from north of Panama Road to Buena Vista Boulevard.

Adobe Road

Adobe Road is a designated north-south arterial that currently exists as a two (2) lane, undivided roadway from north of Buena Vista Boulevard to south of Buena Vista Boulevard.

IV. Traffic Projections

Existing Traffic Volumes - Traffic Counts

Traffic counts were taken at major intersections within the study area as required by the City of Bakersfield, County of Kern, and Caltrans. Counts were used to determine the local peak hour, directional distribution, and existing operational level of service. Existing traffic counts were taken at the AM and PM Peak Hours for all intersections within the study area. Figures 1 and 1A show the existing turning movement volumes at major intersections from actual field surveys during the PM and AM peak hour scenarios, respectively.

Year 2020 and Year 2035 Future Traffic Volumes

A traffic projection for Year 2035 volumes, with the project traffic, is needed to evaluate the cumulative impact of the project and future traffic growth upon the transportation network. Analysis was also performed with traffic volume projections for Year 2020 to analyze project generated traffic impacts at a "mid-term" scenario year. Year 2035 traffic volume projections were used to analyze project generated traffic impacts at the time of the anticipated "Horizon Year" of the transportation network. Project generated traffic impact analysis is provided for Year 2035 traffic volume projections to coincide with the current traffic model horizon year used for preparation of the Phase IV Update of the Metropolitan Bakersfield Regional Transportation Impact Fee (RTIF) program.

IV. Traffic Projections (continued)

These projected volumes were used to analyze cumulative impacts on existing and proposed transportation facilities. If cumulative impacts to these facilities could not be mitigated by the improvements proposed by the Metropolitan Bakersfield Regional Transportation Impact Fee Program, nor any other known funding source, then additional improvements/mitigation measures were identified as required by the Year 2020 and Year 2035 analyses. These future year projections take into consideration all existing land uses at reasonable demand-driven growth rates as determined by the City of Bakersfield and the County of Kern in conjunction with Kern Council of Governments, the local transportation planning authority, by using data from the KernCOG traffic model.

Year 2020 and Year 2035 Traffic Volumes were determined using data from the regional 2% annual growth rate traffic model prepared by KernCOG which is the same model used for the Phase IV Update of the Metropolitan Bakersfield RTIF program. The Base Year 2006 traffic model volumes are grown at 2% annually until the Year 2035 to produce the Year 2035 KernCOG traffic models. The KernCOG model uses traffic software, which bases traffic projections on Traffic Analysis Zone (T.A.Z.) Socio-Economic data projected for future year scenarios. Projections of project generated traffic along with projections from the KernCOG model for use in impact analysis accounts for cumulative impacts of the proposed project and growth in background traffic based on reasonable demand driven growth rates. The Year 2020 and Year 2035 without Project traffic volume data was derived from the 2% growth rate, "without project" model provided by KernCOG. The Year 2020 and Year 2035 With Project traffic volume data was derived by adding the proposed project traffic volumes, manually distributed, to the 2020 and 2035 without Project traffic volumes, respectively.

An additional model was requested from KernCOG that includes traffic growth based on the reasonable demand driven growth rate of 2% annually, the projected traffic generated by the proposed project, and additional growth related to full build-out of all proposed General Plan Amendments/Zone Changes within the City of Bakersfield and the County of Kern. As directed by the local agencies, these proposed GPA/Zone Changes are to be included in this model, even if there is only a developer proposal with no formal application submitted. Projects in suspense, but not withdrawn are also required to be included. Information on these proposed GPA/Zone Changes are given to KernCOG by the local jurisdictions. The City of Bakersfield and the County of Kern keep separate, updated lists of proposed projects, and submit the updated lists to KernCOG for use in this model. The current versions at the time of the model request for the proposed project are shown in Appendix A and Appendix B. This model results in overall growth factors substantially higher than reasonable demand driven rates used by KernCOG in other models they maintain.

Since this model tends to significantly overestimate future traffic volumes, it is not used for detailed analysis of the project's cumulative future impacts on existing and proposed traffic facilities or determination of required improvements as it does not accurately predict future conditions. Additionally, use of this model to calculate the project's pro-rata share of the costs of required future improvements would artificially reduce the project's share due to exaggerated background traffic volumes. Analysis of the segment traffic volumes taken directly from this model are presented in Table 10. This analysis is limited to a presentation of resulting volume-to-capacity ratios of existing and proposed roadway segments assuming ultimate roadway configurations as designated in the Metropolitan Bakersfield General Plan Circulation Element. This table identifies roadway segments that would require improvements beyond current local standards if the overestimated volumes actually occur in future year scenarios. The intersections along these particular corridors would commensurately require mitigation beyond current agency standards as well. These cumulative impacts requiring mitigation beyond current standards, although extremely unlikely to occur, would therefore be considered significant and unavoidable.

Figure 10, herein, shows the future Year 2035 Without Project Model, 2% Growth Rate. Figure 11, herein, shows the future Year 2035 With Project, 2% Growth Rate. Figure 12, herein, shows the future Year 2035 With Project Model, Full GPA/ZC Build-Out Plus 2% Growth.

IV. Traffic Projections (continued)

Traffic Model Calibration and Average Growth

The traffic model data is calibrated using segment ADT volumes rather than actual turning movement volumes. Therefore, to determine projected increases in turning movement volumes, individual percentage increase/decrease growth rates for roadway segments adjacent to study intersections were determined from the model data and used to project future turning movement volumes by applying these growth rates to existing turning movement volumes. Since the KernCOG model does not include all collector designated road segments, some study intersections are not specifically represented by the model nodes. For these intersections, growth rates from adjacent intersections were applied to existing turning movement volumes to determine future volumes.

Figures 2 and 2A herein show the PM and AM projected turning movement volumes, respectively, for Year 2020 without Project generated traffic. Figures 7 and 7A herein show the PM and AM projected turning movement volumes, respectively, for Year 2020 Future volumes with Project generated traffic. Similarly, figures 3 and 3A herein show the PM and AM projected turning movement volumes, respectively, for Year 2035 without Project generated traffic, and figures 8 and 8A herein show the PM and AM projected turning movement volumes, respectively, for Year 2035 Future volumes with Project generated traffic.

Project Traffic

For analysis purposes full "build-out" of the Project is assumed to be completed by the Year 2020. The traffic volumes generated from the proposed project, were estimated using the "Institute of Transportation Engineers" Trip Generation Manual, 8th ed. © 2008.

Project Traffic – PM Peak Hour

The P.M. Peak Hour traffic volumes generated from the proposed land uses were estimated using the "Institute of Transportation Engineers" Trip Generation Manual, 8th ed. © 2008.

Table 2a: Proposed Project Traffic - P.M. Peak Hour Trip Ends

Land Use	Acres	GLFA	ITE Code	Rate	Peak Hour Trips-PM	Split In	Split Out
Light Industrial	110.00	N/A	130	Note 1	972	204	768
Service Industrial	159.00	N/A	130	Note 1	1,406	295	1110
General Commercial	47.00	511,830	820	Note 2	1,900	931	969
TOTALS	316.00				4,278	1,430	2,847

Note 1: Industrial Park – Used Average Rate: (T) = 8.84 x (Acres) to determine trip generation.
Note 2: General Commercial - Used Fitted Curve Equation: Ln(T) = 0.67Ln(x) + 3.37 to determine trip generation with a 20% reduction to account for "Pass-By" and "Diverted-Linked" trips taken at the nearest adjacent facilities beyond project entrances.

.

IV. Traffic Projections (continued)

Project Traffic – AM Peak Hour

The A.M. Peak Hour traffic volumes generated from the proposed land uses were estimated using the "Institute of Transportation Engineers" Trip Generation Manual, 8th ed. © 2008.

Table 2b: Proposed Project Traffic - A.M. Peak Hour Trip Ends

Land Use	Acres	GLFA	ITE Code	Rate	Peak Hour Trips-AM	Split In	Split Out
Light Industrial	110.00	N/A	130	Note 1	941	781	160
Service Industrial	159.00	N/A	130	Note 1	1,359	1128	231
General Commercial	47.00	511,830	820	Note 2	512	312	200
TOTALS	316.00				2,812	2,221	591

Note 1: Industrial Park – Used Average Rate: (T) = 8.55 x (Acres) to determine trip generation.
Note 2: General Commercial - Used Average Rate: (T) = 1.00 x (GLFA) to determine trip generation with a 20% reduction to account for "Pass-By" and "Diverted-Linked" trips taken at the nearest adjacent facilities beyond project entrances.

Project Traffic – Daily Traffic (A.A.D.T.)

The Average Daily Traffic volumes generated from the proposed land uses were estimated using the "Institute of Transportation Engineers" Trip Generation Manual, 8th ed. © 2008.

Table 2c: Proposed Project Traffic – Daily Traffic Trip Ends (A.A.D.T.)

Land Use	Acres	GLFA	ITE Code	Rate	Average Daily Trips-AADT	Split In	Split Out
Light Industrial	110.00	N/A	130	Note 1	6,942	3,471	3,471
Service Industrial	159.00	N/A	130	Note 1	10,034	5,017	5,017
General Commercial	47.00	511,830	820	Note 2	19,628	9,814	9,814
TOTALS	316.00				36,604	18,302	18,302

Note 1: Industrial Park – Used Average Rate: (T) = 63.11 x (Acres) to determine trip generation.
Note 2: General Commercial - Used Fitted Curve Equation: Ln(T) = 0.65Ln(x) + 5.83 to determine trip generation with a 20% reduction to account for "Pass-By" and "Diverted-Linked" trips taken at the nearest adjacent facilities beyond project entrances.

V. Traffic Analysis

Study Scope

Traffic facilities included in the study scope were based on the CalTrans sliding scale criteria. A facility is included in the scope of the analysis if the project generated AM or PM Peak Hour trips utilizing that facility exceed 50 vehicles per hour (vph). For facilities currently at service levels of "C" or less the "sliding scale" criteria is used where the peak hour volume threshold varies with the service level. Those various thresholds are as follow:

LOS "C" ----- 40 vph, project generated trips

LOS "D" ----- 30 vph, project generated trips

LOS "E" ----- 20 vph, project generated trips

LOS "F" ----- 10 vph, project generated trips

Traffic Assignment

Project generated traffic was assigned to the existing and proposed surface street network within the project boundary and to immediately adjacent intersections based on observations of existing traffic patterns during the AM and PM peak hour, projections of traffic patterns for Years 2020 and 2035, study counts of directional movements at intersections, characteristics of the existing and future street network, knowledge of trip attractors, and the quantity of generated trips relative to the area. The KernCOG regional traffic models were used to distribute future traffic at intersections and roadway segments outside of the nearby project vicinity. Refer to figure 4 and 4A, herein, for distribution of project generated traffic that was estimated for the total project within the study area. Figures 5 and 6, along with 5A and 6A, represent the project specific distribution for the given land use generators of Industrial and General Commercial, respectively, across the metropolitan roadway network.

Level of Service

Operational analysis of existing and proposed streets and intersections was performed using methods outlined in the "*Transportation Research Board, National Research Council"*, Highway Capacity Manual, ©2000.

A "Level of Service" designation is the generally accepted gauge for describing the quality of operation of either a roadway segment or intersection. Other attributes of operational quality associated with each level of service are v/c - volume to capacity ratio for street segments and vehicle delay through an intersection. For each type of street segment or intersection analysis, the criteria to arrive at a particular Level of Service vary slightly. Levels of Service for every type of roadway or intersection are described thoroughly in the Highway Capacity Manual, however, the following brief descriptions have been provided:

Table 3: Signalized Intersections

Level of Service	Control Delay per Vehicle (sec.)
A	<10
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80

V. Traffic Analysis (continued)

Table 4: Unsignalized Intersections

Level of Service	Average Total Delay (sec/veh)	Expected Delay to Minor Street Traffic
A	**<10**	Little or no delay.
B	**>10 and <15**	Short traffic delay.
C	**>15 and <25**	Average traffic delay.
D	**>25 and <35**	Long traffic delay.
E	**>35 and <50**	Very long traffic delay.
F	**>50**	see Note 1

Note 1: When demand volume exceeds the capacity of the lane, extreme delays will be encountered. This condition usually warrants improvement to the intersection.

Table 5: Level of Service for Highways and Arterials

Level of Service	Description	V/C Ratio
A	Free flow conditions, unimpeded ability to maneuver and pass, very little delay, no platoons, highest average travel speeds.	**0.00-0.60**
B	Mostly free flow conditions, presence of other vehicles begins to be noticeable. Passing is required to maintain speeds, slightly less average travel speeds than Level of Service "A".	**0.61-0.70**
C	Traffic density clearly affects the ability to pass and maneuver within the stream. Speeds are reduced to about 50 mph on highways and to about 50% of the average on urban arterials.	**0.71-0.80**
D	Unstable flow. Speeds are reduced from 40% to 60% of normal. Passing demand is high although mostly impossible on 2-Lane Highways. Traffic disruptions usually cause extensive queues.	**0.81-0.90**
E	Very unstable flow at or near capacity. Passing and maneuvering virtually impossible. Extensive platooning on highways and queuing on arterials. Speeds range from 20 mph or less on arterials and 2-Lane Highways, and up to 50 mph on Multi-Lane Highways.	**0.91-1.0**
F	Forced or breakdown flow. Demand exceeds capacity. Vehicles experience short spurts of movement followed by stoppages. Intersection congestion, long queues and delays are common.	**Above 1.0**

Traffic Analysis

Methods used to evaluate cumulative plus project traffic conditions were taken from the above referenced Highway Capacity Manual. In addition to these methods, a computer software package "*SYNCHRO 6*", was used to primarily coordinate and facilitate extensive HCM intersection calculations. All computer-generated reports are included in the Appendix C of this report.

Summaries of intersection level of service calculations for the analyzed scenarios are shown in Table 7. The scenarios include Existing, Year 2020 with and without project generated traffic, and Year 2035 with and without project generated traffic. The summary includes Highway Capacity Manual (HCM) service level results for signalized intersections, non-signalized intersections and all-way stop intersections.

V. Traffic Analysis (continued)

Roadway segments were evaluated by calculating Volume-to-Capacity ratios using existing segment volumes, projected Year 2020 Future Volumes, and projected Year 2035 Future Volumes with and without adding project generated traffic. Required laneage configurations are based on a maximum 80% Volume-to-Capacity ratio for Level of Service "C". These volumes and calculations are shown in Table 8. The Highway Capacity Manual's Two-Lane roadways' Level of Service is verified in Appendix B.

Roadway segment laneage configurations for existing conditions and improved configurations are indicated on Table 9. Also shown is the required laneage configurations determined for the Year 2020 Future volumes with and without Project traffic scenarios and the Year 2035 Future volumes with and without Project traffic scenarios.

VI. Warrant Analysis

Traffic Signal Warrant

Signalization of an intersection is not necessarily justified by the satisfaction of a single warrant. Poor operation (Levels of Service) and poor safety characteristics, as well as satisfaction of multiple warrants are normally the criteria for installing a traffic signal. For purposes of this study, a poor operational level of service for multiple movements, and satisfaction of signal warrants, was considered justification for traffic signal installations.

All unsignalized intersections within the study scope were analyzed for traffic signal warrants using the procedures outlined in the *California MUTCD* for Warrants ***1A*** "Figure 4C-103(CA): ADT - Minimum Vehicular Traffic", ***1B*** "Figure 4C-103(CA): ADT - Interruption of Continuous Traffic", ***1A&B*** "Figure 4C-103(CA): ADT - Combinations of Warrants 1A and 1B" and ***3*** "Figure 4C-4, Peak Hour (70% Factor) Warrant." Details of the warrant analysis are included with SYNCHRO's HCM analyses in Appendix C. Below is a list of the intersections analyzed for traffic signal warrants. The results are included in Table 6, "Intersection Improvements/Mitigation/Pro-Rata Share".

Panama Lane & Cottonwood Road – Warrants 1 & 3 Satisfied @ 2035 Future without Project volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Hosking Avenue & State Route 99 Southbound Off Ramp – Warrants 1 & 3 Satisfied @ 2035 without Project Volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Hosking Avenue & State Route 99 Northbound Off Ramp – Warrants 1 & 3 Satisfied @ 2035 without Project Volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Hosking Avenue & South H Street – Warrant 3 satisfied @ 2020 Future without Project Volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Hosking Avenue & South Union Avenue – Warrants 1 & 3 Satisfied @ 2020 Future without Project Volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

Hosking Avenue & Cottonwood Road – No warrants satisfied @ 2035 Future with Project Volumes.

VI. Warrant Analysis (continued)

Taft Highway/State Route 119 & Wible Road – Warrants 1 & 3 are satisfied with existing volumes. A signal is assumed to be installed in the very near future and has thus been included in the Existing scenario analysis. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

East Panama Road & Cottonwood Road – Warrants 1 & 3 satisfied @ 2020 Future without Project Volumes. Signalization of this intersection is included in the Phase IV Metropolitan Bakersfield Regional Transportation Impact Fee Program (RTIF).

State Route 99 Northbound Off Ramp & South H Street – Warrant 3 satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Curnow Road & South Union Avenue – No warrants satisfied @ 2035 Future with Project Volumes.

Curnow Road & Cottonwood Road – No warrants satisfied @ 2035 Future with Project Volumes.

DiGiorgio Road & Chevalier Road – No warrants satisfied @ 2035 Future with Project Volumes.

DiGiorgio Road & South Union Avenue – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

DiGiorgio Road & Cottonwood Road – No warrants satisfied @ 2035 Future with Project Volumes.

Lamb Avenue/ Project Entrance #1 & Chevalier Road – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Lamb Avenue & South Union Avenue – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Project Entrance #2 & South Union Avenue – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Mugsy Avenue & South Union Avenue – No warrants satisfied @ 2035 Future with Project Volumes.

Houghton Road & Stine Road – No warrants satisfied @ 2035 Future with Project Volumes.

Houghton Road & Wible Road – No warrants satisfied @ 2035 Future with Project Volumes.

Houghton Road & South H Street – No warrants satisfied @ 2035 Future with Project Volumes.

Houghton Road & State Route 99 Southbound Ramps/ Costajo Street – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Houghton Road & State Route 99 Northbound Ramps – Warrants 1 & 3 Satisfied @ 2020 Future with Project volumes.

VI. Warrant Analysis (continued)

Houghton Road & Project Entrance # 4 - Warrants 1 & 3 Satisfied @ 2035 Future with Project volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Houghton Road & Chevalier Road - Warrants 1 & 3 Satisfied @ 2020 Future with Project volumes.

Houghton Road & Project Entrance # 3 - Warrants 1 & 3 Satisfied @ 2035 Future with Project volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Houghton Road/ Buena Vista Boulevard & South Union Avenue – Warrants 1 & 3 satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Buena Vista Boulevard & Cottonwood Road – No warrants satisfied @ 2035 Future with Project Volumes.

Buena Vista Boulevard & Adobe Road – Warrants 1 & 3 Satisfied @ 2035 Future with Project Volumes. However, acceptable service levels can be achieved without the addition of a traffic signal.

Shafter Road & Chevalier Road – No warrants satisfied @ 2035 Future with Project Volumes.

Shafter Road & South Union Avenue – No warrants satisfied @ 2035 Future with Project Volumes.

Kaiser Lane & South Union Avenue – No warrants satisfied @ 2035 Future with Project Volumes.

State Route 99 Southbound Ramps & Costajo Street – No warrants satisfied @ 2035 Future with Project Volumes.

Bear Mountain Boulevard/ State Route 223 & Costajo Street – No warrants satisfied @ 2035 Future with Project Volumes.

Bear Mountain Boulevard/ State Route 223 & State Route 99 Northbound Ramps – Warrants 1 & 3 satisfied @ 2035 Future without Project Volumes.

Bear Mountain Boulevard/ State Route 223 & South Union Avenue – Warrants 1 & 3 satisfied @ 2020 Future without Project Volumes.

VII. Mitigation

Criteria for Mitigation

In accordance with CalTrans standards, (CalTrans' "Guide for the Preparation of Traffic Impact Studies") and local agency standards, mitigation is normally considered necessary if a particular intersection or street segment is degraded to below Level of Service "C" by the impact of Project generated traffic. If the existing operational Level of Service of a facility is below "C" prior to the addition of Project generated traffic and the addition of project traffic substantially degrades the Level of Service further, then mitigation to restore the facility to at least its existing operational Level of Service is deemed appropriate.

Mitigation

In order to mitigate the 2020 Future traffic volumes and the 2035 Future traffic volumes plus Project generated traffic impacts to intersections and segments, the mitigation measures summarized below are needed for the roadway network in order to maintain acceptable Levels of Service. It is assumed that the *improvements* required for the roadway facilities at Existing, 2020 Future, and 2035 Future traffic will be in place prior to the addition of the project generated traffic at full build out. See Table 1 – "Summary of Impacts" for *improvements* required for existing and future projected traffic volumes without the addition of project traffic.

No facilities included in Table 10 are identified as requiring mitigation beyond current standards. If identified as being required, most mitigation measures beyond current standards would be deemed infeasible and therefore the impacts to these facilities would be identified as being "Significant and Unavoidable". Although some of the mitigation measures identified as being beyond current standards may be feasible to construct in areas where adjacent properties have not been developed, it is unlikely that these facilities would be built, and unlikely that they would be required due to congestion relief resulting from future construction of regional facilities. In other areas where development is already occurring, where street segments and intersections have already been fully built to local agency standards, the additional expansion identified would be deemed infeasible. This infeasibility is based on excessive costs and also safety issues. Expansion of these existing facilities would require condemnation of private property which has already been developed, and result in excessive costs for demolition and reconstruction of existing structures, pavement, embankments, bridges, culverts, utility lines, walls and landscaping. Safety hazards would be increased with the addition of more lanes creating line-of-sight issues, longer delays due to increased pedestrian crossing times, and potentially greater accident rates with improper lane crossing for vehicles making left-turns from triple left-turn lanes. However, as stated above no mitigation beyond current standards has been identified as being required.

Signalization

As a general note, intersection signalization should incorporate signal interconnect conduit in order to provide coordination along the arterial roadways and to facilitate the use of TSM measures during peak periods. If signalization is required by the addition of Project traffic, a mitigation measure is noted in Table 1. The following intersection(s) require signalization due to the addition of project generated traffic:

Houghton Road & State Route 99 Northbound Ramps (Year 2020)

Houghton Road & Chevalier Road (Year 2020)

VII. Mitigation (continued)

Intersection Mitigation

The specific mitigation measures recommended for individual intersections are detailed on Table 6, "Intersection Improvement/Mitigation". Intersection *improvements* required for Existing, Year 2020 Future, and Year 2035 Future traffic are noted in Table 1 – "Summary of Impacts". If intersection mitigation is required by the addition of Project generated traffic, a mitigation measure is noted on Table 1. The following intersection(s) require mitigation due to the addition of project generated traffic:

Hosking Avenue & South Union Avenue (Year 2035)

DiGiorgio Road & South Union Avenue (Years 2020 & 2035)

Lamb Avenue/ Project Entrance # 1 & Chevalier Road (Year 2020)

Lamb Avenue & South Union Avenue (Year 2035)

Houghton Road & State Route 99 Southbound Ramps/ Costajo Street (Year 2020)

Houghton Road & State Route 99 Northbound Ramps (Year 2020)

Houghton Road & Project Entrance #4 (Year 2020)

Houghton Road & Chevalier Road (Year 2020)

Houghton Road/ Buena Vista Boulevard & South Union Avenue (Year 2035)

Segment Mitigation

Table 9 "Roadway Segment Laneage" reflects the laneage recommended for Existing, 2020 & 2035 Future Traffic (both with and without the project generated traffic) in order to achieve LOS "C" as determined by a Volume-to-Capacity ratio of less than 0.80. If additional lanes are required for existing, 2020 or 2035 Future Traffic without project traffic, *improvements* are noted in Table 1 – "Summary of Impacts". If additional lanes are required by the addition of the project traffic, a mitigation measure is noted in Table 1. The following roadway segment(s) require mitigation due to the addition of project generated traffic:

Taft Highway/ State Route 119 – Wible Road to State Route 99 Southbound Off Ramp (Year 2020)

DiGiorgio Road – Chevalier Road to South Union Avenue (Year 2020)

Lamb Avenue – Chevalier Road to South Union Avenue (Year 2020)

Houghton Road – State Route 99 Northbound On/Off Ramp to Chevalier Road (Year 2020)

State Route 99 – Taft Highway Northbound Off/ Southbound On Ramp to Houghton Road Northbound On/ Southbound Off Ramp (Year 2035)

Chevalier Road – DiGiorgio Road to Houghton Road (Year 2020)

South Union Avenue – North of Panama Lane (Year 2035)

Cottonwood Road – North of Panama Lane (Year 2035)

VIII. Findings

Project's share of Mitigation

The project's proportionate share of traffic mitigation for intersections has been determined to fall under one of two methodologies. If the facility is identified as being within CalTrans' jurisdiction then the pro-rata share of the project's contribution is calculated as the ratio of the project's peak hour traffic to the difference between the future year 2035 traffic and existing traffic volumes. Alternately, if the facility is identified as being outside of CalTrans' jurisdiction then the pro-rata share of the project's contribution is calculated as the ratio of the project's peak hour traffic to the total future traffic volumes. Table 6 indicates the pro-rata share of necessary improvements and mitigation.

Conclusions

If the projected growth within the study area is realized, many of the improvements identified in Table 1 – "Summary of Impacts" will be necessary even without the addition of project generated traffic. The project should contribute its proportionate share, as identified in Table 6 – "Pro-Rata/Mitigation", of the costs to construct necessary improvements required due to future traffic growth projections in the study area. Projections of future traffic growth, though determined with best available data, should be verified by actual counts during future years prior to actual construction of the required improvements identified in this study.

Construction of facilities within the Transportation Impact Fee Program should be in accordance with the City of Bakersfield's and County of Kern's Capital Improvement Plans, at time of construction, for the Metropolitan Bakersfield Area.

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Panama Ln & State Route 99 Southbound Off Ramp - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	2376	34	1.61% (Caltrans)	20	0.95% (Caltrans)	14	0.66% (Caltrans)	4487	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & State Route 99 Southbound Off Ramp - PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	4715	38	8.78% (Caltrans)	27	6.24% (Caltrans)	11	2.54% (Caltrans)	5148	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & State Route 99 Northbound Off Ramp - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	868	34	4.64% (Caltrans)	20	2.73% (Caltrans)	14	1.91% (Caltrans)	1563	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & State Route 99 Northbound Off Ramp - PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1841	39	2.82% (Caltrans)	28	2.02% (Caltrans)	11	0.80% (Caltrans)	3224	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & South H St - AM Peak [6]									
2020: Add 1NL									
2020 + Proj: No mitigation required due to addition of project traffic	2519	13	0.24%	13	0.24%	0	0.00%	5435	1EL, 1WT, 1NL,
2035: Add 1EL, 1WT, 1SL & 1SR									1SL & 1SR
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & South H St - PM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1673	19	0.44%	19	0.44%	0	0.00%	4305	See AM
2035: Add 1NL & 1SR									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & South Union Ave - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1888	78	1.63%	71	1.48%	7	0.15%	4786	-
2035: Add 1WT & 1NL; Restripe to add 1EL & 1ET									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & South Union Ave - PM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	847	100	2.61%	97	2.53%	3	0.08%	3835	-
2035: Add 1WT; Restripe to add 1EL & 1ET									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & Cottonwood Rd - AM Peak [6]									
2020: Add 1EL									
2020 + Proj: No mitigation required due to addition of project traffic	699	63	3.24%	52	2.68%	11	0.57%	1942	-
2035: Provide Signal - Warrant Satisfied: 3; Add 1WL									
2035 + Proj: No mitigation required due to addition of project traffic									
Panama Ln & Cottonwood Rd - PM Peak [6]									
2020: Add 1EL, 1WR, 1NT, 1SL & 1SR									
2020 + Proj: No mitigation required due to addition of project traffic	898	55	2.30%	53	2.21%	2	0.08%	2396	-
2035: Provide Signal - Warrants Satisfied: 1 & 3; Add 1WL & 1WT									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & State Route 99 Southbound Off Ramp - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	705	71	4.51% (Caltrans)	62	3.94% (Caltrans)	9	0.57% (Caltrans)	2278	-
2035: Add 1ET, 1WT & 1SR									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrant Satisfied: 3									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Hosking Ave & State Route 99 Southbound Off Ramp - PM Peak [6]									
2020: Add 1SR									
2020 + Proj: No mitigation required due to addition of project traffic	616	132	5.80% (Caltrans)	122	5.36% (Caltrans)	10	0.44% (Caltrans)	2892	-
2035: Provide Signal - Warrants Satisfied: 1 & 3; Add 2ET, 2WT & 1SL									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & State Route 99 Northbound Off Ramp - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	705	14	0.76% (Caltrans)	9	0.49% (Caltrans)	5	0.27% (Caltrans)	2558	-
2035: Add 1ET, 2WT, 1NL & 1NR (or Signalize per PM Peak Requirements)									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrant Satisfied: 3									
Hosking Ave & State Route 99 Northbound Off Ramp - PM Peak [6]									
2020: Add 1WT & 1NR									
2020 + Proj: No mitigation required due to addition of project traffic	616	51	1.95% (Caltrans)	44	1.68% (Caltrans)	7	0.27% (Caltrans)	3231	-
2035: Provide Signal - Warrants Satisfied: 1 & 3									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & South H St - AM Peak [6]									
2020: Provide Signal - Warrant Satisfied: 3; Add 1EL, 1NR & 1SR;									
Restripe to add 1WL & 1WT	1321	30	0.70%	22	0.51%	8	0.19%	4298	-
2020 + Proj: No mitigation required due to addition of project traffic									
2035: Add 1ET, 1NT, 1SL & 1ST									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & South H St - PM Peak [6]									
2020: Add 1EL, 1NR & 1SR; Restripe to add 1WL									
2020 + Proj: No mitigation required due to addition of project traffic	1134	20	0.57%	19	0.54%	1	0.03%	3502	-
2035: Provide Signal - Warrants Satisfied: 1 & 3; Add 1ET, 1NT & 1ST;									
Restripe to add 1WT									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & South Union Ave - AM Peak [6]									
2020: Provide Signal - Warrant Satisfied: 3									
2020 + Proj: No mitigation required due to addition of project traffic	1179	162	5.94%	141	5.17%	21	0.77%	2727	1WL
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: Add 1EL & 1WL; Rephase EL & WL from "Perm" to "Prot"									
Hosking Ave & South Union Ave - PM Peak [6]									
2020: Provide Signal - Warrants Satisfied: 1 & 3									
2020 + Proj: No mitigation required due to addition of project traffic	873	161	7.05%	135	5.91%	26	1.14%	2285	See AM
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Hosking Ave & Cottonwood Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	313	59	4.61%	50	3.91%	9	0.70%	374	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Hosking Ave & Cottonwood Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	363	52	4.06%	47	3.67%	5	0.39%	426	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Taft Hwy/ SR 119 & Wible Rd - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1023	69	3.57% (Caltrans)	57	2.95% (Caltrans)	12	0.62% (Caltrans)	2957	-
2035: Add 1ET & 1WT									
2035 + Proj: No mitigation required due to addition of project traffic									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Taft Hwy/ SR 119 & Wible Rd - PM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1260	101	4.19% (Caltrans)	101	4.19% (Caltrans)	0	0.00% (Caltrans)	3670	-
2035: Add 1ET & 1WT									
2035 + Proj: No mitigation required due to addition of project traffic									
Taft Hwy/ SR 119 & Frwy 99 Southbound Off Ramp/ Compagnoni St - AM Peak [6]									
2020: Add 1ET									
2020 + Proj: No mitigation required due to addition of project traffic	1289	78	5.69% (Caltrans)	59	4.31% (Caltrans)	19	1.39% (Caltrans)	2659	See PM
2035: Add 1SL									
2035 + Proj: No mitigation required due to addition of project traffic									
Taft Hwy/ SR 119 & Frwy 99 Southbound Off Ramp/ Compagnoni St - PM Peak [6]									
2020: Add 1ET to maintain existing LOS "D"									
2020 + Proj: No mitigation required due to addition of project traffic	1894	146	9.89% (Caltrans)	146	9.89% (Caltrans)	0	0.00% (Caltrans)	3370	1SL
2035: Add 1SL to maintain existing LOS "D"									
2035 + Proj: No mitigation required due to addition of project traffic									
Taft Hwy/ SR 119 & South H St - AM Peak [6]									
2020: Add 1ET & 1WT									
2020 + Proj: No mitigation required due to addition of project traffic	1229	97	2.82% (Caltrans)	73	2.12% (Caltrans)	24	0.70% (Caltrans)	4666	See PM
2035: Add 1EL, 1ET, 1WT, 1NL & 1SR									
2035 + Proj: No mitigation required due to addition of project traffic									
Taft Hwy/ SR 119 & South H St - PM Peak [6]									
2020: Add 1ET & 1WT									
2020 + Proj: No mitigation required due to addition of project traffic	1279	154	4.37% (Caltrans)	147	4.17% (Caltrans)	7	0.20% (Caltrans)	4800	1ET, 1WT & 1NL
2035: Add 1EL, 1ET, 1WT & 1NL									
2035 + Proj: No mitigation required due to addition of project traffic									
Taft Hwy/ SR 119/ East Panama Rd & South Union Ave - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	918	363	17.53% (Caltrans)	293	14.15% (Caltrans)	70	3.38% (Caltrans)	2989	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: Add 1ET & 1WR									
Taft Hwy/ SR 119/ East Panama Rd & South Union Ave - PM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	1143	440	17.14% (Caltrans)	320	12.47% (Caltrans)	120	4.67% (Caltrans)	3710	-
2035: Add 1ET, 1WT & 1WR									
2035 + Proj: No mitigation required due to addition of project traffic									
East Panama Rd & Cottonwood Rd - AM Peak [6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: Provide Signal - Warrant Satisfied: 3	563	124	6.68%	103	5.55%	21	1.13%	1855	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
East Panama Rd & Cottonwood Rd - PM Peak [6]									
2020: Provide Signal - Warrants Satisfied: 1 & 3									
2020 + Proj: No mitigation required due to addition of project traffic	813	181	7.84%	148	6.41%	33	1.43%	2308	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Frwy 99 Northbound Off Ramp & South H St - AM Peak [4, 6]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	113	24	1.81% (Caltrans)	17	1.28% (Caltrans)	7	0.53% (Caltrans)	767	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic Warrant Satisfied: 3									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Frwy 99 Northbound Off Ramp & South H St - PM Peak [4, 6] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: Add 1EL 2035 + Proj: No mitigation required due to addition of project traffic Warrant Satisfied: 3	235	33	2.74% (Caltrans)	32	2.66% (Caltrans)	1	0.08% (Caltrans)	1022	1EL
Curnow Rd & South Union Ave - AM Peak [4] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: No improvements required for future 2035 traffic increases 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	350	446	30.97%	344	23.89%	102	7.08%	966	-
Curnow Rd & South Union Ave - PM Peak [4] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: No improvements required for future 2035 traffic increases 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	539	547	37.99%	382	26.53%	165	11.46%	1201	-
Curnow Rd & Cottonwood Rd - AM Peak [4] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: No improvements required for future 2035 traffic increases 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	95	57	4.45%	48	3.75%	9	0.70%	159	-
Curnow Rd & Cottonwood Rd - PM Peak [4] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: No improvements required for future 2035 traffic increases 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	180	91	7.11%	72	5.63%	19	1.48%	292	-
DiGiorgio Rd & Chevalier Rd - AM Peak [4] 2020 + Proj: No mitigation required due to addition of project traffic 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	0	388	30.31%	374	29.22%	14	1.09%	388	-
DiGiorgio Rd & Chevalier Rd - PM Peak [4] 2020 + Proj: No mitigation required due to addition of project traffic 2035 + Proj: No mitigation required due to addition of project traffic Warrants Satisfied: None	0	502	39.22%	462	36.09%	40	3.13%	502	-
DiGiorgio Rd & South Union Ave - AM Peak [4] 2020: No improvements required for future 2020 traffic increases 2020 + Proj: No mitigation required due to addition of project traffic 2035: No improvements required for future 2035 traffic increases 2035 + Proj: No mitigation required due to addition of project traffic Warrant Satisfied: 3	290	550	38.19%	430	29.86%	120	8.33%	1255	-
DiGiorgio Rd & South Union Ave - PM Peak 2020: No improvements required for future 2020 traffic increases 2020 + Proj: Add 1EL, 1WR & 1SR 2035: No improvements required for future 2035 traffic increases 2035 + Proj: Provide All-Way Stop Warrants Satisfied: 1 & 3	544	793	55.07%	588	40.83%	205	14.24%	1855	All-Way Stop, 1EL, 1WR & 1SR

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
DiGiorgio Rd & Cottonwood Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	224	98	7.66%	82	6.41%	16	1.25%	452	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
DiGiorgio Rd & Cottonwood Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	373	113	8.83%	78	6.09%	35	2.73%	668	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Lamb Ave/ Project Entrance # 1 & Chevalier Rd - AM Peak [4, 5]									
2020 + Proj: Add 1NL & 1NR	0	1410	97.92%	1379	95.76%	31	2.15%	1410	1NL
2035 + Proj: No mitigation required due to addition of project traffic									
Warrant Satisfied: 3									
Lamb Ave/ Project Entrance # 1 & Chevalier Rd - PM Peak [5]									
2020 + Proj: Provide All-Way Stop; Add 1ER, 1WL, 1NR & 1SR	0	1671	100.00%	1564	93.60%	107	6.40%	1671	All-Way Stop, 1ER, 1WL, 1NR & 1SR
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: 1 & 3									
Lamb Ave & South Union Ave- AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	193	410	28.47%	280	19.44%	130	9.03%	1082	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Lamb Ave & South Union Ave- PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	309	770	40.83%	564	29.90%	206	10.92%	1886	1ER
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: Add 1ER									
Warrants Satisfied: 1 & 3									
Project Entrance # 2 & South Union Ave- AM Peak [4, 5]									
2020 + Proj: No mitigation required due to addition of project traffic	170	212	14.72%	60	4.17%	152	10.56%	828	-
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Project Entrance # 2 & South Union Ave- PM Peak [5]									
2020 + Proj: No mitigation required due to addition of project traffic	288	733	33.44%	438	19.98%	295	13.46%	2192	-
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: 1 & 3									
Mugsy Ave & South Union Ave- AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	169	255	17.71%	184	12.78%	71	4.93%	859	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Mugsy Ave & South Union Ave- PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	286	827	43.46%	532	27.96%	295	15.50%	1903	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Houghton Rd & Stine Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	123	30	2.34%	21	1.64%	9	0.70%	197	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Stine Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	156	22	1.72%	11	0.86%	11	0.86%	229	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Wible Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	165	35	2.73%	26	2.03%	9	0.70%	302	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Wible Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	163	36	2.81%	17	1.33%	19	1.48%	316	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & South H St - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	199	49	3.83%	32	2.50%	17	1.33%	272	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & South H St - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	168	80	6.25%	35	2.73%	45	3.52%	286	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Frwy 99 Southbound On/Off Ramp/ Costajo St - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: Add 2SL & Construct Striped Median for EB & WB Approaches	239	1012	77.61%	904	69.33%	108	8.28%	1543	2SL & EB/WB
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		Striped Median
2035 + Proj: No mitigation required due to addition of project traffic									
Warrant Satisfied: 3									
Houghton Rd & Frwy 99 Southbound On/Off Ramp/ Costajo St - PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	282	1294	82.26%	760	48.32%	534	33.95%	1855	See AM
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: Add 1SL & Construct Striped Median for EB & WB Approaches									
Warrants Satisfied: 1 & 3									
Houghton Rd & Frwy 99 Northbound On/Off Ramp - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: Create All-Way Stop; Add 1ET & 1WL; Warrant Satisfied: 3	262	1767	85.12%	1550	74.66%	217	10.45%	2338	See PM
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Houghton Rd & Frwy 99 Northbound On/Off Ramp - PM Peak									
2020: No improvements required for future 2020 traffic increases									Signalize,
2020 + Proj: Provide Signal - Warrants Satisfied: 1 & 3; Add 1ET & 2WL	299	2946	86.77%	1829	53.87%	1117	32.90%	3694	1ET & 2WL
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Houghton Rd & Project Entrance # 4 - AM Peak [5]									
2020 + Proj: No mitigation required due to addition of project traffic	229	1833	77.28%	1551	65.39%	282	11.89%	2372	-
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Project Entrance # 4 - PM Peak [5]									
2020 + Proj: Add 1ET, 1WT & 1SR	248	3238	83.73%	1829	47.30%	1409	36.44%	3867	1ET, 1WT & 1SR
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: 1 & 3									
Houghton Rd & Chevalier Rd - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: Provide Signal - Warrant Satisfied: 3;	231	1818	75.56%	1594	66.25%	224	9.31%	2406	1EL
Add 2EL, 1WL, 1WR & 1SR									(See PM for
2035: No improvements required for future 2035 traffic increases									Remaining)
2035 + Proj: No mitigation required due to addition of project traffic									
Houghton Rd & Chevalier Rd - PM Peak									
2020: No improvements required for future 2020 traffic increases									Signalize,
2020 + Proj: Provide Signal - Warrants Satisfied: 1 & 3;	245	2935	82.51%	1957	55.02%	978	27.50%	3557	1EL, 1WL, 1WT,
Add 1EL, 1WL, 1WT, 1WR, 2SR & Overlap SR Phase									1WR, 2SR,
2035: No improvements required for future 2035 traffic increases									Overlap SR Phase
2035 + Proj: No mitigation required due to addition of project traffic									
Houghton Rd & Project Entrance # 3 - AM Peak [4, 5]									
2020 + Proj: No mitigation required due to addition of project traffic	232	306	23.91%	196	15.31%	110	8.59%	869	-
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Houghton Rd & Project Entrance # 3 - PM Peak [5]									
2020 + Proj: No mitigation required due to addition of project traffic	241	1196	65.71%	547	30.05%	649	35.66%	1820	-
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: 1 & 3									
Houghton Rd/ Buena Vista Blvd & South Union Ave - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	376	290	18.13%	217	13.56%	73	4.56%	1241	See PM
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrant Satisfied: 3									
Houghton Rd/ Buena Vista Blvd & South Union Ave - PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	500	918	43.59%	594	28.21%	324	15.38%	2106	1EL
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: Add 1EL									
Warrants Satisfied: 1 & 3									
Buena Vista Blvd & Cottonwood Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	268	60	4.69%	44	3.44%	16	1.25%	546	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Buena Vista Blvd & Cottonwood Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	308	181	14.14%	87	6.80%	94	7.34%	776	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Buena Vista Blvd & Adobe Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	259	45	3.52%	30	2.34%	15	1.17%	642	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Buena Vista Blvd & Adobe Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	351	145	11.33%	70	5.47%	75	5.86%	917	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: 1 & 3									
Shafter Rd & Chevalier Rd - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	9	26	2.03%	4	0.31%	22	1.72%	42	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Shafter Rd & Chevalier Rd - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	8	46	3.59%	16	1.25%	30	2.34%	60	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Shafter Rd & South Union Ave - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	111	50	3.47%	33	2.29%	17	1.18%	586	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Shafter Rd & South Union Ave - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	203	89	6.18%	37	2.57%	52	3.61%	1133	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Kaiser Ln & South Union Ave - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	106	53	3.68%	31	2.15%	22	1.53%	618	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Kaiser Ln & South Union Ave - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	189	69	4.79%	32	2.22%	37	2.57%	633	-
2035: No improvements required for future 2035 traffic increases									
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Frwy 99 Southbound On/Off Ramp & Costajo St - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	237	2	0.17%	1	0.08%	1	0.08%	583	-
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Frwy 99 Southbound On/Off Ramp & Costajo St - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	372	19	1.78%	17	1.59%	2	0.19%	824	-
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Bear Mountain Blvd/ SR 223 & Costajo St - AM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	309	8	0.71%	3	0.27%	5	0.44%	828	-
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Bear Mountain Blvd/ SR 223 & Costajo St - PM Peak [4]									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	575	23	2.66%	19	2.20%	4	0.46%	1014	-
2035: No improvements required for future 2035 traffic increases			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Warrants Satisfied: None									
Bear Mountain Blvd/ SR 223 & Frwy 99 Northbound On/Off Ramp - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	402	13	1.04%	8	0.64%	5	0.40%	1655	See PM
2035: Provide Signal - Warrant Satisfied: 3; Add 2WL			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Bear Mountain Blvd/ SR 223 & Frwy 99 Northbound On/Off Ramp - PM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	591	6	0.42%	3	0.21%	3	0.21%	2027	Signalize,
2035: Provide Signal - Warrants Satisfied: 1 & 3; Add 2WL			(Caltrans)		(Caltrans)		(Caltrans)		2WL
2035 + Proj: No mitigation required due to addition of project traffic									

Table 6: Intersection Improvements/Mitigation/Pro-Rata Share - 99 Houghton, LLC

Intersection/Mitigation [3]	Existing	Total Project Traffic @ Year 2035		Industrial Park Project Traffic @ Year 2035		General Commercial Project Traffic @ Year 2035		Year 2035 Future Traffic + Project	Improvements not Covered by RTIF or other funding sources
	PHV	PHV	% [1, 2]	PHV	% [1, 2]	PHV	% [1, 2]	PHV	
Bear Mountain Blvd/ SR 223 & South Union Ave - AM Peak									
2020: No improvements required for future 2020 traffic increases									
2020 + Proj: No mitigation required due to addition of project traffic	501	52	3.29%	31	1.96%	21	1.33%	2083	See PM
2035: Provide Signal - Warrant Satisfied: 3			(Caltrans)		(Caltrans)		(Caltrans)		
2035 + Proj: No mitigation required due to addition of project traffic									
Bear Mountain Blvd/ SR 223 & South Union Ave - PM Peak									
2020: Provide Signal - Warrants Satisfied: 1 & 3									Signalize,
2020 + Proj: No mitigation required due to addition of project traffic	751	62	3.37%	28	1.52%	34	1.85%	2593	1EL, 1ET & 1WL;
2035: Add 1EL, 1ET & 1WL; Rephase EL & WL from "Permitted" to "Protected"			(Caltrans)		(Caltrans)		(Caltrans)		Rephase EL & WL
2035 + Proj: No mitigation required due to addition of project traffic									to "Protected"

Notes:

PHV = Peak Hour Volume

NL = Northbound Left Lane, **NT** = Northbound Through Lane, **NR** = Northbound Right Lane

EL = Eastbound Left Lane, **ET** = Eastbound Through Lane, **ER** = Eastbound Right Lane

SL = Southbound Left Lane, **ST** = Southbound Through Lane, **SR** = Southbound Right Lane

WL = Westbound Left Lane, **WT** = Westbound Through Lane, **WR** = Westbound Right Lane

LOS = Level of Service, **Byd Std.** = Beyond City of Bakersfield Standard Detail T-4

RTIF = Regional Transportation Impact Fee, **s/v** = seconds per vehicle in delay

1 Percentages for State Facilities are based on Cal-Trans Formula: Project Volume/(Future Volume - Existing Volume)
Remaining percentages are based on standard formula: Project Volume / Future Volume

2 Project percentage of future traffic is shown in this column regardless of mitigation requirements.

3 Additional lanes required as shown are with reference to existing lanes at time of study survey. Since laneage configurations may have changed since time of survey, intersection analysis printouts contained in the appendix should be referred to for actual total laneage configurations required for mitigation.

4 Percentage share at this intersection is based on the project's contribution to the minimum threshold for signalization at this intersection (1280vph for 1 lane by 1 lane Approaches, 1440vph for 2 lane by 1 lane Approaches, and 1600vph for 2 lane by 2 lane Approaches).

5 Project created intersection. Developer shall be responsible for all improvement costs related to this intersection.

6 Improvements to this intersection are included in the Phase III Metropolitan Bakersfield Regional Transportation Impact Fee Program and therefore paid for by project's contribution to that fee program.

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
PANAMA LN and SR 99 SB Off Ramp AM PEAK	Existing	S		B			A					A		A	B
	2020 Future w/o Project	S		A			A					B		B	A
	2020 Future with Project	S		B			A					B		B	B
	2035 Future w/o Project	S		B			A					C		B	B
	2035 Future with Project	S		B			A					C		C	B
PANAMA LN and SR 99 SB Off Ramp PM PEAK	Existing	S		C			B					B		D	C
	2020 Future w/o Project	S		C			B					B		D	C
	2020 Future with Project	S		C			B					B		D	C
	2035 Future w/o Project	S		C			B					C		D	C
	2035 Future with Project	S		C			B					C		D	C
PANAMA LN and SR 99 NB Off Ramp AM PEAK	Existing	S		A			A		A		A				A
	2020 Future w/o Project	S		A			A		A		A				A
	2020 Future with Project	S		A			A		A		A				A
	2035 Future w/o Project	S		A			A		A		A				A
	2035 Future with Project	S		A			A		A		A				A
PANAMA LN and SR 99 NB Off Ramp PM PEAK	Existing	S		B			A		A		A				A
	2020 Future w/o Project	S		B			A		B		A				B
	2020 Future with Project	S		A			A		B		A				A
	2035 Future w/o Project	S		B			A		B		B				B
	2035 Future with Project	S		B			A		B		B				B
PANAMA LN and SOUTH H ST AM PEAK	Existing	S	D	B	B	E	C	B	E	B	B	D	C	C	C
	2020 Future w/o Project	S	F	C	C	F	D	C	F	C	C	D	D	D	D
	2020 Future w/o Project (Improved)	S	E	B	B	E	C	B	E	C	C	D	C	C	C
	2020 Future with Project	S	E	B	B	E	C	B	E	C	C	D	C	C	C
	2035 Future w/o Project	S	F	C	C	F	F	C	F	D	C	E	F	F	E
	2035 Future w/o Project (Improved)	S	E	C	C	F	C	C	D	C	B	D	D	C	C
	2035 Future with Project	S	E	C	C	F	C	C	D	C	B	D	D	C	C
PANAMA LN and SOUTH H ST PM PEAK	Existing	S	C	B	B	D	B	B	C	B	B	D	B	B	B
	2020 Future w/o Project	S	D	B	B	F	C	B	F	B	B	E	C	C	C
	2020 Future with Project	S	D	B	B	F	C	B	F	B	B	E	C	C	C
	2035 Future w/o Project	S	F	D	C	F	D	C	F	C	C	E	E	E	E
	2035 Future w/o Project (Improved)	S	E	C	B	F	C	B	D	C	C	E	D	C	C
	2035 Future with Project	S	E	C	B	F	C	B	D	C	C	E	D	C	C
PANAMA LN and SOUTH UNION AVE AM PEAK	Existing	S	E	B	B	E	C	B	E	B	B	F	B	B	C
	2020 Future w/o Project	S	E	C	B	E	C	C	E	C	B	F	C	C	C
	2020 Future with Project	S	E	C	B	E	C	C	E	C	B	F	C	C	C
	2035 Future w/o Project	S	F	E	C	F	F	D	F	D	C	F	F	C	E
	2035 Future w/o Project (Improved)	S	D	C	C	F	C	C	D	C	C	D	C	B	C
	2035 Future with Project	S	D	C	C	D	C	C	D	D	C	D	C	B	C
PANAMA LN and SOUTH UNION AVE PM PEAK	Existing	S	F	C	B	D	C	B	E	A	A	E	A	A	C
	2020 Future w/o Project	S	D	B	B	C	C	B	D	C	B	D	C	B	C
	2020 Future with Project	S	D	B	B	D	C	B	D	C	B	D	C	B	C
	2035 Future w/o Project	S	F	C	C	E	E	C	F	D	C	E	E	C	E
	2035 Future w/o Project (Improved)	S	D	C	C	D	C	C	D	C	B	D	C	B	C
	2035 Future with Project	S	D	C	C	E	C	C	D	C	B	D	C	B	C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
PANAMA LN and COTTONWOOD RD AM PEAK	Existing	AWS	B	B	B	A	A	A	A	A	A	A	A	A	B
	2020 Future w/o Project	AWS	F	F	F	C	C	C	C	C	C	C	C	C	E
	2020 Future w/o Project (Improved)	AWS	C	C	C	C	C	C	B	B	B	C	C	C	C
	2020 Future with Project	AWS	C	C	C	C	C	C	C	C	C	C	C	C	C
	2035 Future w/o Project	AWS	F	F	F	F	F	F	D	D	D	E	E	E	F
	2035 Future w/o Project (Improved)	S	D	B	B	F	C	C	C	C	C	D	D	D	C
	2035 Future with Project	S	D	B	B	E	C	C	B	B	B	D	D	D	C
PANAMA LN and COTTONWOOD RD PM PEAK	Existing	AWS	B	B	B	B	B	B	B	B	B	B	B	B	B
	2020 Future w/o Project	AWS	F	F	F	F	F	F	D	D	D	F	F	F	F
	2020 Future w/o Project (Improved)	AWS	C	C	C	D	D	D	B	B	B	B	B	B	C
	2020 Future with Project	AWS	C	C	C	D	D	D	B	B	B	B	B	B	C
	2035 Future w/o Project	AWS	F	F	F	F	F	F	C	C	C	C	C	C	F
	2035 Future w/o Project (Improved)	S	D	C	C	D	C	C	D	D	D	B	B	B	C
	2035 Future with Project	S	D	C	C	D	C	C	D	D	D	B	B	B	C
HOSKING AVE and SR 99 SB Off Ramp AM PEAK	Existing	N/A													
	2020 Future w/o Project	U		A			A					F		F	C
	2020 Future with Project	U		A			A					F		F	C
	2035 Future w/o Project	U		A			A					F		F	F
	2035 Future w/o Project (Improved)	U		A			A					E		E	C
	2035 Future with Project	U		A			A					F		E	C
HOSKING AVE and SR 99 SB Off Ramp PM PEAK	Existing	N/A													
	2020 Future w/o Project	U		A			A					F		F	F
	2020 Future w/o Project (Improved)	U		A			A					E		C	A
	2020 Future with Project	U		A			A					F		D	B
	2035 Future w/o Project	U		A			A					F		F	F
	2035 Future w/o Project (Improved)	U		A			A					D		F	D
	2035 Future w/o Project (Improved)	S		C			B					A		D	C
	2035 Future with Project	S		D			C					A		D	C
HOSKING AVE and SR 99 NB Off Ramp AM PEAK	Existing	N/A													
	2020 Future w/o Project	U		A			A		F		F				B
	2020 Future with Project	U		A			A		F		F				C
	2035 Future w/o Project	U		A			A		F		F				F
	2035 Future w/o Project (Improved)	U		A			A		F		B				B
	2035 Future with Project	U		A			A		F		B				B
HOSKING AVE and SR 99 NB Off Ramp PM PEAK	Existing	N/A													
	2020 Future w/o Project	U		A			A		F		F				E
	2020 Future w/o Project (Improved)	U		A			A		F		C				A
	2020 Future with Project	U		A			A		F		C				C
	2035 Future w/o Project	U		A			A		F		E				F
	2035 Future w/o Project (Improved)	U		A			A		F		B				F
	2035 Future w/o Project (Improved)	S		C			A		E		E				C
	2035 Future with Project	S		D			A		E		E				C
HOSKING AVE and SOUTH H ST AM PEAK	Existing	AWS	D	D	D	B	B	B	B	B	B	B	B	B	C
	2020 Future w/o Project	AWS	F	F	F	F	F	F	E	E	E	F	F	F	F
	2020 Future w/o Project (Improved)	S	E	C	B	D	C	C	D	C	C	D	C	B	C
	2020 Future with Project	S	D	C	B	F	C	C	D	C	C	D	C	B	C
	2035 Future w/o Project	S	F	F	C	F	E	D	F	F	C	F	D	C	F
	2035 Future w/o Project (Improved)	S	D	C	B	D	D	C	E	C	C	D	C	C	C
	2035 Future with Project	S	D	C	B	D	D	C	E	C	C	D	C	C	C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
HOSKING AVE	Existing	AWS	B	B	B	B	B	B	B	B	B	B	B	B	B
and	2020 Future w/o Project	AWS	F	F	F	E	E	E	D	D	D	F	F	F	F
SOUTH H ST	2020 Future w/o Project (Improved)	AWS	D	D	D	C	C	C	C	C	C	C	C	C	C
PM PEAK	2020 Future with Project	AWS	D	D	D	C	C	C	C	C	C	C	C	C	C
	2035 Future w/o Project	AWS	F	F	F	F	F	F	F	F	F	F	F	F	F
	2035 Future w/o Project (Improved)	S	E	C	B	E	C	C	D	C	C	E	C	C	C
	2035 Future with Project	S	E	C	B	E	C	C	D	C	C	E	C	C	C
HOSKING AVE	Existing	AWS	C	C	C	B	B	B	C	C	C	E	E	E	D
and	2020 Future w/o Project	AWS	F	F	F	C	C	C	F	F	F	F	F	F	F
SOUTH UNION AVE	2020 Future w/o Project (Improved)	S	C	C	C	A	A	A	E	B	B	E	B	B	B
AM PEAK	2020 Future with Project	S	C	C	C	B	B	A	F	B	B	E	B	B	C
	2035 Future w/o Project	S	D	D	D	B	B	B	F	B	B	F	C	C	C
	2035 Future with Project	S	E	E	E	B	B	B	F	C	C	E	D	D	D
	2035 Future with Project (Mitigated)	S	D	C	C	D	D	C	E	B	B	E	C	C	C
HOSKING AVE	Existing	AWS	B	B	B	A	A	A	B	B	B	B	B	B	B
and	2020 Future w/o Project	AWS	C	C	C	B	B	B	D	D	D	F	F	F	F
SOUTH UNION AVE	2020 Future w/o Project (Improved)	U	F	F	F	A	A	A	A	A	A	A	A	A	D
PM PEAK	2020 Future w/o Project (Improved)	S	C	C	C	C	C	B	C	A	A	C	A	A	B
	2020 Future with Project	S	C	C	C	C	C	B	C	A	A	C	A	A	B
	2035 Future w/o Project	S	C	C	C	C	C	B	C	B	B	C	B	B	B
	2035 Future with Project	S	D	D	D	C	C	B	C	B	B	C	B	B	B
HOSKING AVE	Existing	U	B		B				A	A			A	A	A
and	2020 Future w/o Project	U	B		B				A	A			A	A	A
COTTONWOOD RD	2020 Future with Project	U	B		B				A	A			A	A	A
AM PEAK	2035 Future w/o Project	U	B		B				A	A			A	A	A
	2035 Future with Project	U	B		B				A	A			A	A	A
HOSKING AVE	Existing	U	B		B				A	A			A	A	A
and	2020 Future w/o Project	U	B		B				A	A			A	A	A
COTTONWOOD RD	2020 Future with Project	U	B		B				A	A			A	A	A
PM PEAK	2035 Future w/o Project	U	B		B				A	A			A	A	A
	2035 Future with Project	U	B		B				A	A			A	A	A
TAFT HWY/ SR 119	Existing (Signal Assumed)	S	F	A	A	C	A	A	B	B	A	B	B	A	B
and	2020 Future w/o Project	S	E	B	A	F	B	A	B	B	B	C	C	B	B
WIBLE RD	2020 Future with Project	S	F	B	A	F	B	A	C	C	B	C	C	B	B
AM PEAK	2035 Future w/o Project	S	E	F	A	F	B	A	E	E	D	F	F	D	E
	2035 Future w/o Project (Improved)	S	C	B	A	F	B	A	B	B	B	C	C	B	B
	2035 Future with Project	S	C	B	A	F	B	A	B	B	B	C	C	B	B
TAFT HWY/ SR 119	Existing (Signal Assumed)	S	D	A	A	F	B	A	B	B	B	B	B	B	B
and	2020 Future w/o Project	S	D	C	A	F	B	A	C	C	C	D	D	C	C
WIBLE RD	2020 Future with Project	S	E	C	A	F	B	A	C	C	C	D	D	C	C
PM PEAK	2035 Future w/o Project	S	F	F	A	F	C	B	E	E	D	F	F	D	F
	2035 Future w/o Project (Improved)	S	D	B	A	E	B	B	C	C	C	D	D	C	C
	2035 Future with Project	S	D	C	A	E	B	B	C	C	C	D	D	C	C
TAFT HWY/ SR 119	Existing	S		C	B	C	A		D		C	C	B	B	C
and	2020 Future w/o Project	S		D	B	D	B		E		D	E	C	C	D
SR 99 SB OFF RAMP/	2020 Future w/o Project (Improved)	S		C	B	C	B		E		C	C	B	B	C
COMPAGNONI ST	2020 Future with Project	S		C	B	C	B		E		C	C	B	B	C
AM PEAK	2035 Future w/o Project	S		D	C	E	B		D		D	E	B	C	D
	2035 Future w/o Project (Improved)	S		C	B	D	B		E		D	D	B	C	C
	2035 Future with Project	S		C	B	D	B		E		D	D	B	C	C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
TAFT HWY/ SR 119	Existing	S		D	B	D	B		D		C	E	B	C	D
and	2020 Future w/o Project	S		F	C	F	B		E		E	F	C	C	F
SR 99 SB OFF RAMP/	2020 Future w/o Project (Improved)	S		D	C	E	C		D		C	D	B	B	D
COMPAGNONI ST	2020 Future with Project	S		D	C	E	C		D		D	D	B	C	D
PM PEAK	2035 Future w/o Project	S		F	D	F	D		E		F	F	C	C	E
	2035 Future w/o Project (Improved)	S		D	B	F	B		D		D	E	C	C	D
	2035 Future with Project	S		D	B	F	C		D		D	E	C	C	D
TAFT HWY/ SR 119	Existing	S	E	A	A	A	B	B	F	B	B	F	B	B	C
and	2020 Future w/o Project	S	F	C	B	F	E	C	F	D	D	E	E	F	E
SOUTH H ST	2020 Future w/o Project (Improved)	S	E	B	B	F	C	C	E	C	C	D	C	D	C
AM PEAK	2020 Future with Project	S	E	B	B	F	C	C	E	C	C	D	C	D	C
	2035 Future w/o Project	S	F	C	B	F	F	C	F	D	D	F	D	F	F
	2035 Future w/o Project (Improved)	S	E	B	B	F	C	B	E	C	C	D	C	D	C
	2035 Future with Project	S	E	B	B	F	C	B	E	C	C	E	C	D	C
TAFT HWY/ SR 119	Existing	S	D	A	A	A	B	B	E	B	B	D	B	B	C
and	2020 Future w/o Project	S	F	C	A	F	D	B	F	E	D	E	E	E	D
SOUTH H ST	2020 Future w/o Project (Improved)	S	D	B	B	F	C	B	D	C	C	D	C	C	C
PM PEAK	2020 Future with Project	S	E	B	B	F	C	C	E	C	C	D	C	C	C
	2035 Future w/o Project	S	F	C	B	F	F	C	F	E	D	E	E	E	E
	2035 Future w/o Project (Improved)	S	D	B	B	F	C	C	D	C	C	D	C	C	C
	2035 Future with Project	S	D	B	B	F	C	C	D	D	C	E	C	C	C
TAFT HWY/ SR 119/	Existing	S	F	B	B	C	B	B	D	B	B	E	B	B	C
EAST PANAMA RD	2020 Future w/o Project	S	D	B	A	C	B	B	C	C	C	D	C	C	C
and	2020 Future with Project	S	D	B	B	C	C	C	D	B	B	D	C	B	C
SOUTH UNION AVE	2035 Future w/o Project	S	E	B	B	D	C	C	E	D	C	E	D	C	C
AM PEAK	2035 Future with Project	S	F	C	B	D	D	D	F	C	C	F	C	C	D
	2035 Future with Project (Mitigated)	S	E	B	B	D	D	B	E	C	C	E	C	C	C
TAFT HWY/ SR 119/	Existing	S	C	B	B	C	B	B	F	B	B	E	B	B	C
EAST PANAMA RD	2020 Future w/o Project	S	D	B	B	F	C	C	E	C	C	D	C	C	C
and	2020 Future with Project	S	D	C	B	F	D	D	D	C	C	E	C	C	C
SOUTH UNION AVE	2035 Future w/o Project	S	F	C	B	F	E	E	F	E	D	F	E	D	E
PM PEAK	2035 Future w/o Project (Improved)	S	D	B	B	D	C	C	D	C	C	D	C	C	C
	2035 Future with Project	S	D	C	B	F	C	C	D	C	C	D	C	C	C
EAST PANAMA RD	Existing	AWS	B	B	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future w/o Project	AWS	D	D	A	C	C	C	A	A	A	B	B	B	C
COTTONWOOD RD	2020 Future with Project	AWS	E	E	A	C	C	C	B	B	B	B	B	B	D
AM PEAK	2020 Future with Project (Mitigated)	S	A	A	A	A	A	A	A	A	A	B	B	A	A
	2035 Future w/o Project	S	B	B	A	A	A	A	B	B	B	B	B	B	B
	2035 Future with Project	S	B	B	A	A	A	A	B	B	B	B	B	B	B
EAST PANAMA RD	Existing	AWS	B	B	B	B	B	B	A	A	A	A	A	A	B
and	2020 Future w/o Project	AWS	F	F	F	E	E	E	B	B	B	B	B	B	F
COTTONWOOD RD	2020 Future w/o Project (Improved)	S	A	A	A	A	A	A	B	B	B	B	B	B	A
PM PEAK	2020 Future with Project	S	B	B	A	A	A	A	B	B	B	B	B	B	A
	2035 Future w/o Project	S	B	B	A	A	A	A	C	C	C	C	C	C	B
	2035 Future with Project	S	C	C	A	A	A	A	D	D	C	D	D	C	B
SR 99 NB OFF RAMP	Existing	U	A		A					A			A		A
and	2020 Future w/o Project	U	B		A					A			A		A
SOUTH H ST	2020 Future with Project	U	B		A					A			A		A
AM PEAK	2035 Future w/o Project	U	C		A					A			A		A
	2035 Future with Project	U	C		A					A			A		B

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
SR 99 NB OFF RAMP and SOUTH H ST PM PEAK	Existing	U	A		A					A			A		A
	2020 Future w/o Project	U	B		A					A			A		A
	2020 Future with Project	U	C		A					A			A		A
	2035 Future w/o Project	U	F		A					A			A		F
	2035 Future w/o Project (Improved)	U	C		C					A			A		B
	2035 Future with Project	U	C		C					A			A		B
CURNOW RD and SOUTH UNION AVE AM PEAK	Existing	U	B	B	A	B	B	B	A	A	A	A	A	A	A
	2020 Future w/o Project	U	B	B	A	B	B	B	A	A	A	A	A	A	A
	2020 Future with Project	U	B	B	A	C	C	C	A	A	A	A	A	A	A
	2035 Future w/o Project	U	B	B	A	B	B	B	A	A	A	A	A	A	A
	2035 Future with Project	U	C	C	B	C	C	C	A	A	A	A	A	A	A
CURNOW RD and SOUTH UNION AVE PM PEAK	Existing	U	B	B	A	B	B	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
	2020 Future with Project	U	C	C	B	D	D	D	A	A	A	A	A	A	A
	2035 Future w/o Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
	2035 Future with Project	U	D	D	B	D	D	D	A	A	A	A	A	A	A
CURNOW RD and COTTONWOOD RD AM PEAK	Existing	U	A		A				A	A			A	A	A
	2020 Future w/o Project	U	A		A				A	A			A	A	A
	2020 Future with Project	U	A		A				A	A			A	A	A
	2035 Future w/o Project	U	A		A				A	A			A	A	A
	2035 Future with Project	U	A		A				A	A			A	A	A
CURNOW RD and COTTONWOOD RD PM PEAK	Existing	U	A		A				A	A			A	A	A
	2020 Future w/o Project	U	A		A				A	A			A	A	A
	2020 Future with Project	U	A		A				A	A			A	A	A
	2035 Future w/o Project	U	A		A				A	A			A	A	A
	2035 Future with Project	U	A		A				A	A			A	A	A
DiGIORGIO RD and CHEVALIER RD AM PEAK	Existing	N/A													
	2020 Future with Project	U		A	A	A	A		A		A				A
	2035 Future with Project	U		A	A	A	A		B		B				A
DiGIORGIO RD and CHEVALIER RD PM PEAK	Existing	N/A													
	2020 Future with Project	U		A	A	A	A		A		A				A
	2035 Future with Project	U		A	A	A	A		A		A				A
DiGIORGIO RD and SOUTH UNION AVE AM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	U	E	E	E	C	C	C	A	A	A	A	A	A	A
	2035 Future w/o Project	U	A	A	A	B	B	B	A	A	A	A	A	A	A
	2035 Future with Project	U	F	F	F	D	D	D	A	A	A	A	A	A	A
DiGIORGIO RD and SOUTH UNION AVE PM PEAK	Existing	U	C	C	C	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	D	D	D	B	B	B	A	A	A	A	A	A	A
	2020 Future with Project	U	F	F	F	D	D	D	A	A	A	A	A	A	F
	2020 Future with Project (Mitigated)	U	F	D	D	F	F	B	A	A	A	A	A	A	C
	2035 Future w/o Project	U	E	A	A	E	E	B	A	A	A	A	A	A	A
	2035 Future with Project	U	F	F	F	F	F	B	A	A	A	B	A	A	F
	2035 Future with Project (Mitigated)	AWS	B	B	B	A	A	A	C	C	C	C	C	C	C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
DiGIORGIO RD and COTTONWOOD RD AM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
DiGIORGIO RD and COTTONWOOD RD PM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	B	B	B	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	B	B	B	A	A	A	A	A	A	A	A	A	B
LAMB AVE/ PROJ. ENTRANCE # 1 and CHEVALIER RD AM PEAK	Existing	N/A													
	2020 Future with Project	U	F	F	F	F	F	F	A	A	A	A	A	A	D
	2020 Future with Project (Mitigated)	U	E	E	E	F	F	F	A	A	A	A	A	A	C
	2035 Future with Project	U	E	E	E	F	F	F	A	A	A	A	A	A	C
LAMB AVE/ PROJ. ENTRANCE # 1 and CHEVALIER RD PM PEAK	Existing	N/A													
	2020 Future with Project	U	F	F	F	F	F	F	A	A	A	A	A	A	F
	2020 Future with Project (Mitigated)	AWS	B	B	A	C	A	A	B	B	B	D	D	A	C
	2035 Future with Project	AWS	B	B	A	C	A	A	B	B	B	D	D	A	C
LAMB AVE and SOUTH UNION AVE AM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	B	B	B	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	U	C	C	C	C	C	C	A	A	A	A	A	A	A
	2035 Future w/o Project	U	B	B	B	B	B	B	A	A	A	A	A	A	A
	2035 Future with Project	U	C	C	C	C	C	C	A	A	A	A	A	A	A
LAMB AVE and SOUTH UNION AVE PM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	B	B	B	B	B	B	A	A	A	A	A	A	A
	2020 Future with Project	U	F	F	F	C	C	C	A	A	A	A	A	A	C
	2035 Future w/o Project	U	C	C	C	B	B	B	A	A	A	A	A	A	A
	2035 Future with Project	U	F	F	F	E	E	E	A	A	A	A	A	A	F
	2035 Future with Project (Mitigated)	U	F	F	C	D	D	D	A	A	A	A	A	A	B
PROJ. ENTRANCE # 2 and SOUTH UNION AVE AM PEAK	Existing	N/A													
	2020 Future with Project	U			A				A	A			A	A	A
	2035 Future with Project	U			B				A	A			A	A	A
PROJ. ENTRANCE # 2 and SOUTH UNION AVE PM PEAK	Existing	N/A													
	2020 Future with Project	U			B				A	A			A	A	A
	2035 Future with Project	U			C				A	A			A	A	A
MUGSY AVE and SOUTH UNION AVE AM PEAK	Existing	U						A	A	A	A	A	A	A	A
	2020 Future w/o Project	U						A	A	A	A	A	A	A	A
	2020 Future with Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
MUGSY AVE and SOUTH UNION AVE PM PEAK	Existing	U						A	A	A	A	A	A	A	A
	2020 Future w/o Project	U						A	A	A	A	A	A	A	A
	2020 Future with Project	U	B	B	B	A	A	A	B	A	A	A	A	A	A
	2035 Future w/o Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	U	B	B	B	B	B	B	B	A	A	A	A	A	A

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
HOUGHTON RD and STINE RD AM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and STINE RD PM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and WIBLE RD AM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and WIBLE RD PM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and SOUTH H ST AM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and SOUTH H ST PM PEAK	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
HOUGHTON RD and SR 99 SB RAMPS/ COSTAJO ST AM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	A	A	A	A	A	A	B	B	A	B	B	A	A
	2020 Future with Project	U	A	A	A	A	A	A	B	B	A	F	F	A	F
	2020 Future with Project (Mitigated)	U	A	A	A	A	A	A	B	B	A	C	A	A	C
	2035 Future w/o Project	U	A	A	A	A	A	A	B	B	A	B	A	A	A
	2035 Future with Project	U	A	A	A	A	A	A	B	B	A	D	A	A	C
HOUGHTON RD and SR 99 SB RAMPS/ COSTAJO ST PM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	B	B	A	A
	2020 Future w/o Project	U	A	A	A	A	A	A	A	A	A	B	B	A	A
	2020 Future with Project	U	A	A	A	A	A	A	A	A	A	E	E	A	C
	2035 Future w/o Project	U	A	A	A	A	A	A	A	A	A	B	B	A	A
	2035 Future with Project	U	A	A	A	A	A	A	A	A	A	F	F	A	E
	2035 Future with Project (Mitigated)	U	A	A	A	A	A	A	A	A	A	F	B	B	C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
HOUGHTON RD and SR 99 NB RAMPS AM PEAK	Existing	U		A	A	A	A		B		A				A
	2020 Future w/o Project	U		A	A	A	A		B		A				A
	2020 Future with Project	U		A	A	B	B		F		F				F
	2020 Future with Project (Mitigated)	AWS		C	C	B	B		B		B				C
	2035 Future w/o Project	AWS		A	A	A	A		A		A				A
	2035 Future with Project	AWS		D	D	C	C		B		B				C
HOUGHTON RD and SR 99 NB RAMPS PM PEAK	Existing	U		A	A	A	A		B		A				A
	2020 Future w/o Project	U		A	A	A	A		B		A				A
	2020 Future with Project	U		A	A	F	F		F		E				F
	2020 Future with Project (Mitigated)	AWS		D	A	F	F		A		A				F
	2020 Future with Project (Mitigated)	S		C	C	C	A		C		C				C
	2035 Future w/o Project	S		B	B	B	A		A		A				B
	2035 Future with Project	S		C	C	C	A		C		C				C
HOUGHTON RD and PROJ. ENTRANCE # 4 AM PEAK	Existing	N/A													
	2020 Future with Project	U		A			A	A						B	A
	2035 Future with Project	U		A			A	A						B	A
HOUGHTON RD and PROJ. ENTRANCE # 4 PM PEAK	Existing	N/A													
	2020 Future with Project	U		A			A	A						F	F
	2020 Future with Project (Mitigated)	U		A			A	A						F	A
	2035 Future with Project	U		A			A	A						F	A
HOUGHTON RD and CHEVALIER RD AM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	U	F	F	F	A	A	A	F	F	B	F	F	F	F
	2020 Future with Project (Mitigated)	AWS	F	B	B	B	B	A	A	A	A	A	A	A	F
	2020 Future with Project (Mitigated)	S	D	A	A	F	D	C	D	D	D	D	D	D	C
	2035 Future w/o Project	S	A	B	B	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	S	D	A	A	E	D	C	D	D	D	D	D	D	C
HOUGHTON RD and CHEVALIER RD PM PEAK	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future w/o Project	U	A	A	A	A	A	A	A	A	A	A	A	A	A
	2020 Future with Project	U	E	E	E	A	A	A	F	F	B	F	F	F	F
	2020 Future with Project (Mitigated)	AWS	E	C	C	F	F	A	A	A	A	B	B	B	F
	2020 Future with Project (Mitigated)	S	D	A	A	F	D	C	D	D	D	D	D	C	C
	2035 Future w/o Project	S	A	A	A	A	A	A	A	A	A	A	A	A	A
	2035 Future with Project	S	D	A	A	F	D	C	E	E	D	D	D	C	C
HOUGHTON RD and PROJ. ENTRANCE # 3 AM PEAK	Existing	N/A													
	2020 Future with Project	U	A	A			A	A						B	A
	2035 Future with Project	U	A	A			A	A						B	A
HOUGHTON RD and PROJ. ENTRANCE # 3 PM PEAK	Existing	N/A													
	2020 Future with Project	U	A	A			A	A						E	A
	2035 Future with Project	U	A	A			A	A						F	A

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
HOUGHTON RD/	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
BUENA VISTA BLVD	2020 Future w/o Project	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future with Project	AWS	B	B	A	A	A	A	A	A	A	A	A	A	A
SOUTH UNION AVE	2035 Future w/o Project	AWS	B	B	A	A	A	A	A	A	A	A	A	A	B
AM PEAK	2035 Future with Project	AWS	C	C	A	B	B	A	B	B	A	A	A	A	B
HOUGHTON RD/	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
BUENA VISTA BLVD	2020 Future w/o Project	AWS	B	B	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future with Project	AWS	D	D	A	C	C	A	B	B	A	A	A	A	C
SOUTH UNION AVE	2035 Future w/o Project	AWS	C	C	A	B	B	A	B	B	A	B	B	A	B
PM PEAK	2035 Future with Project	AWS	F	F	A	E	E	A	C	C	A	B	B	A	E
	2035 Future with Project (Mitigated)	AWS	C	C	A	E	E	A	C	C	A	B	B	A	C
BUENA VISTA BLVD	Existing	U	A	A			A	A				A		A	A
and	2020 Future w/o Project	U	A	A			A	A				B		B	A
COTTONWOOD RD	2020 Future with Project	U	A	A			A	A				B		B	A
AM PEAK	2035 Future w/o Project	U	A	A			A	A				B		B	A
	2035 Future with Project	U	A	A			A	A				B		B	A
BUENA VISTA BLVD	Existing	U	A	A			A	A				A		A	A
and	2020 Future w/o Project	U	A	A			A	A				B		B	A
COTTONWOOD RD	2020 Future with Project	U	A	A			A	A				B		B	A
PM PEAK	2035 Future w/o Project	U	A	A			A	A				B		B	A
	2035 Future with Project	U	A	A			A	A				B		B	A
BUENA VISTA BLVD	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future w/o Project	U	A	A	A	A	A	A	B	B	B	A	A	A	A
ADOBE RD	2020 Future with Project	U	A	A	A	A	A	A	B	B	B	A	A	A	A
AM PEAK	2035 Future w/o Project	U	A	A	A	A	A	A	B	B	B	B	B	B	A
	2035 Future with Project	U	A	A	A	A	A	A	B	B	B	B	B	B	A
BUENA VISTA BLVD	Existing	U	A	A	A	A	A	A	B	B	B	A	A	A	A
and	2020 Future w/o Project	U	A	A	A	A	A	A	B	B	B	A	A	A	A
ADOBE RD	2020 Future with Project	U	A	A	A	A	A	A	B	B	B	A	A	A	A
PM PEAK	2035 Future w/o Project	U	A	A	A	A	A	A	C	C	C	A	A	A	A
	2035 Future with Project	U	A	A	A	A	A	A	C	C	C	B	B	B	A
SHAFTER RD	Existing	U				A		A		A	A	A	A		A
and	2020 Future w/o Project	U				A		A		A	A	A	A		A
CHEVALIER RD	2020 Future with Project	U				A		A		A	A	A	A		A
AM PEAK	2035 Future w/o Project	U				A		A		A	A	A	A		A
	2035 Future with Project	U				A		A		A	A	A	A		A
SHAFTER RD	Existing	U				A		A		A	A	A	A		A
and	2020 Future w/o Project	U				A		A		A	A	A	A		A
CHEVALIER RD	2020 Future with Project	U				A		A		A	A	A	A		A
PM PEAK	2035 Future w/o Project	U				A		A		A	A	A	A		A
	2035 Future with Project	U				A		A		A	A	A	A		A
SHAFTER RD	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future w/o Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
SOUTH UNION AVE	2020 Future with Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
AM PEAK	2035 Future w/o Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
	2035 Future with Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
SHAFTER RD	Existing	U	A	A	A	A	A	A	A	A	A	A	A	A	A
and	2020 Future w/o Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
SOUTH UNION AVE	2020 Future with Project	U	B	B	A	B	B	A	A	A	A	A	A	A	A
PM PEAK	2035 Future w/o Project	U	C	C	A	C	C	B	A	A	A	A	A	A	A
	2035 Future with Project	U	C	C	A	D	D	B	A	A	A	A	A	A	A
KAISER LN	Existing	U			A					A			A	A	A
and	2020 Future w/o Project	U			A					A			A	A	A
SOUTH UNION AVE	2020 Future with Project	U			A					A			A	A	A
AM PEAK	2035 Future w/o Project	U			A					A			A	A	A
	2035 Future with Project	U			A					A			A	A	A
KAISER LN	Existing	U			A					A			A	A	A
and	2020 Future w/o Project	U			A					A			A	A	A
SOUTH UNION AVE	2020 Future with Project	U			A					A			A	A	A
PM PEAK	2035 Future w/o Project	U			A					A			A	A	A
	2035 Future with Project	U			A					A			A	A	A
SR 99 SB RAMP	Existing	U				A		A		A	A	A	A		A
and	2020 Future w/o Project	U				B		A		A	A	A	A		A
COSTAJO ST	2020 Future with Project	U				B		A		A	A	A	A		A
AM PEAK	2035 Future w/o Project	U				B		A		A	A	A	A		A
	2035 Future with Project	U				B		A		A	A	A	A		A
SR 99 SB RAMP	Existing	U				B		A		A	A	A	A		A
and	2020 Future w/o Project	U				B		A		A	A	A	A		A
COSTAJO ST	2020 Future with Project	U				B		A		A	A	A	A		A
PM PEAK	2035 Future w/o Project	U				C		A		A	A	A	A		A
	2035 Future with Project	U				C		A		A	A	A	A		B
BEAR MOUNTAIN BLVD/	Existing	U	A	A			A	A				B		A	A
SR 223	2020 Future w/o Project	U	A	A			A	A				B		A	A
and	2020 Future with Project	U	A	A			A	A				B		A	A
COSTAJO ST	2035 Future w/o Project	U	A	A			A	A				C		A	B
AM PEAK	2035 Future with Project	U	A	A			A	A				C		A	B
BEAR MOUNTAIN BLVD/	Existing	U	A	A			A	A				B		A	A
SR 223	2020 Future w/o Project	U	A	A			A	A				C		A	A
and	2020 Future with Project	U	A	A			A	A				C		A	A
COSTAJO ST	2035 Future w/o Project	U	A	A			A	A				D		B	C
PM PEAK	2035 Future with Project	U	A	A			A	A				D		B	C
BEAR MOUNTAIN BLVD/	Existing	U		A	A	A	A		B		A				A
SR 223	2020 Future w/o Project	U		A	A	A	A		E		B				A
and	2020 Future with Project	U		A	A	A	A		E		B				A
SR 99 NB RAMP	2035 Future w/o Project	U		A	A	C	C		F		B				F
AM PEAK	2035 Future w/o Project (Improved)	AWS		D	D	F	F		B		A				F
	2035 Future w/o Project (Improved)	S		C	B	C	A		C		C				B
	2035 Future with Project	S		C	B	C	A		C		C				B
BEAR MOUNTAIN BLVD/	Existing	U		A	A	A	A		C		A				A
SR 223	2020 Future w/o Project	U		A	A	A	A		F		B				A
and	2020 Future with Project	U		A	A	A	A		F		B				A
SR 99 NB RAMP	2035 Future w/o Project	U		A	A	F	F		F		C				F
PM PEAK	2035 Future w/o Project (Improved)	AWS		F	A	E	E		A		A				F
	2035 Future w/o Project (Improved)	S		C	B	D	A		C		C				C
	2035 Future with Project	S		C	B	D	A		C		C				C

Table 7: Intersection Level of Service - 99 Houghton, LLC

			East Bound			West Bound			North Bound			South Bound			Intersection
Intersection	**Scenario**	**Type**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Composite**
BEAR MOUNTAIN BLVD/	Existing	AWS	A	A	A	A	A	A	A	A	A	A	A	A	A
SR 223	2020 Future w/o Project	AWS	C	C	A	C	C	A	B	B	A	B	B	B	C
and	2020 Future with Project	AWS	D	D	A	D	D	A	B	B	A	B	B	B	C
SOUTH UNION AVE	2035 Future w/o Project	AWS	F	F	A	F	F	A	B	B	A	C	C	C	F
AM PEAK	2035 Future w/o Project (Improved)	S	C	C	A	B	B	A	E	C	C	F	C	C	C
	2035 Future with Project	S	D	D	A	B	B	A	E	C	C	F	C	C	C
BEAR MOUNTAIN BLVD/	Existing	AWS	B	B	A	B	B	A	A	A	A	A	A	A	B
SR 223	2020 Future w/o Project	AWS	F	F	A	F	F	A	B	B	A	B	B	B	F
and	2020 Future w/o Project (Improved)	S	B	B	A	A	A	A	E	C	C	D	B	B	B
SOUTH UNION AVE	2020 Future with Project	S	B	B	A	A	A	A	E	C	C	E	B	B	B
PM PEAK	2035 Future w/o Project	S	F	F	A	B	B	A	F	E	E	F	E	E	F
	2035 Future w/o Project (Improved)	S	D	B	A	D	D	B	F	D	D	F	D	D	C
	2035 Future with Project	S	E	B	A	E	D	B	E	D	D	F	D	D	C

NOTES:
U-Unsignalized Intersection
S-Signalized Intersection
AWS - All Way Stop

See Appendix for computer reports for each intersection.

Table 8: Roadway Segment Analysis, Year 2020/2035 - 99 Houghton, LLC

ROADWAY SEGMENT	Base Year 2006 ADT (1000 vpd)	Volume to Capacity Ratio for Existing	Year 2020 ADT w/o Project (1000vpd)	Volume to Capacity Ratio for 2020 without Project		Year 2020 ADT with Project (1000vpd)	Volume to Capacity Ratio for 2020 with Project		Year 2035 ADT w/o Project (1000 vpd)	Volume to Capacity Ratio for 2035 without Project		Project Traffic @ Full Buildout (1000 vpd)	Year 2035 ADT with Project (1000 vpd)	Volume to Capacity Ratio for 2035 with Project		Project Share [4]
		w/ Existing Laneage		w/ Existing Laneage	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage			w/ Existing/ *Imprvd* lanes	w/ Mitigated Laneage	
Panama Ln															
- West of SR 99 SB Off Ramp [3]	31.9	0.53							55.5			-1.54	54.0		0%
- SR 99 SB Off Ramp to SR 99 NB Off Ramp	18.4	0.31	24.9	0.42		26.5	0.44		34.5	0.57		1.61	36.1	0.60	4.46%
- SR 99 NB Off Ramp to South H St [3]	22.9	0.38							36.4			-1.78	34.7		0%
- South H St to South Union Ave [3]	10.9	0.27							26.3			-1.11	25.2		0%
- South Union Ave to Cottonwood Rd [3]	8.0	0.54							21.7			-0.71	21.0		0%
- East of Cottonwood Rd [3]	8.0	0.54							14.9			-0.47	14.4		0%
Hosking Ave															
- West of SR 99 SB Off Ramp [3]	2.5	0.17							25.1			0.37	25.5		1.46%
- SR 99 SB Off Ramp to SR 99 NB Off Ramp [3]	2.5	0.17							22.1			0.11	22.2		0.50%
- SR 99 NB Off Ramp to South H St [3]	2.5	0.17							29.1			-1.89	27.2		0%
- South H St to South Union Ave [3]	2.3	0.16							11.8			-0.94	10.8		0%
- South Union Ave to Cottonwood Rd [3]	0.1	0.01							4.5			-0.18	4.3		0%
Taft Hwy/ SR 119/ East Panama Rd															
- West of Wible Rd	4.2	0.28	7.9	0.53		10.0	0.67		15.6	1.04	0.52	2.05	17.7	*0.59*	*15.21%*
- Wible Rd to SR 99 SB Off Ramp	6.1	0.41	10.0	0.67		12.1	0.81	0.40	16.9	*0.56*		2.10	19.0	*0.63*	*16.28%*
- SR 99 SB Off Ramp to South H St	8.6	0.57	15.8	1.06	0.53	17.0	*0.57*		30.4	*1.01*	0.76	1.15	31.6	*0.79*	*4.99%*
- South H St to South Union Ave	15.5	1.03	20.6	1.37	0.69	20.8	*0.69*		27.9	*0.93*	0.70	0.20	28.1	*0.70*	*1.55%*
- South Union Ave to Cottonwood Rd	13.3	0.89	16.7	1.11	0.56	18.2	*0.61*		21.2	*0.71*		1.48	22.7	0.76	6.51%
- East of Cottonwood Rd [3]	12.7	0.85							20.4			-0.52	19.9		0%
Curnow Rd (East of SR 99)															
- West of South Union Ave [3]	0.3	0.02							2.2			0.60	2.8		21.55%
- South Union Ave to Cottonwood Rd [3]	0.1	0.00							0.2			-0.01	0.2		0%
DiGiorgio Rd															
- Chevalier Rd to South Union Ave	N/A					0.5	0.04		0.0	0.00		0.53	0.5	0.04	100.00%
- South Union Ave to Cottonwood Rd	0.02	0.00	0.0	0.00		0.5	0.03		0.1	0.01		0.45	0.6	0.04	80.47%
- East of Cottonwood Rd [3]	0.41	0.03							0.2			0.44	0.6		72.38%
Lamb Ave															
- Chevalier Rd to South Union Ave	N/A					7.3	0.49		0.0	0.00		7.29	7.3	0.49	100.00%
- East of South Union Ave	0.0	0.00	0.1	0.00		0.2	0.01		0.3	0.02		0.12	0.4	0.03	30.77%
Mugsy Ave															
- West of South Union Ave	0.0	0.00	0.0	0.00		5.7	0.38		0.0	0.00		5.67	5.7	0.38	99.89%
- East of South Union Ave	0.0	0.00	0.0	0.00		0.02	0.00		0.0	0.00		0.01	0.04	0.00	27.78%
Houghton Rd/ Buena Vista Blvd															
- West of Stine Rd [3]	1.8	0.12							1.4			-0.07	1.4		0%
- Stine Rd to Wible Rd [3]	1.0	0.06							1.1			-0.07	1.0		0%
- Wible Rd to South H St [3]	0.7	0.05							0.9			0.07	0.9		7.19%
- South H St to SR 99 SB On/Off Ramps/ Costajo St [3]	1.1	0.07							2.2			0.06	2.3		2.49%
- SR 99 SB On/Off Ramps to SR 99 NB On/Off Ramp	2.7	0.18	3.4	0.23		9.7	0.65		4.4	0.29		6.35	10.7	0.71	59.23%
- SR 99 NB On/Off Ramps to Project Entrance # 4	4.6	0.31	5.5	0.37		17.9	1.19	0.60	6.7	*0.22*		12.36	19.1	*0.64*	64.75%
- Project Entrance # 4 to Chevalier Rd	4.6	0.31	5.5	0.37		17.9	1.20	0.60	6.6	*0.22*		12.46	19.1	*0.64*	65.25%
- Chevalier Rd to Project Entrance # 3	4.6	0.31	5.5	0.37		10.4	0.70		6.6	0.44		4.96	11.6	0.77	42.76%
- Project Entrance # 3 to South Union Ave	4.6	0.30	5.5	0.36		5.5	0.37		6.6	0.44		0.05	6.7	0.44	0.75%
- South Union Ave to Cottonwood Rd	4.6	0.31	5.2	0.35		5.3	0.36		5.9	0.39		0.14	6.0	0.40	2.26%
- Cottonwood Rd to Adobe Rd [3]	4.7	0.31							6.1			0.15	6.2		2.37%
- East of Adobe Rd [3]	4.7	0.31							6.1			0.17	6.2		2.66%
Shafter Rd															
- Chevalier Rd to South Union Ave [3]	0.0	0.00							0.1			0.09	0.2		55.13%
- East of South Union Ave [3]	0.01	0.00							0.3			-0.02	0.3		0%
Kaiser Ln															
- Chevalier Rd to South Union Ave [3]	0.0	0.00							0.1			0.19	0.3		73.08%

Table 8: Roadway Segment Analysis, Year 2020/2035 - 99 Houghton, LLC

ROADWAY SEGMENT	Base Year 2006 ADT (1000 vpd)	Volume to Capacity Ratio for Existing	Year 2020 ADT w/o Project (1000vpd)	Volume to Capacity Ratio for 2020 without Project		Year 2020 ADT with Project (1000vpd)	Volume to Capacity Ratio for 2020 with Project		Year 2035 ADT w/o Project (1000 vpd)	Volume to Capacity Ratio for 2035 without Project		Project Traffic @ Full Buildout (1000 vpd)	Year 2035 ADT with Project (1000 vpd)	Volume to Capacity Ratio for 2035 with Project		Project Share [4]
		w/ Existing Laneage		w/ Existing Laneage	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage			w/ Existing/ *Imprvd* lanes	w/ Mitigated Laneage	
Bear Mountain Blvd/ SR 223															
- West of Costajo St [3]	1.5	0.10							3.4			-0.10	3.3			*0%*
- Costajo St to SR 99 NB On/Off Ramp [3]	1.5	0.10							11.1			-0.69	10.5			*0%*
- SR 99 NB On/ Off Ramp to South Union Ave [3]	13.9	0.93							20.4			-1.91	18.5			*0%*
- East of South Union Ave [3]	14.1	0.94							21.4			-0.56	20.8			*0%*
Stine Rd																
- North of Houghton Rd [3]	0.3	0.02							0.7			0.06	0.8			7.50%
- South of Houghton Rd [3]	0.3	0.02							1.0			0.04	1.0			3.88%
Wible Rd																
- North of Taft Hwy/ SR 119 [3]	2.1	0.14							3.1			0.01	3.1			0.19%
- Taft Hwy/ SR 119 to Houghton Rd [3]	1.5	0.10							2.1			0.06	2.2			2.86%
- South of Houghton Rd [3]	0.9	0.06							1.8			0.20	2.0			9.66%
South H St																
- North of Panama Ln	10.9	0.27	13.7	0.34		15.4	0.39		17.6	0.44		1.66	19.3	0.48		8.62%
- Panama Ln to Hosking Ave	14.7	0.98	20.2	1.35	0.67	20.9	*0.70*		28.4	*0.95*	0.71	0.76	29.2	*0.73*		2.60%
- Hosking Ave to Taft Hwy/ SR 119	4.6	0.31	8.6	0.57		9.2	0.61		16.5	1.10	0.55	0.66	17.2	*0.57*		3.81%
- Taft Hwy/ SR 119 to SR 99 NB Off Ramp [3]	2.0	0.14							8.6			0.16	8.8			1.82%
- SR 99 NB Off Ramp to Curnow Rd (East) [3]	0.3	0.02							3.7			-0.34	3.4			0%
- Curnow Rd (West) to Houghton Rd [3]	0.4	0.03							0.3			0.06	0.4			16.67%
- South of Houghton Rd [3]	0.3	0.02							1.2			-0.09	1.1			0%
State Route 99																
- North of Panama Ln NB On/ SB Off Ramps [3]	97.5	0.65							166.6			-15.36	151.3			*0%*
- Panama Ln NB On/ SB Off Ramps to NB Off/ SB On Ramps [3]	66.9	0.45							130.6			-7.11	123.5			*0%*
- Panama Ln NB Off/ SB On Ramp to Hosking Ave NB On/ SB Off Ramps [3]	72.7	0.48							142.8			-4.82	137.9			*0%*
- Hosking Ave NB On/SB Off Ramps to NB Off/SB On Ramps [3]	72.7	0.48							116.0			0.18	116.2			*0.41%*
- Hosking Ave NB Off/ SB On Ramps to Taft Hwy NB On/ SB Off Ramps	72.7	0.48	93.0	0.62		95.6	0.64		121.0	0.81	0.60	2.64	123.6	*0.62*		*5.20%*
- Taft Hwy NB On/ SB Off Ramps to NB Off/ SB On Ramps	56.0	0.37	74.1	0.49		78.8	0.53		100.1	0.67		4.65	104.8	0.70		*9.54%*
- Taft Hwy NB Off/ SB On Ramps to Houghton Rd NB On/ SB Off Ramps	59.5	0.40	81.4	0.54		89.9	0.60		113.9	0.76		8.52	122.4	0.82	*0.61*	*13.56%*
- Houghton Rd NB On/ SB Off Ramp to NB Off/ SB On Ramps [3]	54.6	0.36							107.0			-2.69	104.3			*0%*
- Houghton Rd NB Off/ SB On Ramps to Bear Mountain Blvd SB On/ Off Ramp [3]	54.7	0.36							107.7			-2.13	105.6			*0%*
- Bear Mountain Blvd SB On/Off Ramp to NB On/ Off Ramp [3]	41.6	0.28							88.9			-0.34	88.6			*0%*
- South of Bear Mountain Blvd NB On/Off Ramp [3]	41.6	0.28							89.1			-0.34	88.8			*0%*
Chevalier Rd																
- DiGiorgio Rd to Lamb Ave/ Project Entrance # 1	N/A					0.4	0.03		0.0	0.00		0.41	0.4	0.03		100.00%
- Lamb Ave to Houghton Rd	N/A					7.5	0.50		0.0	0.00		7.51	7.5	0.50		100.00%
- Houghton Rd to Shafter Rd	*0.1*	0.01	0.1	0.01		0.6	0.04		0.1	0.01		0.48	0.6	0.04		82.76%
- Shafter Rd to Kaiser Ln	*0.1*	0.01	0.1	0.01		0.4	0.02		0.1	0.01		0.25	0.4	0.02		71.43%
South Union Ave/ SR 99 Business																
- North of Panama Ln	13.8	0.35	19.4	0.49		23.7	0.59		28.0	0.70		4.31	32.3	0.81	0.54	13.35%
- Panama Ln to Hosking Ave	8.1	0.20	13.7	0.34		18.9	0.47		23.9	0.60		5.25	29.2	0.73		17.98%
- Hosking Ave to Taft Hwy/ SR 119/ East Panama Rd	4.5	0.11	7.9	0.20		13.9	0.35		14.6	0.36		6.02	20.6	0.52		29.21%
- Taft Hwy/ SR 119/ East Panama Rd to Curnow Rd	1.8	0.04	3.7	0.09		13.6	0.34		8.0	0.20		9.94	17.9	0.45		55.45%
- Curnow Rd to DiGiorgio Rd	1.5	0.04	2.9	0.07		14.2	0.35		6.1	0.15		11.25	17.3	0.43		64.96%
- DiGiorgio Rd to Lamb Ave	1.4	0.03	2.6	0.07		13.6	0.34		5.4	0.14		10.99	16.4	0.41		66.99%
- Lamb Ave to Project Entrance # 2	1.3	0.03	2.6	0.07		8.3	0.21		5.4	0.13		5.70	11.1	0.28		51.41%
- Project Entrance # 2 to Mugsy Ave	1.3	0.03	2.6	0.07		8.3	0.21		5.4	0.13		5.70	11.1	0.28		51.41%
- Mugsy Ave to Houghton Rd/ Buena Vista Blvd	1.3	0.03	2.6	0.06		2.6	0.07		5.4	0.13		0.05	5.4	0.14		0.89%
- Houghton Rd/ Buena Vista Blvd to Shafter Rd	1.0	0.03	2.5	0.06		2.6	0.06		6.2	0.15		0.10	6.3	0.16		1.64%
- Shafter Rd to Kaiser Ln	0.8	0.02	2.2	0.05		2.2	0.06		6.3	0.16		0.06	6.3	0.16		1.00%
- Kaiser Ln to Bear Mountain Blvd/ SR 223 [3]	0.8	0.02							5.1			0.08	5.2			1.60%
- South of Bear Mountain Blvd/ SR 223 [3]	0.5	0.01							4.0			-1.06	3.0			0%

Table 8: Roadway Segment Analysis, Year 2020/2035 - 99 Houghton, LLC

ROADWAY SEGMENT	Base Year 2006 ADT (1000 vpd)	Volume to Capacity Ratio for Existing	Year 2020 ADT w/o Project (1000vpd)	Volume to Capacity Ratio for 2020 without Project		Year 2020 ADT with Project (1000vpd)	Volume to Capacity Ratio for 2020 with Project		Year 2035 ADT w/o Project (1000 vpd)	Volume to Capacity Ratio for 2035 without Project		Project Traffic @ Full Buildout (1000 vpd)	Year 2035 ADT with Project (1000 vpd)	Volume to Capacity Ratio for 2035 with Project		Project Share [4]
		w/ Existing Laneage		w/ Existing Laneage	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage		w/ Existing/ *Imprvd* lanes	w/ Improved Laneage			w/ Existing/ *Imprvd* lanes	w/ Mitigated Laneage	
Cottonwood Rd															
- North of Panama Ln	1.8	0.12	4.4	0.30		5.5	0.36		12.1	0.80		1.02	13.1	0.87	0.44	7.81%
- Panama Ln to Hosking Ave	0.1	0.01	0.7	0.05		2.3	0.15		3.8	0.25		1.64	5.4	0.36		30.14%
- Hosking Ave to East Panama Rd	0.1	0.01	0.6	0.04		2.5	0.17		2.4	0.16		1.94	4.4	0.29		44.37%
- East Panama Rd to Curnow Rd [3]	0.4	0.03							0.4			0.02	0.4			4.22%
- Curnow Rd to DiGiorgio Rd [3]	0.4	0.03							0.4			0.01	0.5			1.97%
- DiGiorgio Rd to Buena Vista Blvd [3]	0.04	0.00							0.4			0.01	0.4			2.12%
Adobe Rd															
- North of Buena Vista Blvd [3]	0.0	0.00							0.2			0.06	0.2			29.77%
- South of Buena Vista Blvd [3]	0.1	0.01							2.6			0.08	2.7			3.02%

NOTES:

1) Year 2035 ADT volumes are segment volumes from KernCOG's Regional, 2% Growth Traffic Model.

2) Roadway Volume-to-Capacity Ratios are based on the following Level-Of-Service "E" capacities for given roadway configurations.

3) Segments denoted with [3] are not analyzed beyond existing since Project Peak Hour Vehicles do not exceed the LOS threshold listed below in the v/c ratio-LOS-PHV listing

4) *Percentages for State Facilities are based on Cal-Trans Formula: Project Volume/(Future Volume - Existing Volume)*
Remaining percentages are based on standard formula: Project Volume / Future Volume

ROADWAY TYPE	LEVEL OF SERVICE "E" ADT CAPACITY
2-lane, Roadway *	15,000
4-Lane Undivided (Collector)	30,000
4-Lane Divided (Arterial)	40,000
6-Lane Divided	60,000
4-Lane Freeway	100,000
6-Lane Freeway	150,000
8-Lane Freeway	200,000

v/c Ratio	LOS	PHV
0.00-0.60	A	100
0.61-0.70	B	100
0.71-0.80	C	50
0.81-0.90	D	50
0.91-1.00	E	20
> 1.00	F	10

Threshold volumes come from the City of Bakersfield's Subdivision & Engineering Design Manual.

* - City of Bakersfield capacities are shown in the updated Traffic Section of the Subdivision & Engineering Design Manual
This capacity will be used for Caltrans and County roads for consistency

Table 9: Roadway Segment Laneage - 99 Houghton, LLC

Roadway Segment	Existing Configuration	Current General Plan Configuration	Improved Laneage for 2020	Mitigated Laneage for 2020 + Project	Improved Laneage for 2035	Mitigated Laneage for 2035 + Project	Project Pro-Rata Share
Panama Ln							
- West of SR 99 SB Off Ramp	6-lane, divided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 SB Off Ramp to SR 99 NB Off Ramp	6-lane, divided	6-lane, divided					
- SR 99 NB Off Ramp to South H St	6-lane, divided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South H St to South Union Ave	4-lane, divided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South Union Ave to Cottonwood Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- East of Cottonwood Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Hosking Ave							
- West of SR 99 SB Off Ramp	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 SB Off Ramp to SR 99 NB Off Ramp	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 NB Off Ramp to South H St	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South H St to South Union Ave	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South Union Ave to Cottonwood Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Taft Hwy/ SR 119/ East Panama Rd							
- West of Wible Rd	2-lane, undivided	6-lane, divided			4-lane, undivided		*15.21%*
- Wible Rd to SR 99 SB Off Ramp	2-lane, undivided	6-lane, divided		4-lane, undivided			*16.28%*
- SR 99 SB Off Ramp to South H St	2-lane, undivided	6-lane, divided	4-lane, undivided		4-lane, divided		*4.99%*
- South H St to South Union Ave	2-lane, undivided	6-lane, divided	4-lane, undivided		4-lane, divided		*1.55%*
- South Union Ave to Cottonwood Rd	2-lane, undivided	6-lane, divided	4-lane, undivided				6.51%
- East of Cottonwood Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Curnow Rd (East of SR 99)							
- West of South Union Ave	2-lane, undivided	4-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South Union Ave to Cottonwood Rd	2-lane, undivided	4-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
DiGiorgio Rd							
- Chevalier Rd to South Union Ave	N/A	4-lane, divided		2-lane, undivided			100.00%
- South Union Ave to Cottonwood Rd	2-lane, undivided	6-lane, divided					
- East of Cottonwood Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Lamb Ave							
- Chevalier Rd to South Union Ave	N/A	4-lane, divided		2-lane, undivided			100.00%
- East of South Union Ave	2-lane, undivided	4-lane, divided					
Mugsy Ave							
- West of South Union Ave	2-lane, undivided	2-lane, undivided					
- East of South Union Ave	2-lane, undivided	2-lane, undivided					
Houghton Rd/ Buena Vista Blvd							
- West of Stine Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Stine Rd to Wible Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Wible Rd to South H St	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South H St to SR 99 SB On/Off Ramps/ Costajo St	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 SB On/Off Ramps to SR 99 NB On/Off Ramp	2-lane, undivided	6-lane, divided					
- SR 99 NB On/Off Ramps to Project Entrance # 4	2-lane, undivided	6-lane, divided		4-lane, undivided			64.75%
- Project Entrance # 4 to Chevalier Rd	2-lane, undivided	6-lane, divided		4-lane, undivided			65.25%
- Chevalier Rd to Project Entrance # 3	2-lane, undivided	6-lane, divided					
- Project Entrance # 3 to South Union Ave	2-lane, undivided	6-lane, divided					
- South Union Ave to Cottonwood Rd	2-lane, undivided	6-lane, divided					
- Cottonwood Rd to Adobe Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- East of Adobe Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Shafter Rd							
- Chevalier Rd to South Union Ave	2-lane, undivided	4-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- East of South Union Ave	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Kaiser Ln							
- Chevalier Rd to South Union Ave	2-lane, undivided	4-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Bear Mountain Blvd/ SR 223							
- West of Costajo St	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Costajo St to SR 99 NB On/Off Ramp	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 NB On/ Off Ramp to South Union Ave	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- East of South Union Ave	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Stine Rd							
- North of Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Wible Rd							
- North of Taft Hwy/ SR 119	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Taft Hwy/ SR 119 to Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
South H St							
- North of Panama Ln	4-lane, divided	6-lane, divided					
- Panama Ln to Hosking Ave	2-lane, undivided	6-lane, divided	4-lane, undivided		4-lane, divided		2.60%
- Hosking Ave to Taft Hwy/ SR 119	2-lane, undivided	6-lane, divided			4-lane, undivided		3.81%
- Taft Hwy/ SR 119 to SR 99 NB Off Ramp	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- SR 99 NB Off Ramp to Curnow Rd (East)	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Curnow Rd (West) to Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Houghton Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				

Table 9: Roadway Segment Laneage - 99 Houghton, LLC

Roadway Segment	Existing Configuration	Current General Plan Configuration	Improved Laneage for 2020	Mitigated Laneage for 2020 + Project	Improved Laneage for 2035	Mitigated Laneage for 2035 + Project	Project Pro-Rata Share
State Route 99							
- North of Panama Ln NB On/ SB Off Ramps	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Panama Ln NB On/ SB Off Ramps to NB Off/ SB On Ramps	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Panama Ln NB Off/ SB On Ramp to Hosking Ave NB On/ SB Off Ramps	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Hosking Ave NB On/SB Off Ramps to NB Off/SB On Ramps	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Hosking Ave NB Off/ SB On Ramps to Taft Hwy NB On/ SB Off Ramps	6-lane, freeway	8-lane, freeway			8-lane, freeway		*5.20%*
- Taft Hwy NB On/ SB Off Ramps to NB Off/ SB On Ramps	6-lane, freeway	8-lane, freeway					
- Taft Hwy NB Off/ SB On Ramps to Houghton Rd NB On/ SB Off Ramps	6-lane, freeway	8-lane, freeway				8-lane, freeway	*13.56%*
- Houghton Rd NB On/ SB Off Ramp to NB Off/ SB On Ramps	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Houghton Rd NB Off/ SB On Ramps to Bear Mountain Blvd SB On/ Off Ramp	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Bear Mountain Blvd SB On/Off Ramp to NB On/ Off Ramp	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Bear Mountain Blvd NB On/Off Ramp	6-lane, freeway	8-lane, freeway	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Chevalier Rd							
- DiGiorgio Rd to Lamb Ave/ Project Entrance # 1	N/A	4-lane, divided		2-lane, undivided			100.00%
- Lamb Ave to Houghton Rd	N/A	4-lane, divided		2-lane, undivided			100.00%
- Houghton Rd to Shafter Rd	2-lane, undivided	4-lane, divided					
- Shafter Rd to Kaiser Ln	2-lane, undivided	4-lane, divided					
South Union Ave/ SR 99 Business							
- North of Panama Ln	4-lane, divided	6-lane, divided				6-lane, divided	13.35%
- Panama Ln to Hosking Ave	4-lane, divided	6-lane, divided					
- Hosking Ave to Taft Hwy/ SR 119/ East Panama Rd	4-lane, divided	6-lane, divided					
- Taft Hwy/ SR 119/ East Panama Rd to Curnow Rd	4-lane, divided	6-lane, divided					
- Curnow Rd to DiGiorgio Rd	4-lane, divided	6-lane, divided					
- DiGiorgio Rd to Lamb Ave	4-lane, divided	6-lane, divided					
- Lamb Ave to Project Entrance # 2	4-lane, divided	6-lane, divided					
- Project Entrance # 2 to Mugsy Ave	4-lane, divided	6-lane, divided					
- Mugsy Ave to Houghton Rd/ Buena Vista Blvd	4-lane, divided	6-lane, divided					
- Houghton Rd/ Buena Vista Blvd to Shafter Rd	4-lane, divided	6-lane, divided					
- Shafter Rd to Kaiser Ln	4-lane, divided	6-lane, divided					
- Kaiser Ln to Bear Mountain Blvd/ SR 223	4-lane, divided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Bear Mountain Blvd/ SR 223	4-lane, divided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Cottonwood Rd							
- North of Panama Ln	2-lane, undivided	6-lane, divided				4-lane, undivided	7.81%
- Panama Ln to Hosking Ave	2-lane, undivided	6-lane, divided					
- Hosking Ave to East Panama Rd	2-lane, undivided	6-lane, divided					
- East Panama Rd to Curnow Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- Curnow Rd to DiGiorgio Rd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- DiGiorgio Rd to Buena Vista Blvd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
Adobe Rd							
- North of Buena Vista Blvd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				
- South of Buena Vista Blvd	2-lane, undivided	6-lane, divided	Not analyzed beyond existing / Project added peak hour traffic is less than 50				

Table 10: Roadway Segment Analysis, Full Build-Out of Cumulative GPA/ZC Project List Plus 2% Growth - 99 Houghton, LLC

ROADWAY SEGMENT	Base Year 2006 ADT (kv/d)	V/C Ratio for Existing Volumes w/ Exist Laneage	Annual Growth Rate from KernCOG 2035 RTIF Model	KernCOG RTIF 2035 ADT[1] w/o Project (kv/d)	KernCOG RTIF 2035 ADT with Project (kv/d)	Differential Model PROJECT Traffic from 2035 RTIF (kv/d)	Cumulative GPA/ZC Buildout Traffic @ 2035 (kv/d)	V/C Ratio for Cumulative Model Traffic with GP Circ. Elem. Laneage
Panama Ln								
- SR 99 SB Off Ramp to SR 99 NB Off Ramp	18.4	0.31	2.19%	34.5	36.1	1.61	35.9	0.60
Taft Hwy/ SR 119/ East Panama Rd								
- West of Wible Rd	4.2	0.28	4.62%	15.6	17.7	2.05	25.8	0.34
- Wible Rd to SR 99 SB Off Ramp	6.1	0.41	3.57%	16.9	19.0	2.10	23.4	0.31
- SR 99 SB Off Ramp to South H St	8.6	0.39	4.44%	30.4	31.6	1.15	46.0	0.61
- South H St to South Union Ave	15.5	0.70	2.04%	27.9	28.1	0.20	32.2	0.54
- South Union Ave to Cottonwood Rd	13.3	0.61	1.61%	21.2	22.7	1.48	21.5	0.36
DiGiorgio Rd								
- South Union Ave to Cottonwood Rd	0.02	0.00	5.84%	0.1	0.6	0.45	0.4	0.01
Lamb Ave								
- Chevalier Rd to South Union Ave	N/A			0.0	7.3	7.29	0.3	0.01
- East of South Union Ave	0.0	0.00	10.74%	0.3	0.4	0.12	0.0	0.00
Mugsy Ave								
- West of South Union Ave	0.0	0.00	3.86%	0.0	5.7	5.67	4.2	0.28
- East of South Union Ave	0.0	0.00	9.25%	0.0	0.04	0.01	0.02	0.00
Houghton Rd/ Buena Vista Blvd								
- SR 99 SB On/Off Ramps to SR 99 NB On/Off Ramp	2.7	0.10	1.72%	4.4	10.7	6.35	13.8	0.23
- SR 99 NB On/Off Ramps to Project Entrance # 4	4.6	0.17	1.33%	6.7	19.1	12.36	20.9	0.35
- Project Entrance # 4 to Chevalier Rd	4.6	0.17	1.27%	6.6	19.1	12.46	20.9	0.35
- Chevalier Rd to Project Entrance # 3	4.6	0.17	1.27%	6.6	11.6	4.96	16.2	0.27
- Project Entrance # 3 to South Union Ave	4.6	0.17	1.28%	6.6	6.7	0.05	8.8	0.15
- South Union Ave to Cottonwood Rd	4.6	0.17	0.82%	5.9	6.0	0.14	6.3	0.10
South H St								
- North of Panama Ln	10.9	0.27	1.66%	17.6	19.3	1.66	18.9	0.32
- Panama Ln to Hosking Ave	14.7	0.98	2.30%	28.4	29.2	0.76	38.4	0.64
- Hosking Ave to Taft Hwy/ SR 119	4.6	0.31	4.49%	16.5	17.2	0.66	18.6	0.31
State Route 99								
- Hosking Ave NB Off/ SB On Ramps to Taft Hwy NB On/ SB Off Ramps	72.7	0.48	1.77%	121.0	123.6	2.64	138.2	0.69
- Taft Hwy NB On/ SB Off Ramps to NB Off/ SB On Ramps	56.0	0.37	2.02%	100.1	104.8	4.65	110.6	0.55
- Taft Hwy NB Off/ SB On Ramps to Houghton Rd NB On/ SB Off Ramps	59.5	0.40	2.26%	113.9	122.4	8.52	117.5	0.78
Chevalier Rd								
- DiGiorgio Rd to Lamb Ave/ Project Entrance # 1	N/A			0.0	0.4	0.41	9.3	0.31
- Lamb Ave to Houghton Rd	N/A			0.0	7.5	7.51	9.3	0.31
South Union Ave/ SR 99 Business								
- North of Panama Ln	13.8	0.35	2.47%	28.0	32.3	4.31	27.4	0.46
- Panama Ln to Hosking Ave	8.1	0.20	3.80%	23.9	29.2	5.25	23.2	0.39
- Hosking Ave to Taft Hwy/ SR 119/ East Panama Rd	4.5	0.11	4.17%	14.6	20.6	6.02	18.6	0.31
- Taft Hwy/ SR 119/ East Panama Rd to Curnow Rd	1.8	0.04	5.34%	8.0	17.9	9.94	15.2	0.25
- Curnow Rd to DiGiorgio Rd	1.5	0.04	5.03%	6.1	17.3	11.25	11.5	0.19
- DiGiorgio Rd to Lamb Ave	1.4	0.03	4.89%	5.4	16.4	10.99	11.4	0.19
- Lamb Ave to Project Entrance # 2	1.3	0.03	4.97%	5.4	11.1	5.70	11.1	0.19
- Project Entrance # 2 to Mugsy Ave	1.3	0.03	4.97%	5.4	11.1	5.70	11.1	0.19
- Mugsy Ave to Houghton Rd/ Buena Vista Blvd	1.3	0.03	5.06%	5.4	5.4	0.05	7.1	0.12
- Houghton Rd/ Buena Vista Blvd to Shafter Rd	1.0	0.03	6.31%	6.2	6.3	0.10	6.3	0.11
- Shafter Rd to Kaiser Ln	0.8	0.02	7.29%	6.3	6.3	0.06	6.2	0.10

Table 10: Roadway Segment Analysis, Full Build-Out of Cumulative GPA/ZC Project List Plus 2% Growth - 99 Houghton, LLC

ROADWAY SEGMENT	Base Year 2006 ADT (kv/d)	V/C Ratio for Existing Volumes w/ Exist Laneage	Annual Growth Rate from KernCOG 2035 RTIF Model	KernCOG RTIF 2035 ADT[1] w/o Project (kv/d)	KernCOG RTIF 2035 ADT with Project (kv/d)	Differential Model PROJECT Traffic from 2035 RTIF (kv/d)	Cumulative GPA/ZC Buildout Traffic @ 2035 (kv/d)	V/C Ratio for Cumulative Model Traffic with GP Circ. Elem. Laneage
Cottonwood Rd								
- North of Panama Ln	1.8	0.12	6.88%	12.1	13.1	1.02	7.9	0.13
- Panama Ln to Hosking Ave	0.1	0.01	12.19%	3.8	5.4	1.64	3.0	0.05
- Hosking Ave to East Panama Rd	0.1	0.01	10.28%	2.4	4.4	1.94	2.3	0.04

NOTES:

1) Year 2035 ADT volumes are segment volumes from KernCOG's Regional, 2% Growth Traffic Model used for the establishment of the RTIF program.

2) Cumulative Traffic Volumes are from KernCOG's Regional, 2% Growth Traffic Model modified to also include projected traffic resulting from full buildout of all pending and proposed GPA/ZC projects anticipated by the County of Kern and City of Bakersfield as provided to KernCOG.

3) Volume to Capacity Ratios indicated in BOLD text and greater than 0.80 indicate facilities that will experience service levels of less than "C" and cannot be mitigated without expansion beyond current agency standards. Consequently, the intersections along these corridors would require mitigation beyond current agency standards as well. Although unlikely, if full buildout of the current cumulative GPA/ZC project list actually occurs, these cumulative impacts would be considered "Significant and Unavoidable".

4) Roadway Volume-to-Capacity Ratios are based on the following Level-Of-Service "E" capacities for given roadway configurations.

ROADWAY TYPE	LEVEL OF SERVICE "E" ADT CAPACITY
2-lane, City of Bakersfield *	15,000
2-Lane Roadway, CalTrans Roadways **	22,050
2-Lane Roadway, Kern County Roadways **	26,850
4-Lane Undivided	30,000
4-Lane Divided	40,000
6-Lane Divided	60,000
8-Lane Divided *	90,000
6-Lane, Divided Expressway *	75,000
4-Lane Freeway	100,000
6-Lane Freeway	150,000
8-Lane Freeway	200,000

v/c Ratio	LOS	PHV
0.00-0.60	A	100
0.61-0.70	B	100
0.71-0.80	C	50
0.81-0.90	D	50
0.91-1.00	E	20
> 1.00	F	10

* - City of Bakersfield capacities are shown in the updated Traffic Section of the Subdivision & Engineering Design Manual

** - Refer to Appendix B: HCM 2000 Worksheets, Two-Lane Highway Capacity

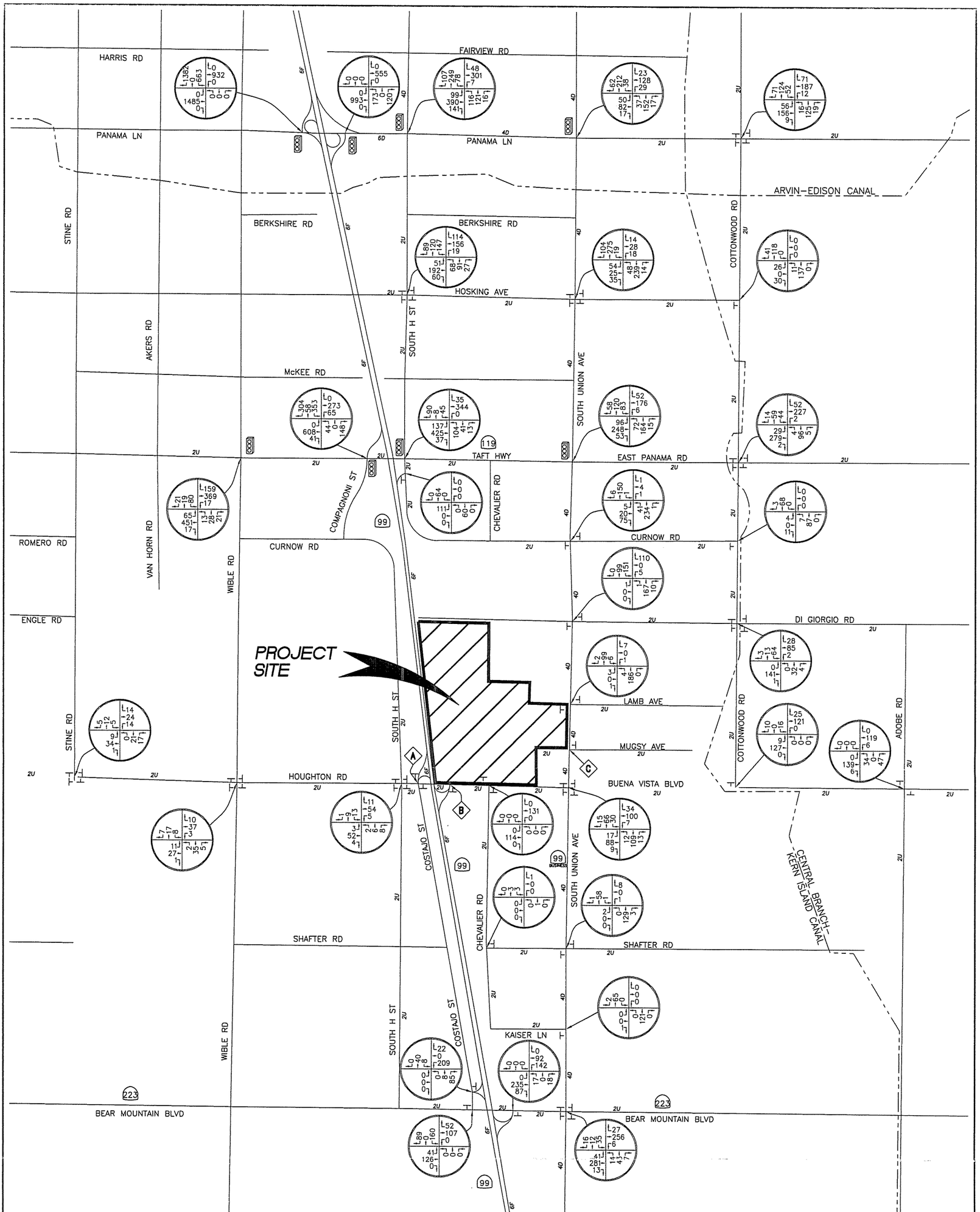


Figure 1 - Existing Peak Hour Turning Movements (PM)

SHEET 1 OF 18 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060121s01

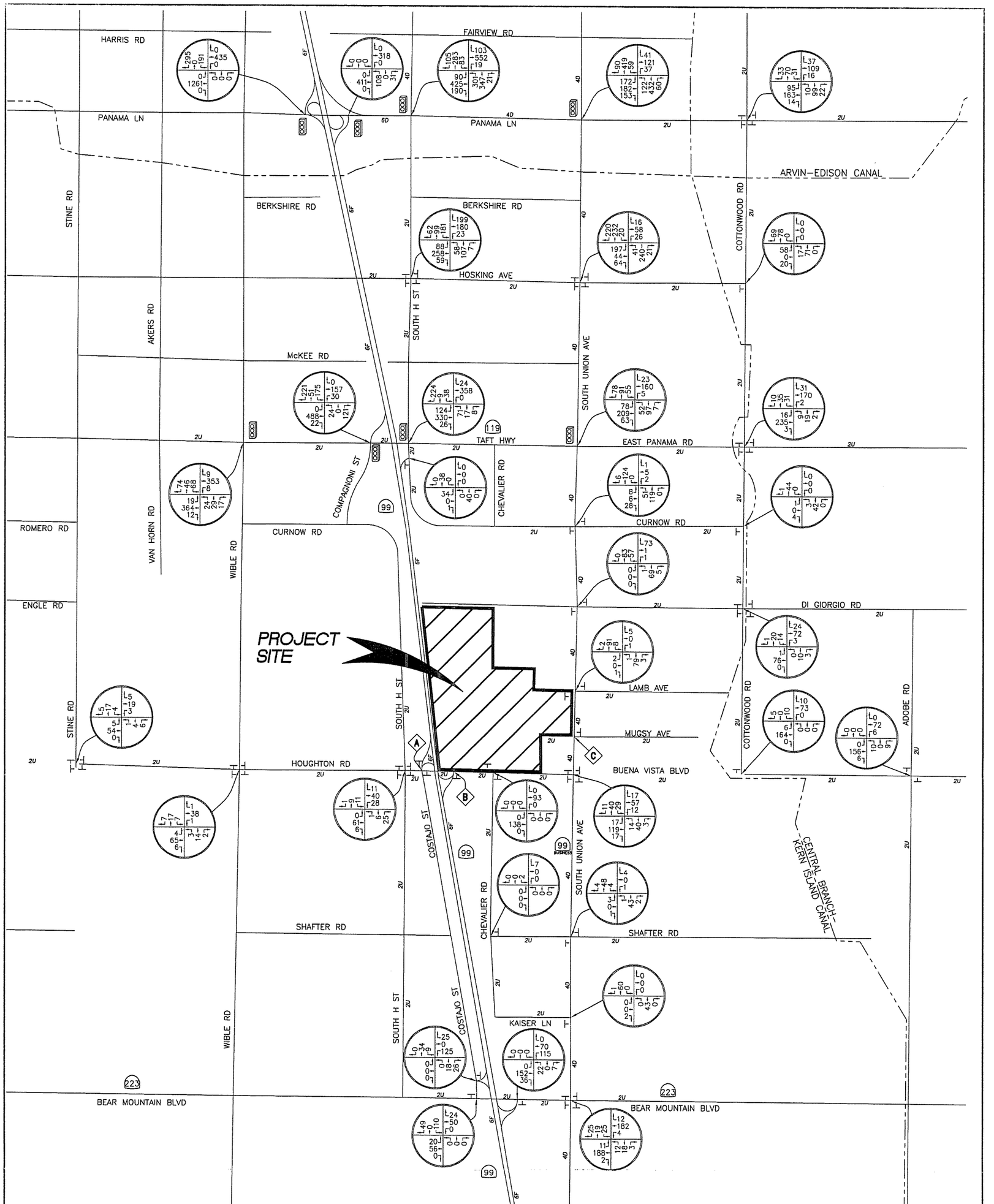
DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING

© 2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

FUTURE ROADWAY

CANAL

SIGNALIZED INTERSECTION

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

Figure 1A – Existing Peak Hour Turning Movements (AM)

SHEET 1A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 080121e01

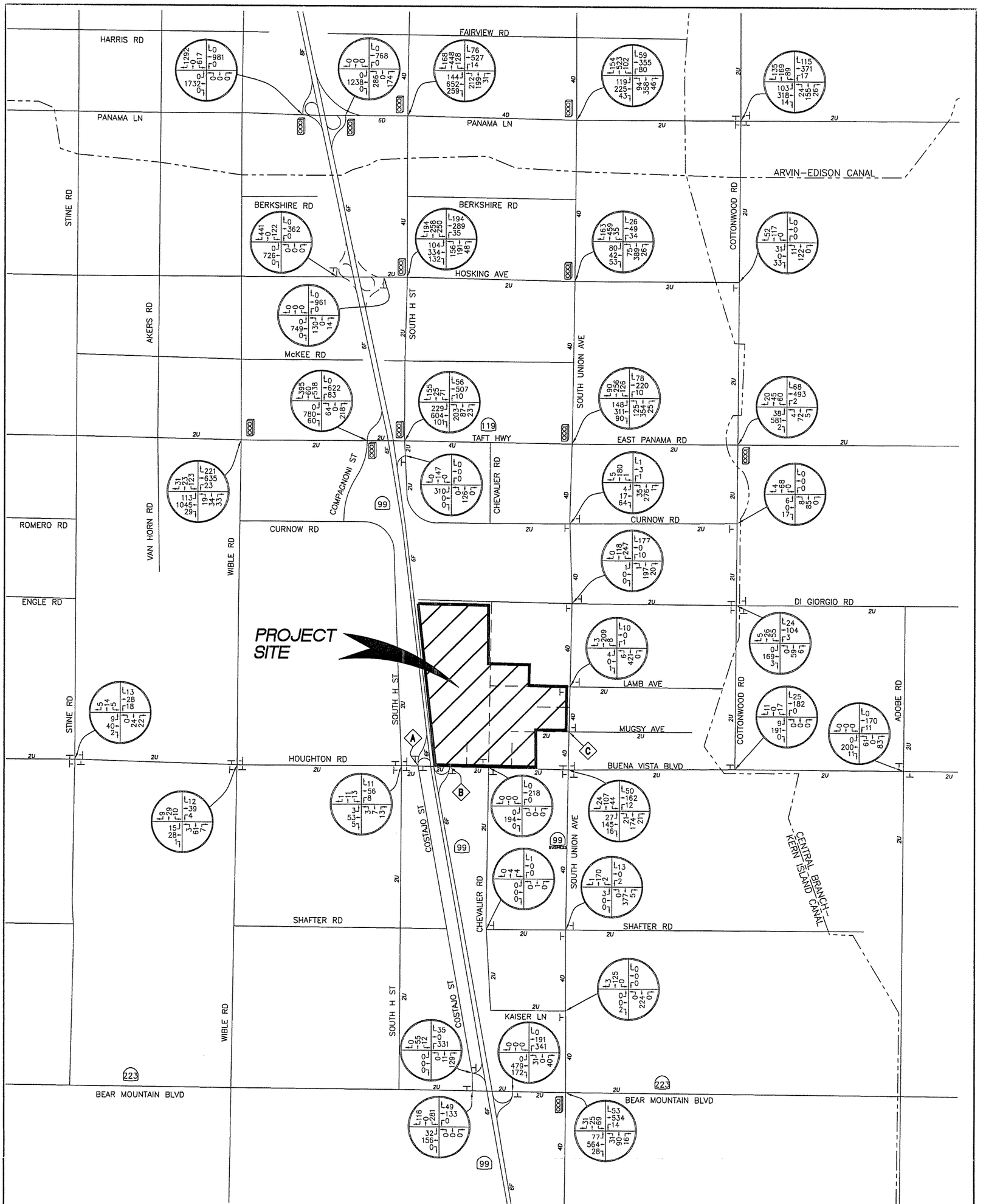
DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING

©2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

LEGEND

PEAK HOUR TURNING MOVEMENTS

SIGNALIZED INTERSECTION

UNSIGNALIZED INTERSECTION (2-Way / 4-Way Stop)

4U STREET SEGMENT LANEAGE (# Lanes, D-Divided, U-Undivided)

FUTURE ROADWAY

CANAL

Figure 2 - 2020 Future Peak Hour Turning Movements Without Project (PM)

SHEET 2 OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

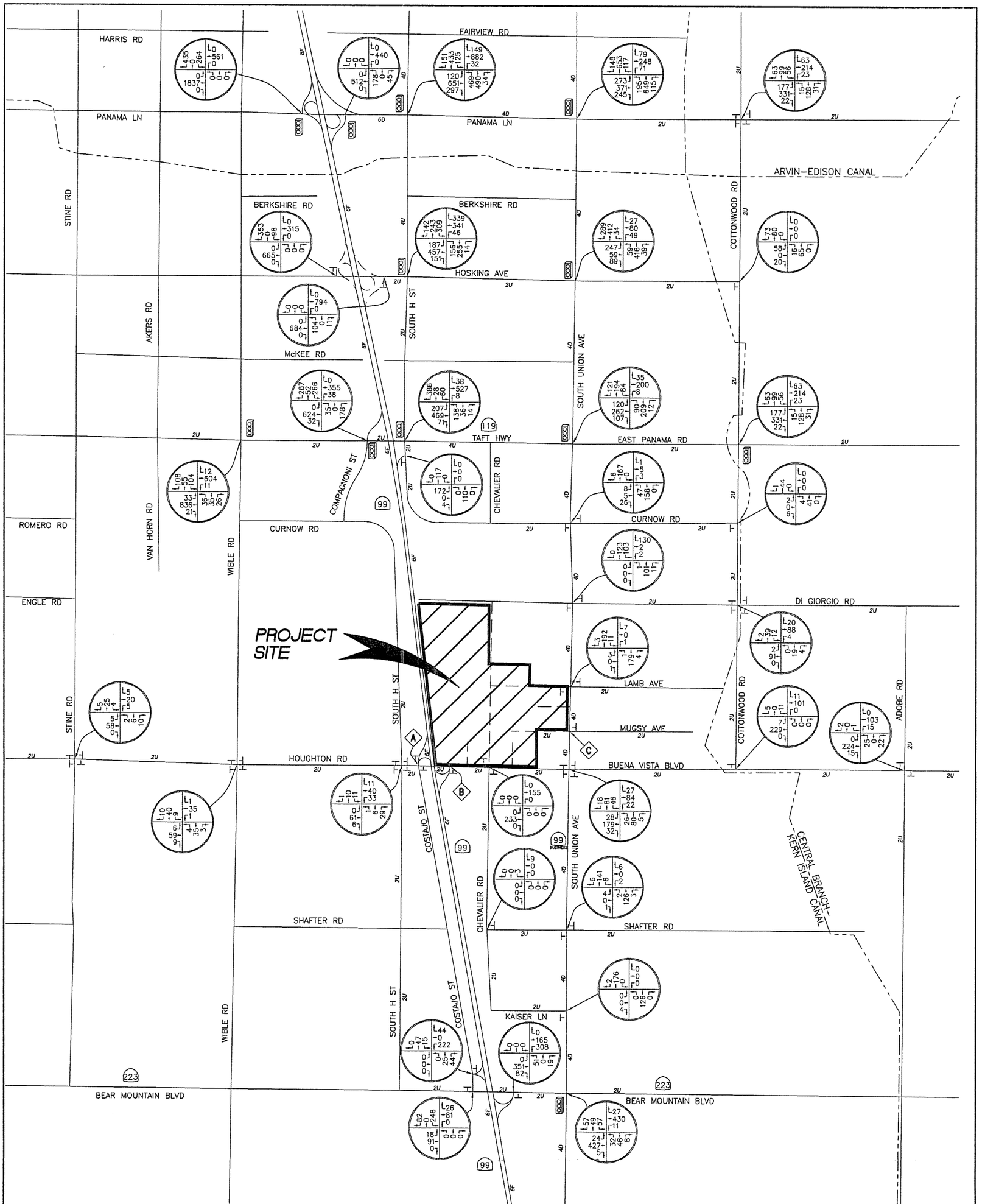
AutoCAD FILE: 060121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO. 05-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING
© 2008



HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

MUGSY AVE & SOUTH UNION AVE

LEGEND

PEAK HOUR TURNING MOVEMENTS

SIGNALIZED INTERSECTION

UNSIGNALIZED INTERSECTION (2-Way / 4-Way Stop)

4U STREET SEGMENT LANEAGE (# Lanes, D=Divided, U=Undivided)

FUTURE ROADWAY

CANAL

Figure 2A - 2020 Future Peak Hour Turning Movements Without Project (AM)

SHEET 2A OF 16 SHEETS

AutoCAD FILE: 060121a01

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING

© 2008

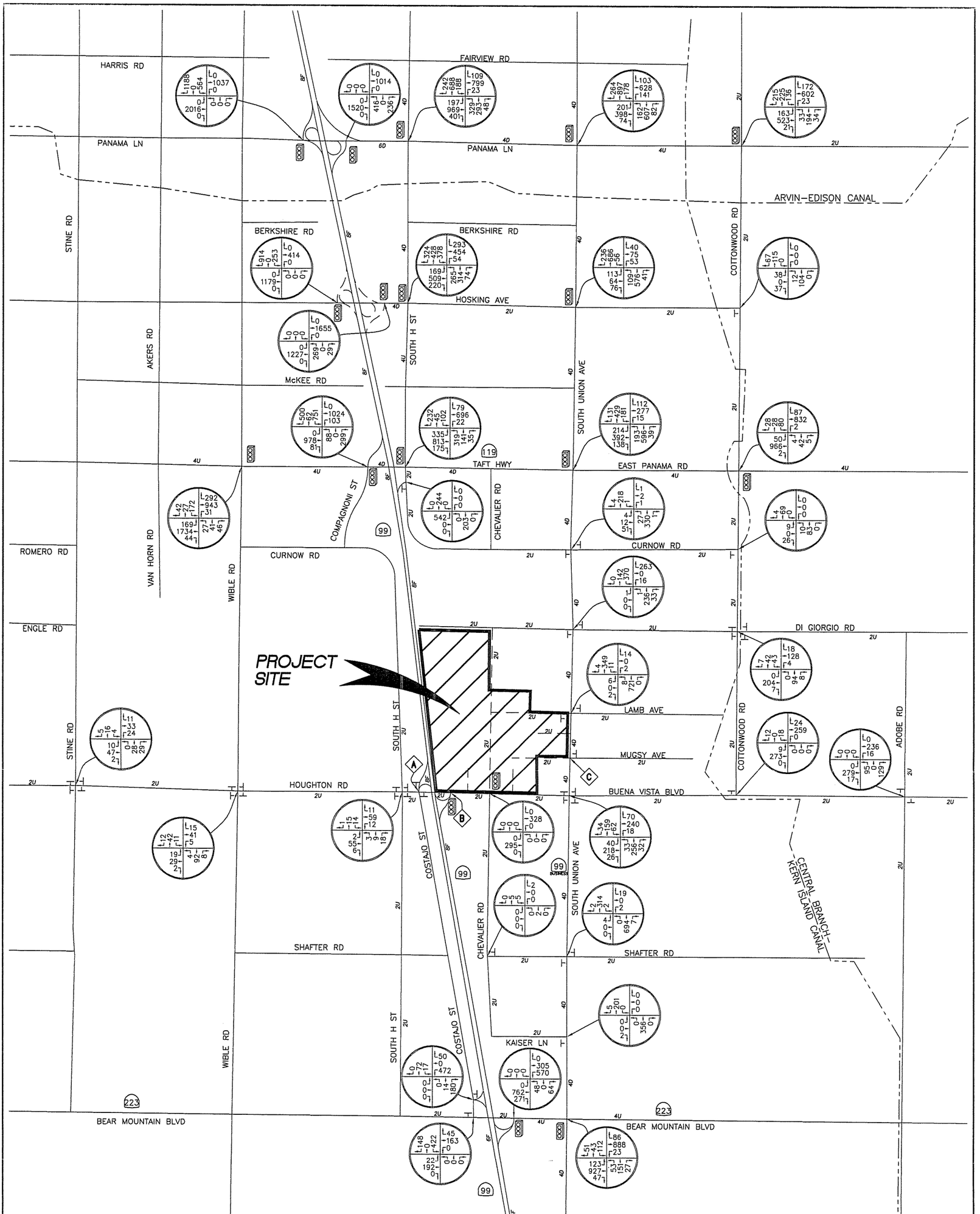


Figure 3 - 2035 Future Peak Hour Turning Movements Without Project (PM)

SHEET 3 OF 18 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060123s01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING ©2008

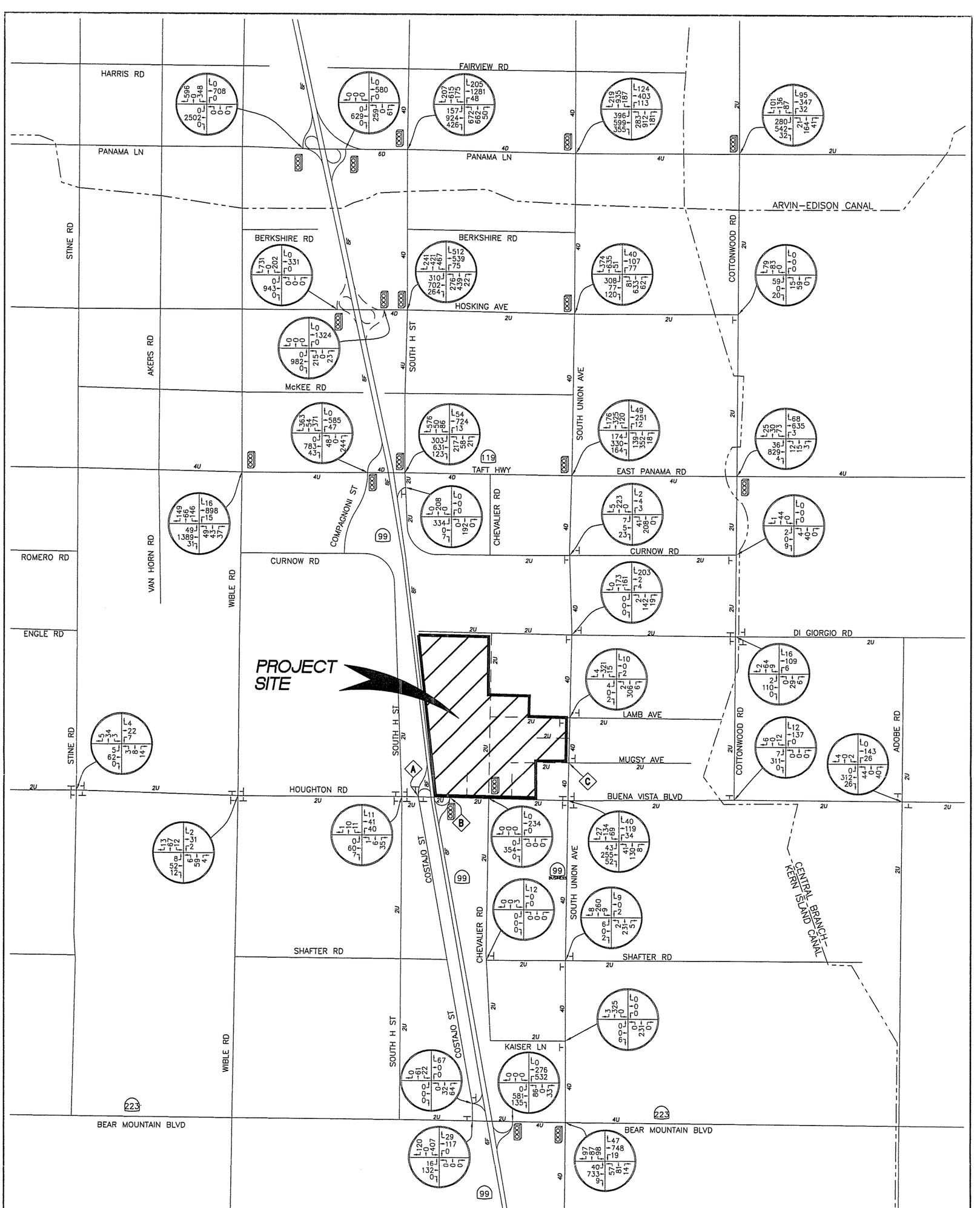


Figure 3A - 2035 Future Peak Hour Turning Movements Without Project (AM)

SHEET 3A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060123a01

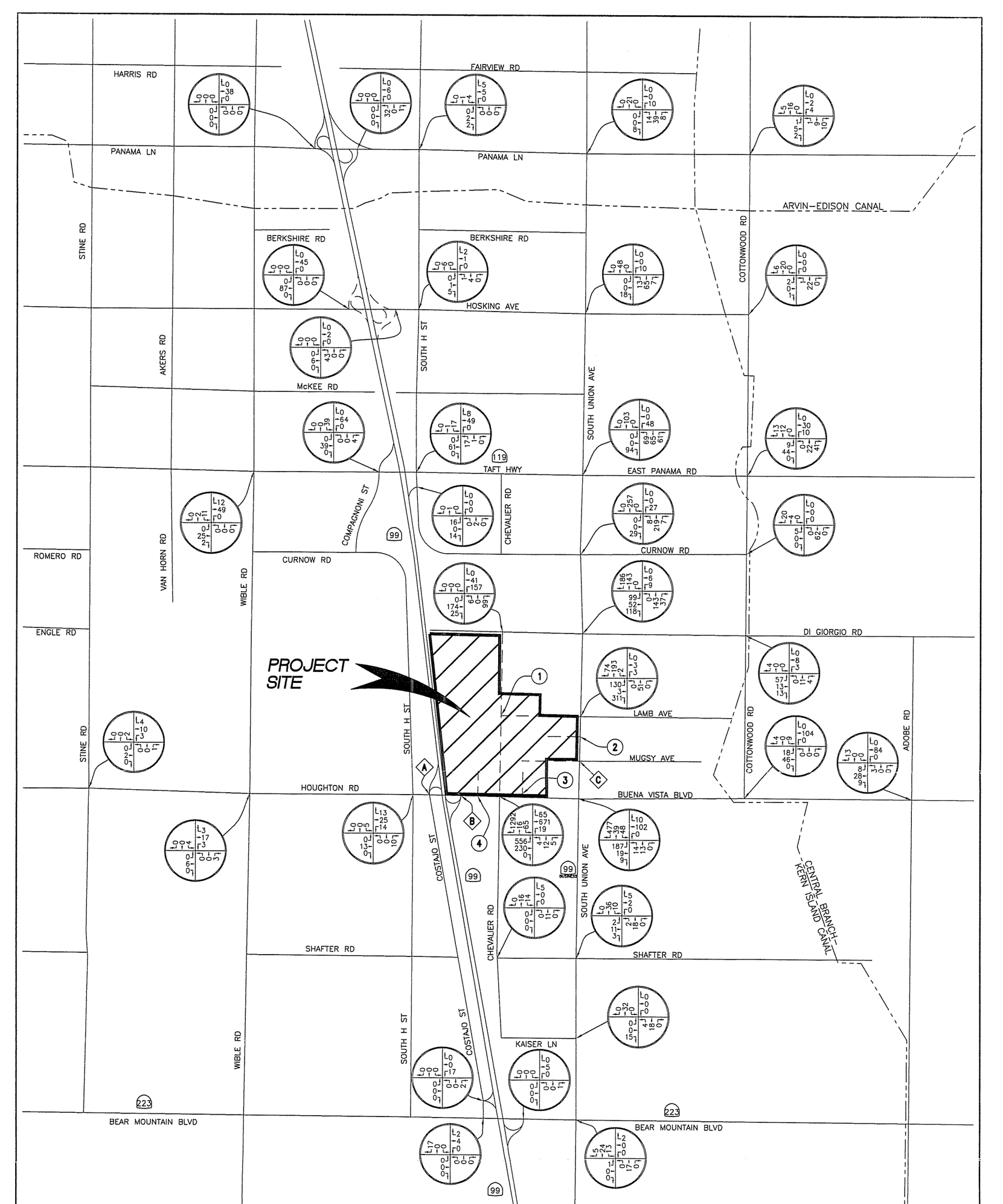
DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING

©2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U — STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

SIGNALIZED INTERSECTION

FUTURE ROADWAY

CANAL

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

Figure 4 - Total Project Generated Peak Hour Turning Movements (PM)

SHEET 4 OF 18 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060121s01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING © 2008

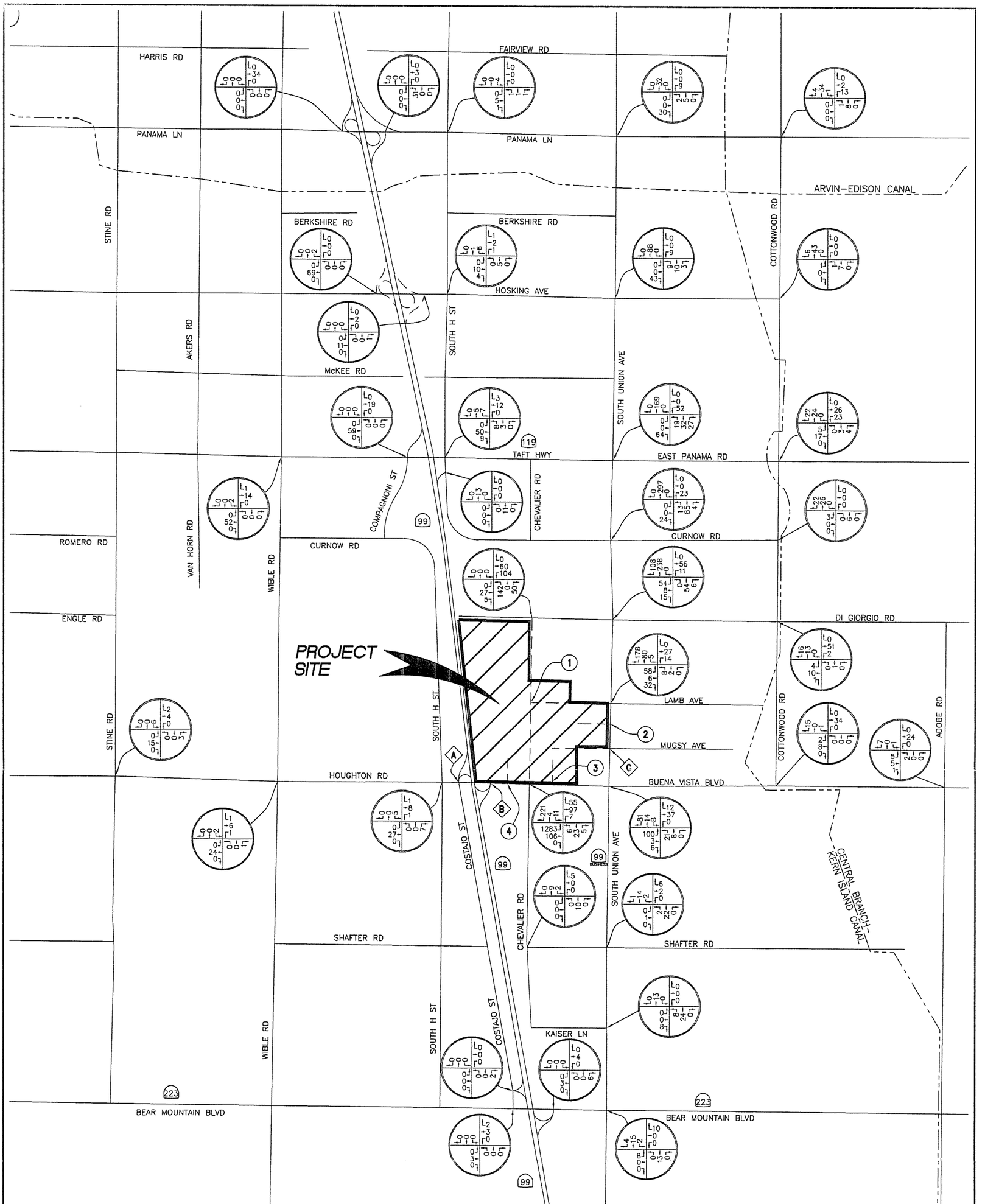


Figure 4A – Total Project Generated Peak Hour Turning Movements (AM)

SHEET 4A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

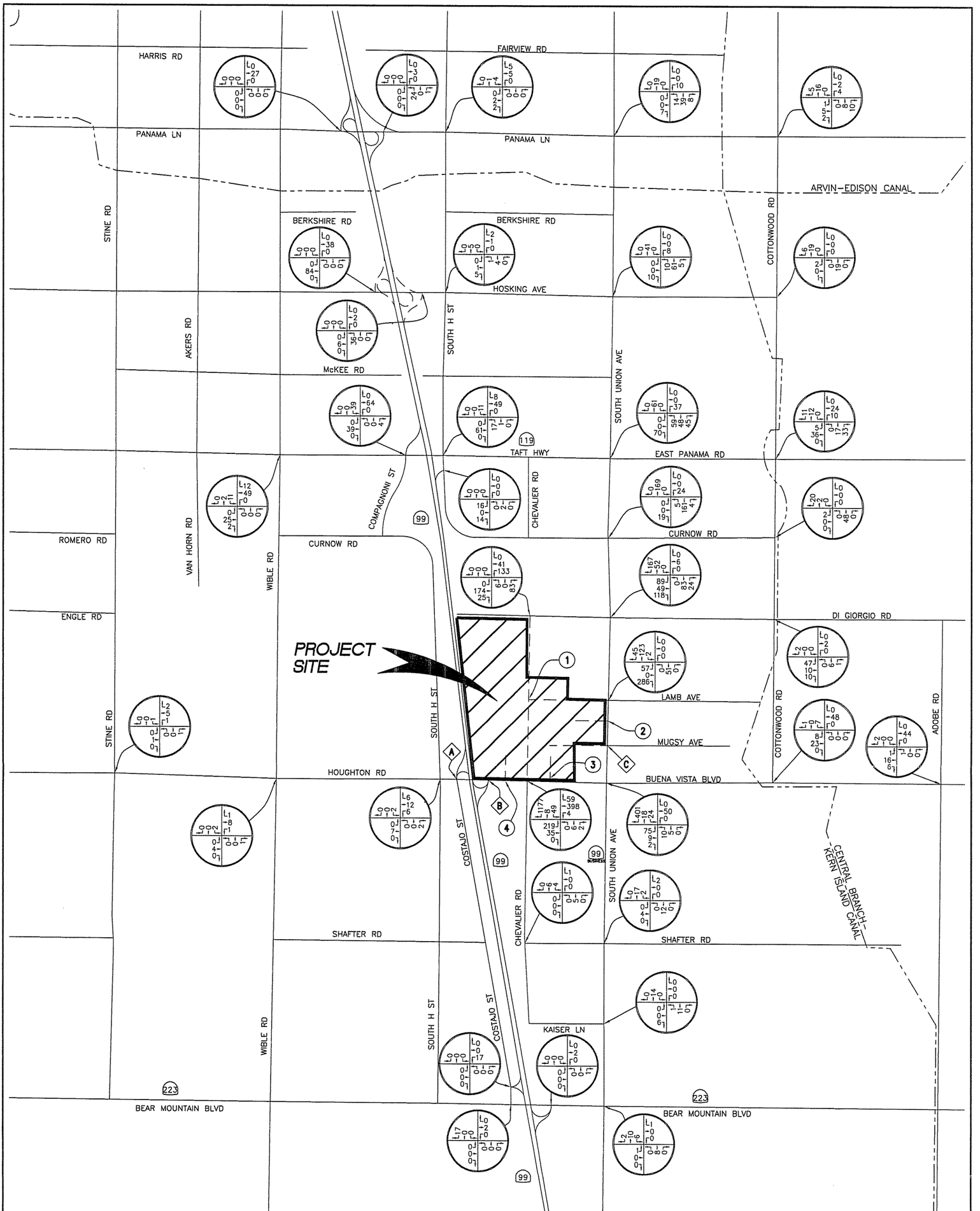
AutoCAD FILE: 060121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06–012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING ©2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

SIGNALIZED INTERSECTION

UNSIGNALIZED INTERSECTION (2-Way / 4-Way Stop)

4U — STREET SEGMENT LANEAGE (# Lanes, D-Divided, U-Undivided)

FUTURE ROADWAY

CANAL

Figure 5 - Industrial Generated Peak Hour Turning Movements (PM)

SHEET 5 OF 16 SHEETS

99 HOUGHTON, LLC

MITCHELL PROPERTY

TRAFFIC STUDY MAP

AutoCAD FILE: 080121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR	JOB NO. 06-012
CHECKED BY:	DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING ©2008

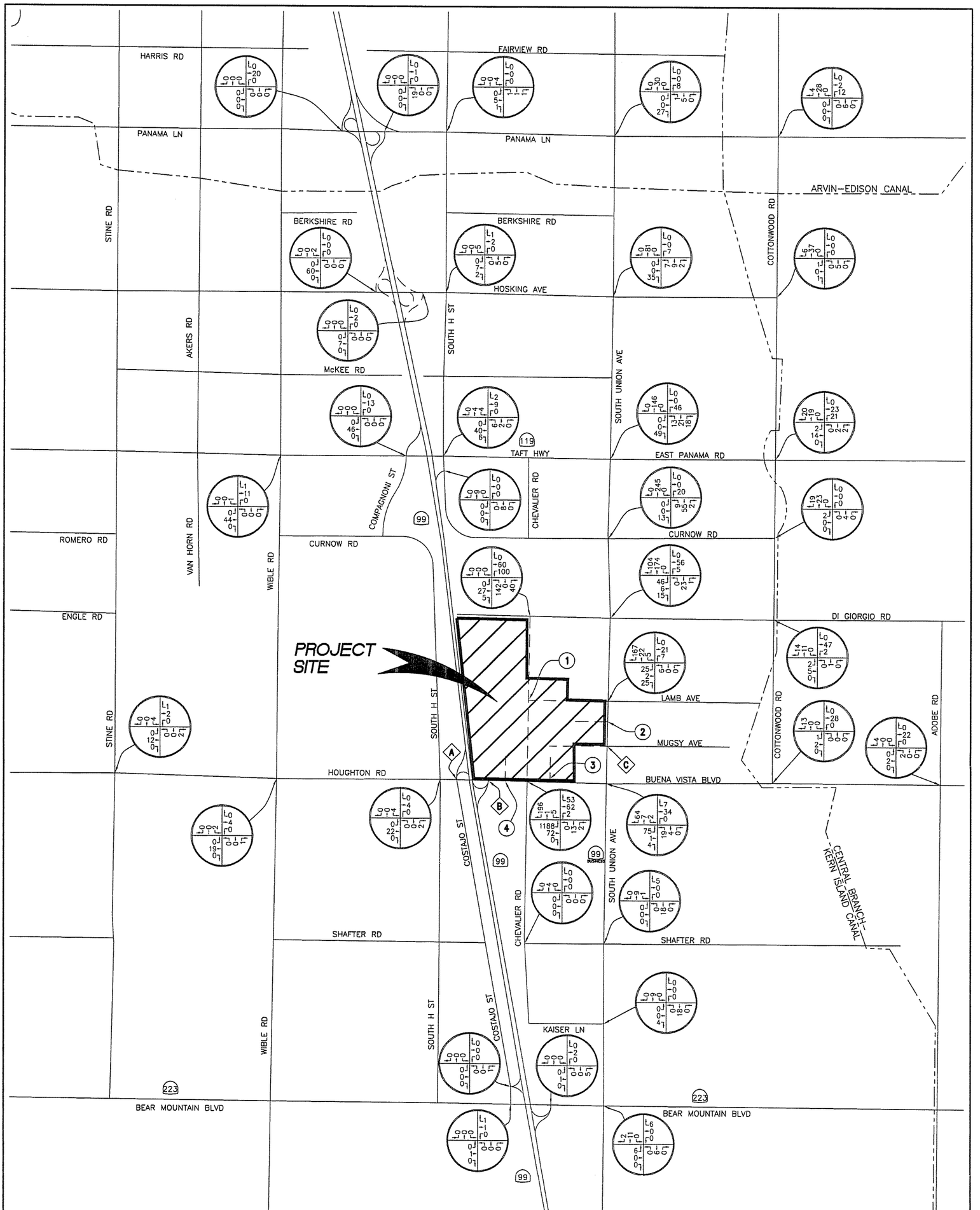


Figure 5A - Industrial Generated Peak Hour Turning Movements (AM)

SHEET 5A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

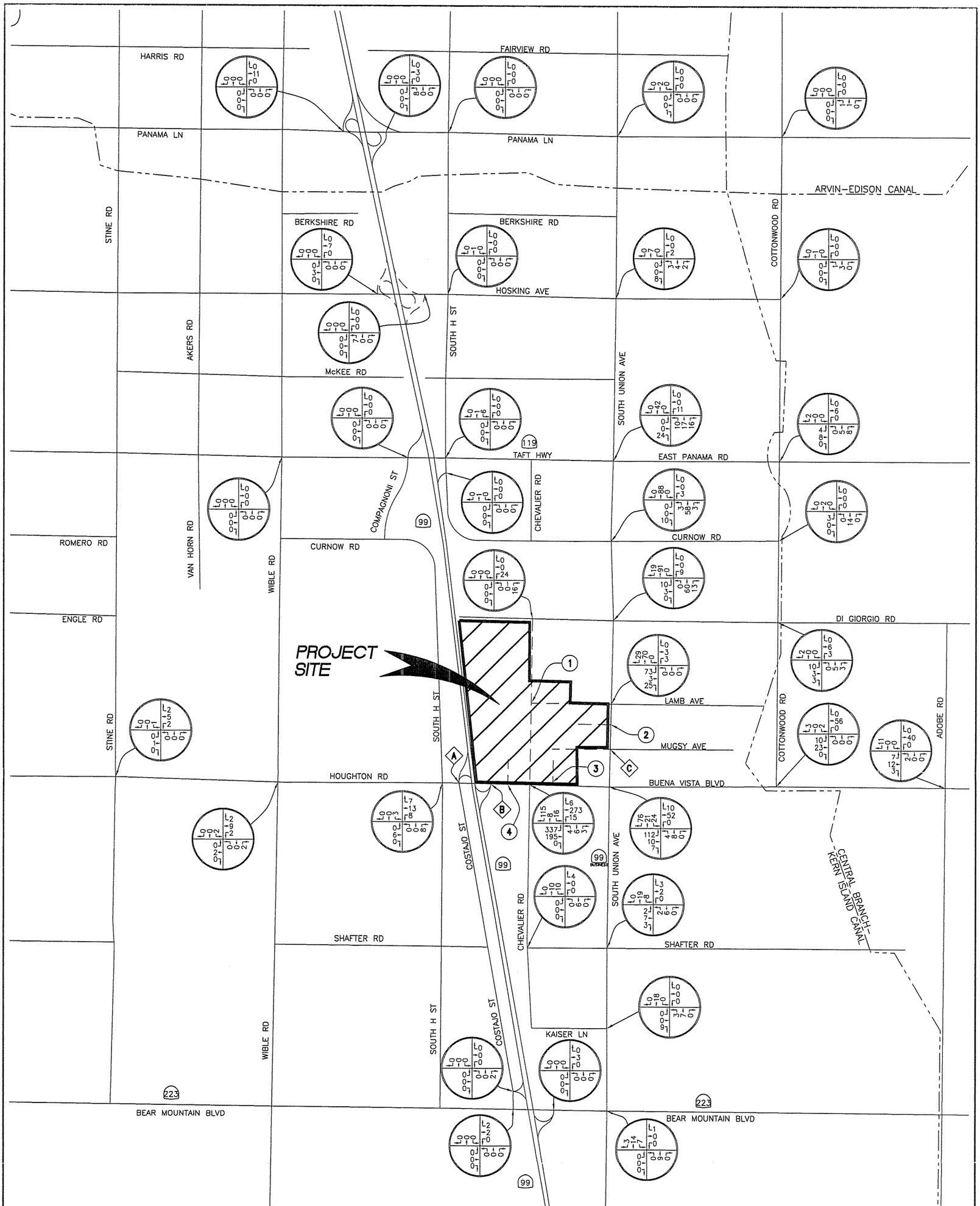
AutoCAD FILE: 080121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO. 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING ©2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

SIGNALIZED INTERSECTION

FUTURE ROADWAY

CANAL

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

Figure 6 - Commercial Generated Peak Hour Turning Movements (PM)

SHEET 6 OF 18 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

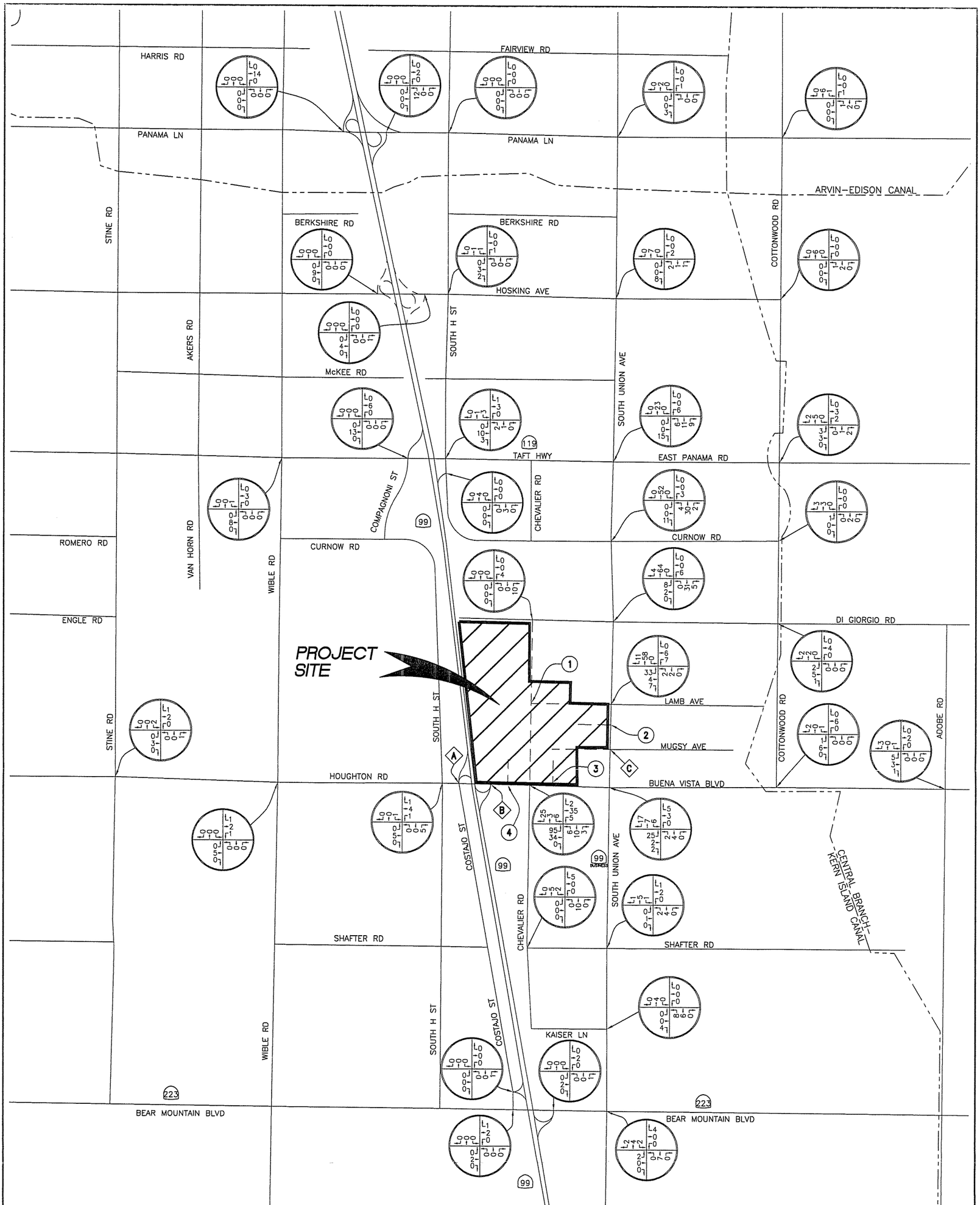
AutoCAD FILE: 060121s01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING © 2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U — STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

SIGNALIZED INTERSECTION

FUTURE ROADWAY

CANAL

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

Figure 6A - Commercial Generated Peak Hour Turning Movements (AM)

SHEET 6A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060121s01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING

©2008

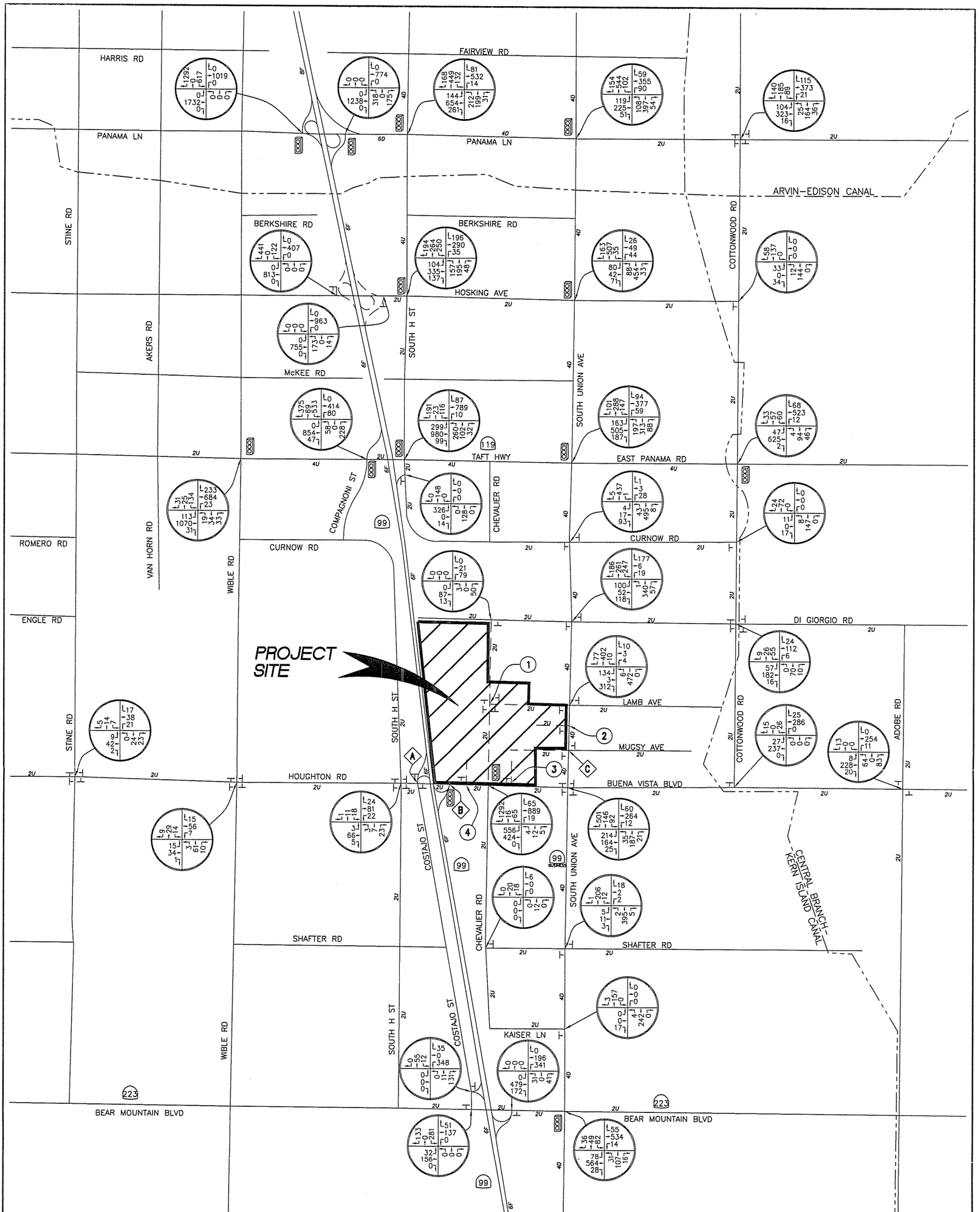


Figure 7 - 2020 Future Peak Hour Turning Movements Plus Project (PM)

SHEET 7 OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

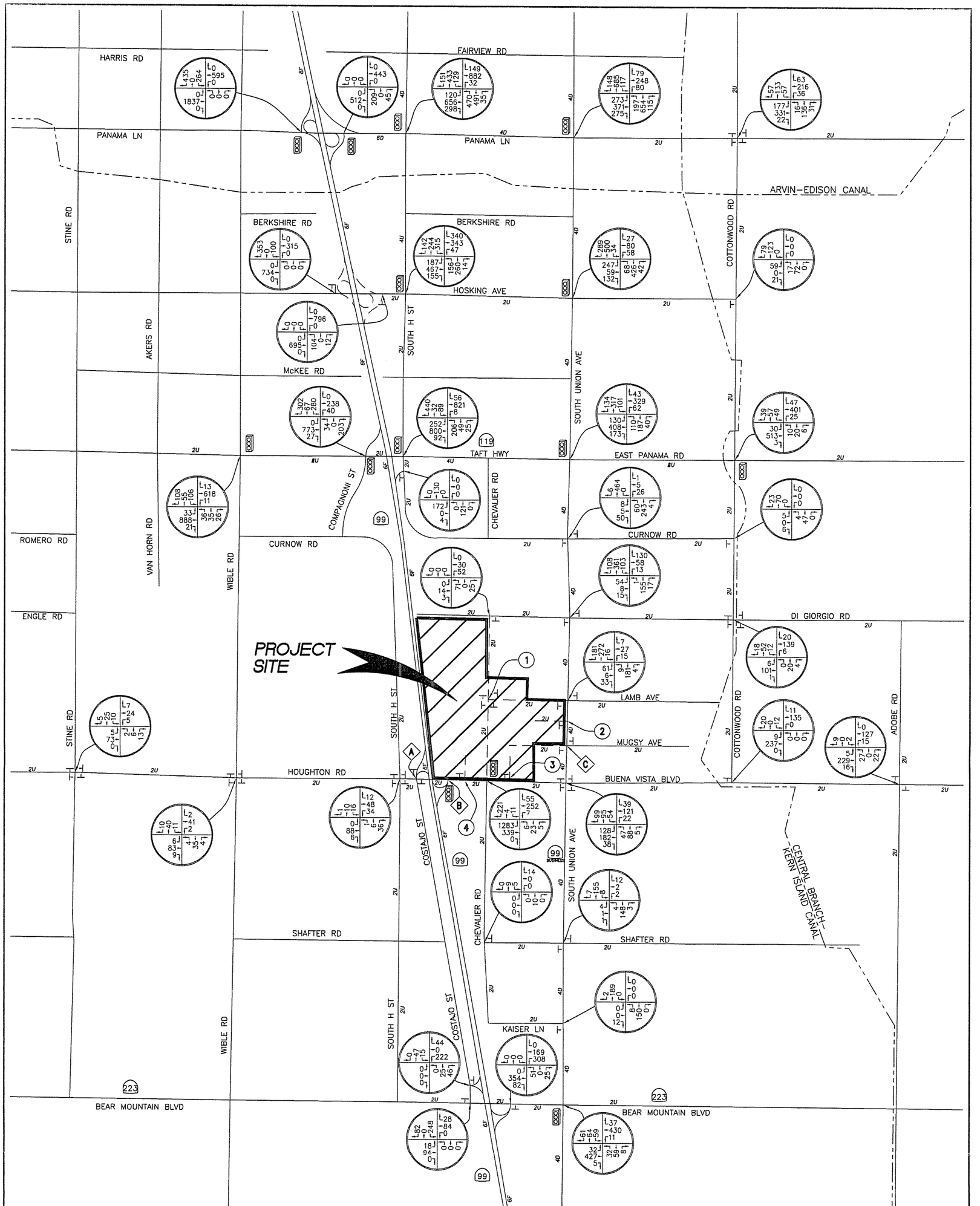
AutoCAD FILE: 080121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO. 08-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING
©2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

SIGNALIZED INTERSECTION

FUTURE ROADWAY

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

CANAL

Figure 7A – 2020 Future Peak Hour Turning Movements Plus Project (AM)

SHEET 7A OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

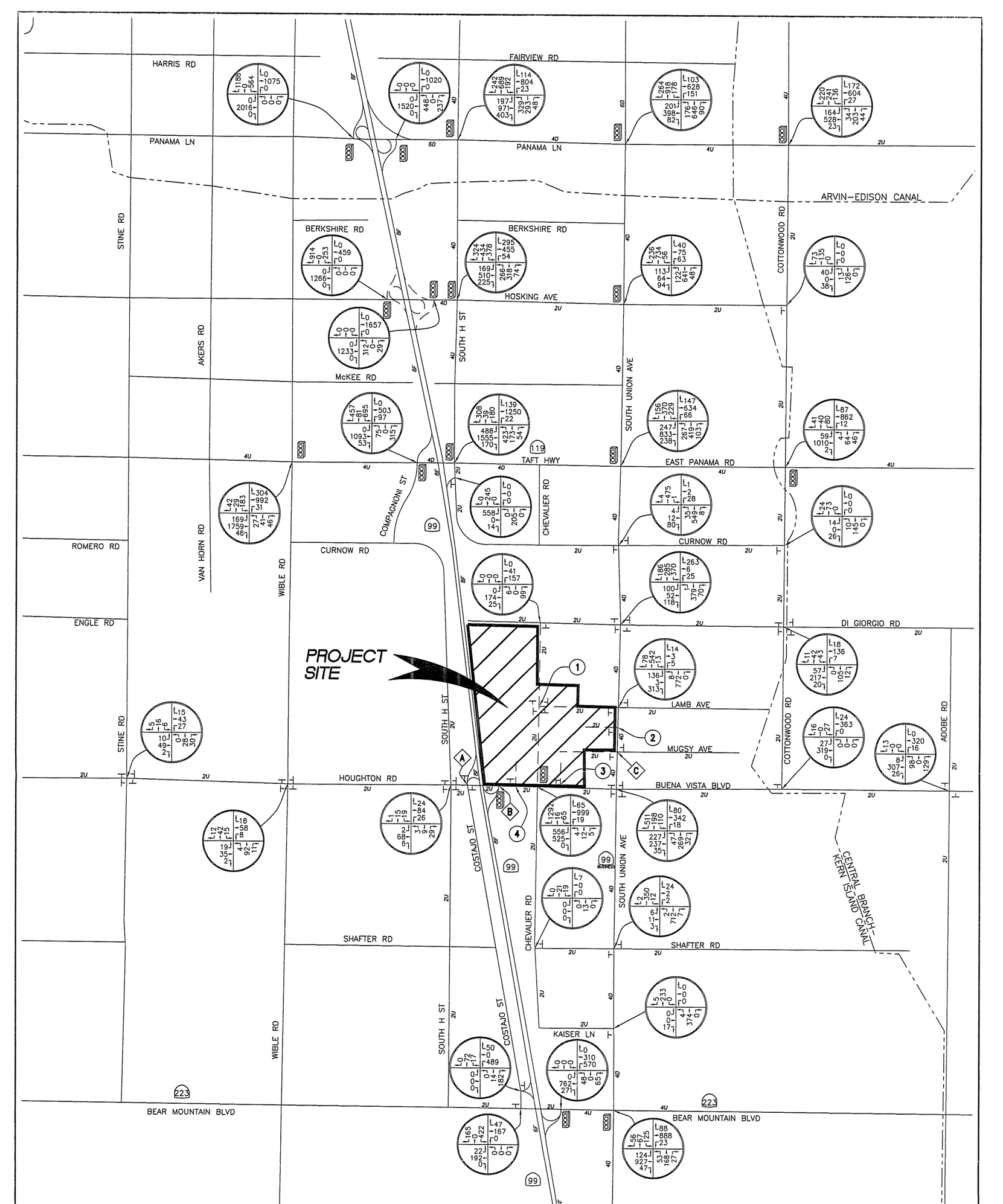
AutoCAD FILE: 060121a01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING
© 2008



A — HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B — HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C — MUGSY AVE & SOUTH UNION AVE

1 — CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 — SOUTH UNION AVE & PROJECT ENTRANCE #2

3 — HOUGHTON RD & PROJECT ENTRANCE #3

4 — HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

4U STREET SEGMENT LANEAGE (# Lanes, D–Divided, U–Undivided)

SIGNALIZED INTERSECTION

FUTURE ROADWAY

CANAL

UNSIGNALIZED INTERSECTION (2–Way / 4–Way Stop)

Figure 8 – 2035 Future Peak Hour Turning Movements Plus Project (PM)

SHEET 8 OF 16 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

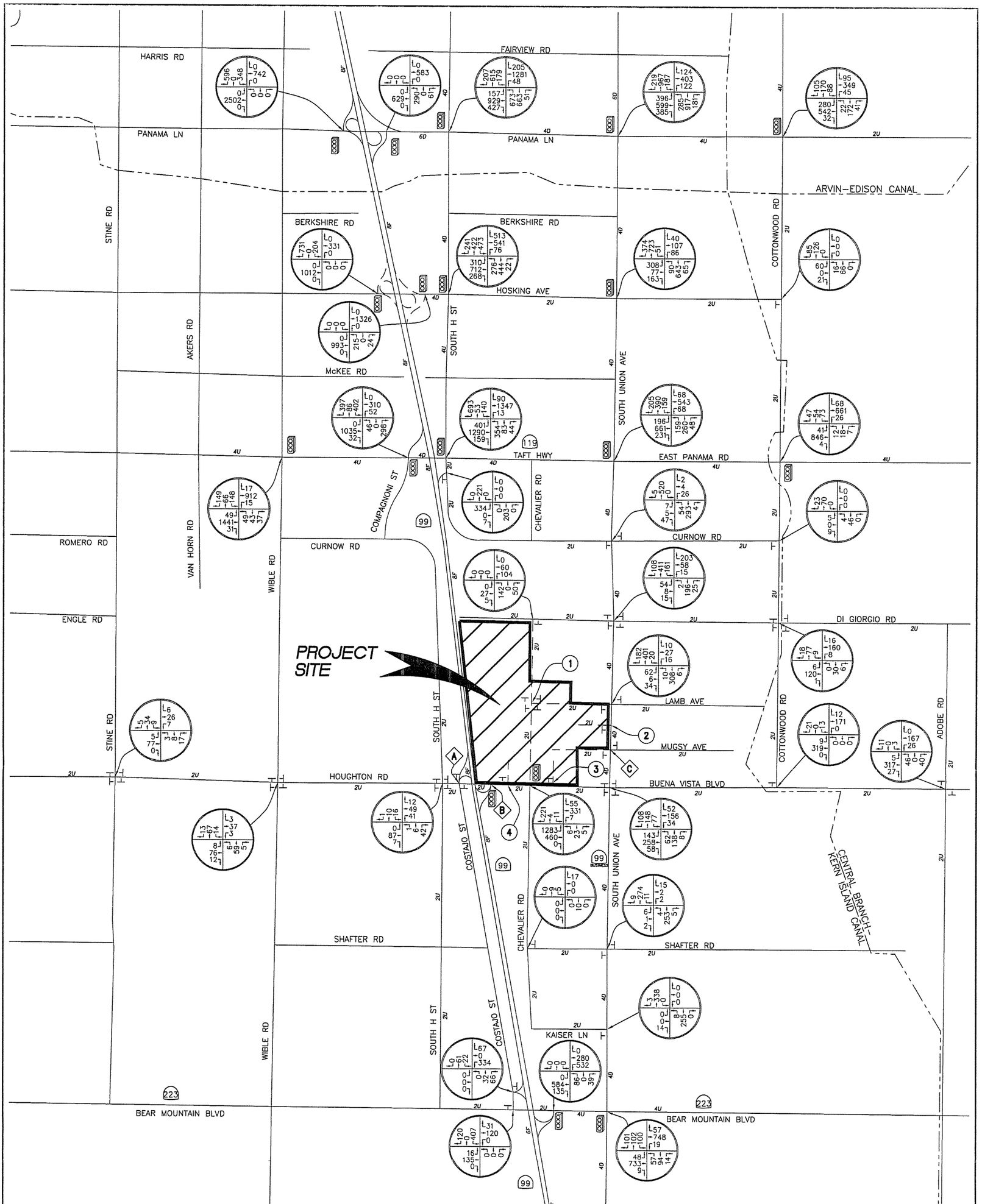
AutoCAD FILE: 060121x01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 – 4814

DRAWN BY: DAR | JOB NO: 06–012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING
© 2008



A HOUGHTON RD & SR 99 SOUTHBOUND RAMP/ COSTAJO ST

B HOUGHTON RD & SR 99 NORTHBOUND ON/OFF RAMP

C MUGSY AVE & SOUTH UNION AVE

1 CHEVALIER RD & LAMB AVE/PROJECT ENTRANCE #1

2 SOUTH UNION AVE & PROJECT ENTRANCE #2

3 HOUGHTON RD & PROJECT ENTRANCE #3

4 HOUGHTON RD & PROJECT ENTRANCE #4

LEGEND

PEAK HOUR TURNING MOVEMENTS

SIGNALIZED INTERSECTION

UNSIGNALIZED INTERSECTION (2-Way / 4-Way Stop)

4U STREET SEGMENT LANEAGE (# Lanes, D-Divided, U-Undivided)

FUTURE ROADWAY

CANAL

Figure 8A - 2035 Future Peak Hour Turning Movements Plus Project (AM)

SHEET 8A OF 18 SHEETS

99 HOUGHTON, LLC
MITCHELL PROPERTY
TRAFFIC STUDY MAP

AutoCAD FILE: 060121s01

DATE	REVISIONS	BY

2001 WHEELAN COURT
BAKERSFIELD, CALIFORNIA 93309
(661) 834 - 4814

DRAWN BY: DAR | JOB NO: 06-012
CHECKED BY: | DATE: 11/05/08

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING ©2008

FIGURE 9: KernCOG BASE YEAR TRAFFIC MODEL - YEAR 2006

cube

Licensed to Kern Council of Governments

FIGURE 10: 2035 KernCOG TRAFFIC MODEL - WITHOUT PROJECT, 2% GROWTH RATE

Licensed to Kern Council of Governments

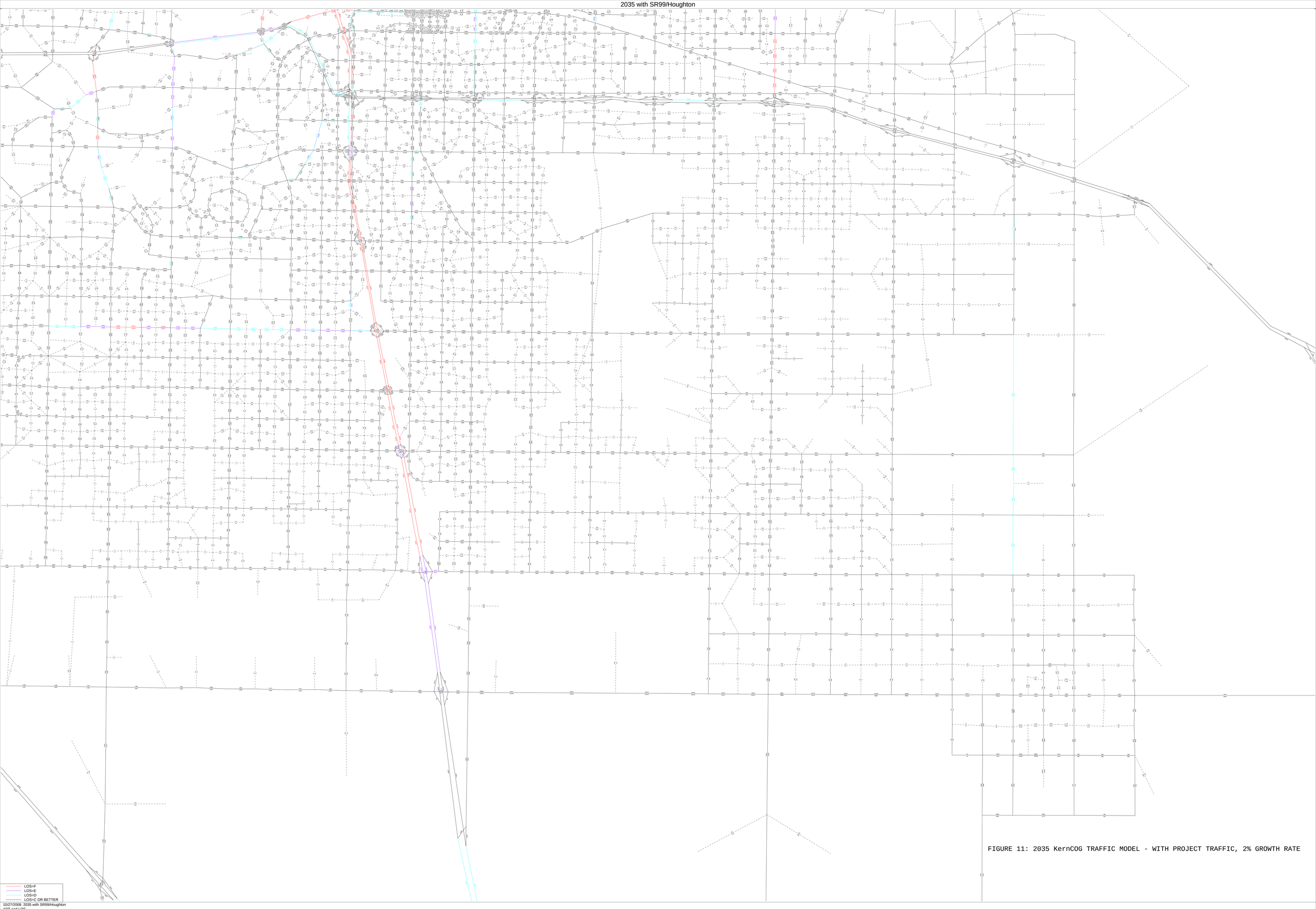


FIGURE 11: 2035 KernCOG TRAFFIC MODEL - WITH PROJECT TRAFFIC, 2% GROWTH RATE

Licensed to Kern Council of Governments

FIGURE 12: 2035 KernCOG TRAFFIC MODEL - WITH PROJECT TRAFFIC, FULL GPA/ZC BUILDOUT, PLUS 2% GROWTH RATE

Licensed to Kern Council of Governments

Appendix A

City of Bakersfield Projects' "Case List" updated 5/27/2008

Kern County Projects' "Cumulative List" updated 6/23/2008

WITHDRAWN COLOR
To add as CODEs
of 4/17/07
Go to Row 121
Updated Info. on previous project

THIS IS A WHOLE NEW LIST TO BE ADDED TO THE NEW 2030 SOCIO-ECONOMIC
DATA FOR USE IN THE CUMULATIVE MODEL ANALYSIS
ALL CASES THAT WERE DEEMED INSIGNIFICANT ARE NOT INCLUDED, NORMAL
GROWTH WOULD APPLY IN THOSE AREAS

Final Model Output Checked

Attractions from
Table 3-16 of KernCOG
1994 validation document

Home Based Shop - Bakersfield	8.986
Home Based Other - Bakersfield	4.756
Non-Home Based Other-Other - Bakersfield	8.060
Total Retail Trips/Employee	21.802

General Information													Daily Trips		
Count	Sortkey	Case Type	Case No.	Project Name	Comments	Approval Status **	Original TAZ	New TAZ	ITE Code	Development Type	Variable	Units	ADT RATE	ADT	Retail
				35 Cases in 5/30/06 cumulative update - to remain											
1		GPA/ZC	02-0030	Gosford Village Walmart											
2		GPA/ZC	02-0193	Panama Walmart											
3		GPA/ZC	03-1544	West Ming (BV Ranch)		Schedule Pending	1034, 1037	1034, 1037, 1070	Already included in KernCOG Special Model run Data						
4		GPA/ZC	04-0874	Batey	Incomplete application, R-IA to LR on 80 ac	Not scheduled - STILL INCOMPLETE as of 1/3/06	12								
5		GPA/ZC	05-0423	Pascoe Family Investments	R-IA to LR on 95.65 ac, 350 DU	Scheduled 4/06	401		210	Single Family	350	Dwelling Units	9.57	3,350	
6		GPA/ZC	05-0424	Robson Trust	LI to LMR on 55 ac, 271 DU	PC Approved 3/16/06	81		220	Multi-Family	271	Dwelling Units	6.63	1,797	
7	1	GPA/ZC	05-0519	SB Capital		Scheduled 6/15/06	765		210	Single Family	1206	Dwelling Units	9.57	11,541	
8	2			Ashe No. 4 Annex			863		210	Single Family	1128	Dwelling Units	9.57	10,795	
9		GPA/ZC	05-0599	Edwards	HI to LMR on 25 ac, 103 DU	PC Approved 3/16/06	81		220	Multi-Family	103	Dwelling Units	6.63	683	
10		GPA/ZC	05-0940	Smale Property	R-IA to LR n 52 ac, 261 DU	PC Denied 3/16/06, Appeal ???	1046		210	Single Family Detached Housing	261	Dwelling Units	9.57	2,498	
11		GPA	05-0945	Banducci	R-IA to LR on 40 ac, 168 DU	Scheduled 6/15/06	79		210	Single Family Detached Housing	168	Dwelling Units	9.57	1,608	
12		GPA	05-0946	Creek Construction	SR to LR on 14 ac, 78 DU	Scheduled 6/15/06	1003		210	Single Family Detached Housing	78	Dwelling Units	9.57	746	
13		GPA	05-1257	Johnson, Schreiver, et al	R-IA to LR on 80 ac, 350 DU	PC Approved 3/16/06	51		210	Single Family Detached Housing	350	Dwelling Units	9.57	3,350	
14		GPA	05-1343	Stockdale Oil & Gas	R-MP to LR on 74.7 ac, 344 DU	PC Approved 3/16/06	384		210	Single Family Detached Housing	344	Dwelling Units	9.57	3,292	
15		GPA/ZC	05-1358	Whitney Trust	R-IA to OC on 6 ac	Incomplete as of 1/3/06	1020		710	OC (Office)	65.34	1,000 SF	eq	5,185	
16		GPA	05-1361	Sterling Oaks	LR to HMR on 7.3 ac, DU est per KernCOG rates	Scheduled 4/6/06	375		220	Multi-Family	117	Dwelling Units	6.63	776	
17		GPA	05-1420	Bakersfield-Taft LLC	R-IA to LR on 87 ac, 405 DU	Incomplete - being revised	812		210	Single Family Detached Housing	405	Dwelling Units	9.57	3,876	
18		GPA	05-1442	Arredondo Ventures	LR to GC on 5.5 ac, 60KSF	Scheduled 4/6/06	133		820	GC (Retail)*	60	1,000 SF	eq	4,172	94
19		GPA	05-1448	Jackson Trust	ER to LR on 51 ac, 220 DU	Scheduled 4/6/06	22		210	Single Family Detached Housing	220	Dwelling Units	9.57	2,105	
20		GPA	05-1450	Etcheverry Property	SR to LR on 66 ac, 275 DU	Scheduled 4/6/06	1018		210	Single Family Detached Housing	275	Dwelling Units	9.57	2,632	
21	1	GPA/ZC	05-1451	Bear Mtn Development	SR to LR & OC on 83 ac	Scheduled 4/6/06	1019		210	Single Family	181	Dwelling Units	9.57	1,732	
	2						1019		710	OC (Office)	65	1,000 SF	eq	5,167	
	3						26		210	Single Family Detached Housing	181	Dwelling Units	9.57	1,732	
22	1	GPA/ZC	05-1452	OMAX, LLC	R-IA to GC on 10 ac, to LR on 68 ac	Scheduled 4/6/06	54		210	Single Family	281	Dwelling Units	9.57	2,689	
	2						54		820	GC (Retail)	82.0	1,000 SF	eq	5,100	128
23	1	GPA/ZC	05-1453	Breckenridge Development	SR to GC on 5 ac, to LR on 85 ac	Scheduled 4/6/06	26		210	Single Family	372	Dwelling Units	9.57	3,560	
	2						26		820	GC (Retail)	41.0	1,000 SF	eq	3,266	64
		GPA/ZC	05-1456	Monarch Affiliates	RR to LR 48.9 ac, 150 DU	Withdraw 6/1/06	1020		210	Single Family	150	Dwelling Units	9.57	1,436	
24		GPA/ZC	05-1561	So. Enterprise Zone One	HI to LI on 17.38 ac	Incomplete as of 1/3/06	195		820	LI	17.38	acres			
25		GPA/ZC	05-1783	FAIRFAX HOLDINGS L.P.	RR, SR & ER to LR on 89.5 acres, 397 DU	Scheduled 6/15/06	182		210	Single Family	397	Dwelling Units	9.57	3,799	
26		GPA	05-1917	Taft 28 LLC	RR to HMR on 28.87 ac, 400 DU (470 DU in study)	Scheduled 6/15/06	765		220	Multi-Family	470	Dwelling Units	6.63	3,116	
27		GPA	05-1918	KC Taft-Gosford LLC	RR to HMR on 18.43 ac, 321 DU	Scheduled 6/15/06	765		220	Multi-Family	321	Dwelling Units	6.63	2,128	
28	1	GPA	05-1928	Todd Sweaney	ER to GC on 6 ac, R-IA to SR on 32ac	Scheduled 6/15/06	1018		820	GC (Retail)	52	1,000 SF	eq	3,805	81
	2						1018		210	Single Family Detached Housing	66	Dwelling Units	9.57	632	
29		GPA	05-1932	Bidart Bros.	SR to LMR 25ac (TAZ 1019), SR to LR on 40 ac (TAZ 26)	Scheduled 6/15/06	1019, 26		210	Single Family	430	Dwelling Units	9.57	4,115	
30		GPA/ZC	05-1947	Banducci	R-IA to LR on 44.5ac, 181 DU	Scheduled 6/15/06	54		210	Single Family	181	Dwelling Units	9.57	1,732	

31	1	GPA	03-0337	General Holdings, The Canyons	LR to GC on 20ac is GPA portion, large residential project on bluffs, mostly in TAZ 343, some in TAZ 378	Not scheduled yet, EIR in progress	343, 378			GC	20	acres	eq	9,558	260
	2									Single Family	1,200	Dwelling Units	9.57	11,484	
32		GPA	05-1580	Manley, 10 Section		Incomplete	260		210	Single Family	800	Dwelling Units	9.57	7,656	
33	1	GPA	06-0168	Stockdale Ranch	SR-R1 - all numbers from KCOG File			1082	210	Single Family	196	Dwelling Units	9.57	1,876	
	2				SR-R1			1083	210	Single Family	641	Dwelling Units	9.57	6,134	
	3				SR-TC SR-R3			1084	210	GC (Retail)					432
	4				SR-TC			1085	210	GC (Retail)					536
	5				SR-R2 SR-R3			1086	210	Single Family	587	Dwelling Units	9.57	5,618	
	6				SR-R2			1087	210	Single Family	204	Dwelling Units	9.57	1,952	
	7				SR-R2			1088	210	Single Family	307	Dwelling Units	9.57	2,938	
	8				SR-R2			1089	210	Single Family	294	Dwelling Units	9.57	2,814	
	9				SR-R2			1090	210	Single Family	253	Dwelling Units	9.57	2,421	
34	1		05-0462	Gateway Sp. Plan	Village 1 - data from KCOG			1077			3574	Dwelling Units			403
	2				Village 2			1078			1925	Dwelling Units			
	3				Village 3			1079			2156	Dwelling Units			2693
	4				Village 4			1080			3037	Dwelling Units			1032
	5				Village 5			1081			3019	Dwelling Units			2724
35	1		05-1692	Flying 7 Ventures	Phase 1			996			2150	Dwelling Units			1474
	2				Phase 2			999			1669	Dwelling Units			1461
	3				Phase 3			997			2813	Dwelling Units			961
	4				Phase 4			998			2520	Dwelling Units			1707

21 CASES added with 6/22/06 Update

1		GPA/ZC	05-1933	Bidart Bros.	B/s Coffee, N/of Etchart, SR to LR 12ac, SR to LMR on 12 ac, 310 DU	Scheduled 09/06	26, 1019		210	Single Family	310	Dwelling Units	9.57	2,967	
2		GPA/ZC	05-1428	Singh, Jassar, et al	S/side Panama Ln, E/o Cottonwood, RR to LR on 100 ac, 400DU	Scheduled 09/06	205		210	Single Family	400	Dwelling Units	9.57	3,828	
3		GPA/ZC	06-0104	Valdez	Berkshire/Union, LR to GC on 1.5 ac	Incomplete	171		820	GC (Retail)	16.34	1,000 SF	eq	1,807	25
4		GPA/ZC	06-0349	HOBBA	north of Highway 178 and east of Morning DrR-MP to LR on 14 acres and LMR on 6 acres100 DU		379		210	Single Family	100	Dwelling Units	9.57	957	
5		GPA/ZC	06-0377	LOWRY	northeast corner of Cottonwood and Berkshire. , ER to LR on 76 acres, 318 DU		205		210	Single Family	318	Dwelling Units	9.57	3,043	
6		GPA/ZC	06-0443	West Coast Inv	N/s Pacheo E/o Stine, LI/SI to HMR, 28.52 ac, 400 DU	Scheduled 09/06	129		220	Multi-Family	400	Dwelling Units	6.63	2,652	
7	1	GPA/ZC	06-0456	Old River Land Co	NE cor Ashe/Mccutchen, R-IA to LI, 25.71 ac, to LR 15.49ac, 60 DU	Scheduled 09/06	78		210	Single Family	60	Dwelling Units	9.57	574	
	2						78		110	Gen Light Industrial	25.71	acres	51.8	1,035	
8	1	GPA/ZC	06-0463	Pascoe	N/s McCutchen W/of Ash, R-IA to LI 41ac, to LMR 30ac, 230DU	Scheduled 09/06	401		220	Multi-Family	230	Dwelling Units	6.63	1,525	
	2						401		110	Gen Light Industrial	41	acres	51.8	2,124	
9		GPA/ZC	06-0494	Deberti	NE Cor Edision/Pioneer, R-MP, OS to LR, 60 ac, 300 DU	Incomplete	380		210	Single Family	300	Dwelling Units	9.57	2,871	
10		GPA/ZC	06-0535	Bianchi	NE cor Buena Vista/Taft Hwy R-IA to HC, 20.52ac	Scheduled 12/06	398			HC (Retail)	226.08	1,000 SF	eq	9,790	228
11		GPA/ZC	06-0544	Third Day Investment	SW Cor Panorama/Vineland, LR to HMR, 10 ac - 80 DU	Scheduled 12/06	379		220	Multi-Family	80	Dwelling Units	6.63	530	
12		GPA/ZC	06-0925	Centex - et al	NE Cor Panama/Allen R-IA to LR, 60 ac, 218 DU	Scheduled 12/06	51		210	Single Family	218	Dwelling Units	9.57	2,086	
13		GPA/ZC	06-0938	Centex - Baroncini	SE cor Ashe/Taft Hwy, RR to LR, 20 ac, 100 DU	Scheduled 12/06	863		210	Single Family	100	Dwelling Units	9.57	957	
14	1	GPA/ZC	06-0960	Sky 29 - Watermark	Sec. 29 29/29 - Total of 2,837 dus (961 Multi-Family & 1,876 Single Family).	Incomplete	380		210	Single Family	1688	Dwelling Units	9.57	16,158	
	2						380		220	Multi-Family	865	Dwelling Units	6.63	5,734	
15	1	GPA/ZC	06-0961	Sky 21 - Riverview	Sec. 21 29/29 - Total of 3,535 dus (1,274 Multi-Family & 2,261 Single Family) and school consisting of 1,500 students.	Incomplete	380		210	Single Family	2035	Dwelling Units	9.57	19,474	
	2						380		220	Multi-Family	1147	Dwelling Units	6.63	7,602	
	3						380		522	PS (School)	1500	Students	1.62	2,430	
16	1	GPA/ZC	06-1002	Sports Village	Taft Hwy, Gosford-Ashe, 163ac, 12 ac GC @ Gosford, 25 ac GC @ Ashe (60 players/family per field, 1000-2000 at remainder of park)		402		Unknown	Sports Village	163	acres	Unknown - use judgement - see m		
	2				12 ac Commercial NE Cor Gosford		402		820	GC (Retail)	130.68	1,000 SF	eq	6,882	204
	3				25 ac Commercial NW Cor Ashe		402		820	GC (Retail)	272.25	1,000 SF	eq	11,033	425
17		GPA/ZC	06-1014	OLD RIVER ROAD, LLC	E/s Old River, 1/4 mi N/o McCutchen, R-IA to LR on 90 ac, 330 DU.	Scheduled 12/06	399		210	Single Family	330	Dwelling Units	9.57	3,158	
18		GPA/ZC	06-1018	KERN DEVELOPMENT III	N/sMorning, 1/4 mi N/o Paladino/Morning , R-MP to LR on 40 ac,175 DU.	Scheduled 12/06	343		210	Single Family	175	Dwelling Units	9.57	1,675	
19	1	GPA/ZC	06-1031	Minaberri	NE Cor Ashe/Engle, R-IA to LR on ?? acres, HMR on 8.4 acres, and GC on ?? Acres, 216 DU (120 LR, 96 HMR, 95KSF retail)	Incomplete	863		210	Single Family	120	Dwelling Units	9.57	1,148	
	2						863		220	Multi-Family	96	Dwelling Units	6.63	636	
	3						863		820	GC (Retail)	95	1,000 SF	eq	5,606	148
20		GPA/ZC	06-1039	BAKERSFIELD 19, LLC	R-IA to LMR, 19.55 ac, N/s Engle, betw Ashe & Stine. 100 DU	Incomplete	863		210	Single Family	100	Dwelling Units	9.57	957	
21		GPA/ZC	06-1052	ANTONGIOVANNI TRUST	SW Cor Panama Ln/Ashe, LR to GC on 18.7 ac	Incomplete	401		820	GC (Retail)	203.64	1,000 SF	eq	9,154	318

6 New CASES added with 2/2007 Update

1		GPA/ZC	06-1662	Trimco LLC	R-MP to LR on 59.5 ac, NE of Paladino/Morning	PC Sched 4/07	343		210	Single Family	275	Dwelling Units	9.57	2,632	
2		GPA/ZC	06-1689	KC Land Investors	R-IA to LMR on 38 ac, NW Cor. Engle & Wible	PC Sched 4/07	853		210	Single Family	350	Dwelling Units	9.57	3,350	
3		GPA/ZC	06-1692	ADAVCO - BIDART	SR to LR on 39.41 ac, NW of Coffee/Etchart	PC Approved 12/21/06	1019		210	Single Family	220	Dwelling Units	9.57	2,105	
4		GPA/ZC	06-1699	Etcheverry Family LLP	LMR/SR to GC, SW cor. 7th Sd & Calloway	PC Sched 4/07	1019		820	GC (Retail)	438.00	1,000 SF	eq	14,978	684
5	1	GPA/ZC	06-1698	Etcheverry Family LLP	GC to LMR on 15 ac, so. of 7th Std, west of Cal. Canal	PC Sched 4/07	1018		210	Single Family	350	Dwelling Units	9.57	3,350	
	2				Note: delete the commercial if you had it loaded in the TAZ										
6	1	GPA/ZC	06-1529	Grand Bakersfield LLC	481 ac residential	EIR Kickoff 3/1/07	862		210	Single Family	4,381	Dwelling Units	9.57	41,926	
	2			(More details to come)	90 ac commercial				820	GC (Retail)	980.10	1,000 SF	eq	25,141	1530
7		GPA/ZC	06-1877	Coffee-Brimhall LLC	Residential	EIR Kickoff 1/30/07	21, 32, 1025		210	Single Family	760	Dwelling Units	9.57	7,273	
				(aka - World Oil)	Retail Commerical				820	GC (Retail)	1650	1,000 SF	eq	35,142	2576
					Office Commercial				710	OC (Office)	1000	1,000 SF	eq	29,962	

1 New CASES added with 3/8/2007 Update, updated 4/17/07 & added 2 more, 7/17/07 - Modified Saco Ranch

		GPA/ZC	06-1722	Rio Bravo Ranch	4412 DU Single Family, 326 DU Multi-Family		666, 668, 669		210	Single Family	4412	Dwelling Units	9.57	42,223	
					Nickel properties in NE Bakersfield				220	Multi-Family	326	Dwelling Units	6.63	2,161	
				(aka Nickel properties)	46 ac GC (previously 25.24ac)				820	GC (Retail)	501	1,000 SF	eq	16,330	782
		GPA/ZC	06-2247	Saco Ranch	288ac GC, OC & LI, south of 7th Standard & east of Coffee Rd		26		820	GC (Retail)	614.475	1,000 SF	eq	18,621	959
									820	GC (Retail)	792.17	1,000 SF	eq	21,925	1237
									710	OC (Office)	332	1,000 SF	eq	14,746	
									110	LI (Light Industrial)	1233	1,000 SF	6.97	8,594	
		GPA/ZC	07-0655	Woodmont Bakersfield	93ac GC, NW cor Hosking Ave & So. H St, Giumarra, et al, employee count from applicant		137		820	GC (Retail)	965	1,000 SF	eq	24,891	1848

* Note: Shopping Center ADT is with 15% passby subtracted
** Status on Planning Official Active list
*** These numbers used on SW_GPA.apr for June '04 Cases

Name	Project Loc	Request	Type	MAP	APN	Total Acres	Acre Breakdown	SEC
99 Houghton LLC by McIntosh & Assoc	NEC Houghton and 99	RI-A to SI, LI, GC and HC	GPA	143	185-140-06	306.00	269 Ind, 47 Com	7
Allen Road Land Development	NEC of Meacham Dr and Allen Rd	UER to HMR	GPA	101	465-511-03 to 07; & 465-521-01 & -02	4.50	n/a	24
Al Graves by Wiley D. Hughes Surveying	1/2 M. W of Hwy 84, end of Reynolds	RR to LMR	GPA	124	174-141-14	30.14	n/a	25
Bakersfield Co. by Jean Laborde	W/S Costajo Rd N/O Bear Mtn Blvd	RIA to LI	GPA	143	185-321-20	20.00	n/a	19
Bakersfield Investors 280 LLC by McIntosh & Assoc	NWC Nord and Hageman (Rosedale)	GC, RR, ER, SR and LMR to LMR and HMR	GPA	101		317.00	300 Res, 7 Com, 10 Park	12
Bakersfield Land Investment/McIntosh & Assoc	SEC Nord Ave & Reina Rd	GPA to LR	GPA	101		160.00	n/a	16
Beech Street	NWC Enos Lane and Hwy 58	436 Dwelling Units	GPA	101	108-040-82	123.00	n/a	
Biolanos, vilante by Smith Tech/USA, Inc.	Round Mounatin Road			83	093-290-12	83.50		30
Blackhawk Land Co. II\Lonnie Oman	E & W Sides of Rudd Rd N/O Hageman	RIA to LR	GPA	101	463-050-35, -79	70.29	n/a	15
BUI Inc. by Partick	SEC of Weedpatch & Redbank	LI & RR to LI	GPA	125			n/a	7
Carriage Homes/Carl Moreland	SWC Weedpatch Hwy & Mountain View Rd	LR & GC	GPA	124	174-150-16	76.33	1.5 Com, 74 Res	36
Central Valley Investors/McMillin Commerical	SEC Olive Dr and Victor St	GPA to GC	GPA	102		4.37	n/a	15
Chipres, Salvadore	SWC of McKee Road and Weedpatch Hwy	RR to GC	GPA	124	174-160-03, -04, -07	11.00	n/a	36
Cruz, Gabriel by Pinnacle Civil Eng.	SWC 99 & McKee	R-IA to GC	GPA	123	514-060-26	3.00	n/a	36
Denela, LLC	SWC Seventh Standard & Chester Ave.	HMR to MC	GPA	102	491-011-38	21.29	n/a	1
Dominguez/Cuevas by Afinar Civil Engineers	NEC fo DiGiorgio Rd & S. Union Ave	RR to GC	GPA	143	185-050-03, -04	17.89	n/a	
Etchison Living Trust/Norm Etchison	NEC Fairfax & DiGiorgio	GPA to LR	GPA	143		152.70	n/a	1
Fakler, Allan J.	SEC Jewetta Ave & Hageman Rd	SR to HMR or GC	GPA	102	449-210-07, -08, 449-200-01		n/a	19
Gudmundson	1730 and 1710 Calloway Drive	ER to LI	GPA	102-29	368-190-54		n/a	29
Hearthstone Adult Services	1932 Jessie St	HMR to GC	GPA	103		1.28	n/a	21
Hopkins Development	NEC Rudd Ave and Noriega Road	142 Dwelling Units	GPA	101		58.00	n/a	
Hughes, Tracy Marie Et Al	Calloway and Holland	SR to OC	GPA	102	110-040-18, -19, -20	1.00	n/a	30
Ironstone, LLC	NEC Shalane Ave & Sagitta Dr	HMR to GC	GPA	104	388-633-01, -02	1.10	n/a	30
James Philips by DeWalt Corp.	SWC Gossford Rd. & Chidez Rd.	R-IA to RR	GPA	142	184-410-16	40.00		20
Jara/Pasquini Eng	N of Beardsley 300' W of N Chester	GPA to HR	GPA	102	114-250-19, -20	1.40	n/a	13
Jensen Design & Survey/Rick Millan	SWC Renfro Rd. & Reina Rd.	R-IA to LMR	GPA	101	463-050-30, -38	79.70		15
JFCA Ranch	NEC Hageman Rd and Nord Rd	240 Dwelling Units	GPA	101		74.00	n/a	
Jon Moule	NEC of Progress Rd. & Shafter Rd.	R-IA to RR	GPA	142-17	184-420-04	20.00		17
Ken Parker	south of SEC of Central & Rosedale	UER to LI	GPA	101-25	496-040-05	1.34		25
Kern Community College District by Tom Burke	NEC Sullivan and Enos Lane	Specific Plan for College Campus (SP), MUC, LMR/HMR & OSP	GPA	100	104-072-45, -58, -52	228.00	158 Res, 30 Com, 40 Park	
Kern Oil & Refining Co.	1/2 M. S of Panama Btn Arvin & Weed	GPA to HI	GPA	124		75.50	n/a	
Kurian, Babby	NWC Union and Barton St	GPA from LMR to SI	GPA	124	517-040-13	7.00	n/a	31
Lopez	Weedpatch Hwy	SR to commercial	GPA	125-31	178-450-30	3.73	n/a	31
Matuk, Mike & Aileen/Marino & Assoc	N/S Stockdale Hwy, 1/4 Mi E/Enos Ln	GPA to RR	GPA	100		84.00	n/a	36
MMR Bakersfield	SEC Greeley Rd and Johnson Rd	245 Dwelling Units	GPA	101	408-250-01, 463-090-26	71.00	n/a	
Moreno, Frederico & Magdalena	N/S Rosedale Hwy, 1/4 Mi E/O Enos	RR to LI or SI	GPA	100	104-230-28	5.00	n/a	
Nadar Development\Pinnacle Eng.	W/S Weedpatch Hwy, S/O Hwy 58	GPA to SR	GPA	124	173-080-03, -13, 173-090-06	88.77	n/a	1
Neighborhood Development	Driver Road and Rosedale Hwy	203 Dwelling Units	GPA	101	463-100-05, -06, 463-080-09, 463-110-01	78.00	68 Res, 10 Com	
Northwest Land & Dev	NEC Noriega and Heath	55 Dwelling Units	GPA	101	463-050-23, -47, -66	16.00	n/a	15
Nuventure Properties by D. Rickels	Welsh and Rosedale Hwy	SR to GC	GPA	101	495-060-02	0.85	n/a	26
Patterson, Ed by Dewalt Corp	NWC Rosedale and Enos Lane	RI-A to RMP	GPA	100	104-230-24	19.00	n/a	24
Petro Properties, LLC	3/4 M. E of Hwy 65, 1/2 Mi N of 7th	GPA from RI-A to HI	GPA	81	483-010-13	16.72	n/a	34
Philips, James by Dewalt Corp.	SWC Gosford Rd & Chaidez Rd	GPA from R-IA to RR	GPA	142	184-410-16	40.00	n/a	

Porter and Associates	NEC Meacham at Renfro	RR to GC	GPA	101		10.30	n/a	23
Reina Ranch	NWC Reina Rd and Renfro Rd	240 Dwelling Units	GPA	101	463-050-28, -30	80.00	n/a	
Ron Pierce by Hughes Surveying	N/S of Breckenridge E of Comanche	GPA from REA to R-MP	GPA	104	388-010-14	20.03	n/a	
Rosedale Crossings	NWC of Rosedale Hwy and Renfro Rd	PD plan Commercial	PD	101	463-130-14, 24	15.40	n/a	22
Rosedale & Greeley LLC/Matt Wade	N/S Rosedale Hwy, W Greeley Rd	GPA to SR	GPA	101		65.00	n/a	
Rosedale & Renfro LP	NEC of Rosedale Hwy and Renfro Rd	PD plan Commercial	PD	101	464-031-40, 41, 42	27.50	n/a	23
S & J Alfalfa Inc. by SIKAND Engineering	Wings Way & 7th Standard	Circulation amendment to take Wings Way off Sec. Line in NWC of Project Site.	GPA	81	N/A		n/a	
S & J Alfalfa/Dennis Harris	7th Standard & West Day	GPA to HC	GPA	81	483-010-28, -29	151.00	n/a	34
Sandoval, Jaime	SEC S. Oswell Rd & Hermosa Rd	GPA from R-MP to RR	GPA	124	174-092-55	24.53	n/a	
Schestug, Yun by Pasquini Eng	Verdugo and Rosedale Hwy	SR and LMR to GC	GPA	102	450-051-01, -03, -05, -06, -07, -12 and 450-060-02, -03, -04, -08, -09	23.00	n/a	19
Stockdale Investor, LLC\David Wood	NWC Stockdale Hwy and Enos Ln	RIA & SI to LMR	GPA	100		264.00	n/a	35
Stonefield Development	N/S Bear Mtn Blvd, 1/4M W Gosford	R-IA to RR	GPA	142	184-490-87	79.09	n/a	
Stonefield Development/McIntosh & Assoc	NWC Enos Lane and Hwy 58	GPA to LR	GPA	100	104-011-12, -16, -43, 104-071-02, -22	305.50	262 Res, 29 Park, 15 school	
Surjit, Singh/Dualiwal Gurdir	So. Union, south of DiGiorgio	M-1 ? Trucking/house/farming	GPA	143	185-170-18	28.67	n/a	8
T. Square LLC by Marino & Associates	E/S of N. Chester Ave, N of Petrol	GPA from LMR to LI & HMR	GPA	81	484-010-19, -20	28.00	8 Res, 20 Ind	36
Vilante Bolanos by Smith Tech	Rd Mtn Rd	REA to RR	GPA	83		83.50	n/a	
Unruh by Reyman and Bardis	NWC of heath Rd. & Hageman Rd.	450 Dwelling Units	GPA	101		105.00	n/a	
Wattenbarger, Scott by Porter & Assoc.	22356 Rosedale Highway	RR to SI	GPA	100	104-230-26	5.00		24

Terminated EIRs in Metro Bakersfield
EIRs

Appendix B

Highway Capacity Manual Two-Lane Highway, Level of Service Worksheets

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information

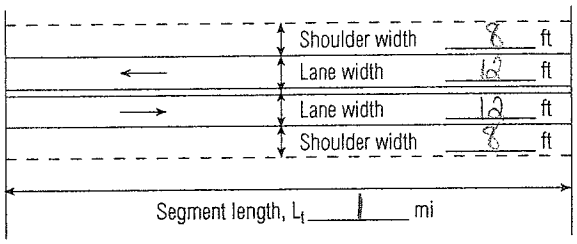
Analyst	S. Letsky
Agency or Company	McTavish & Assoc.
Date Performed	12/9/08
Analysis Time Period	10% ADT, peak hour

Site Information

Highway	2-lane roadway
From/To	—
Jurisdiction	CalTrans
Analysis Year	—

☐ Operational (LOS) ☐ Design (v_p) ☒ Planning (LOS) ☐ Planning (v_p)

Input Data



☒ Class I highway ☐ Class II highway
Terrain ☒ Level ☐ Rolling
Two-way hourly volume 735 veh/h → corresponds to 735 veh/hr (24 hr) = 17640 ADT
Directional split 50 / 50
Peak-hour factor, PHF 0.92
% Trucks and buses, P_T 2 %
% Recreational vehicles, P_R 0 %
% No-passing zone 80 %
Access points/mi 0 /mi

80% of LOS "E" capacity threshold is (0.8)(22050) = 17640 ADT

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.20
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.00
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = \frac{1}{1 + P_T(E_T - 1) + P_R(E_R - 1)}$	0.996
Two-way flow rate,[1] v_p (pc/h) $v_p = \frac{V}{PHF * f_G * f_{HV}}$	802
v_p * highest directional split proportion[2] (pc/h)	401

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed, S_{FM}	55 mi/h	Base free-flow speed, BFFS	____ mi/h
Observed volume, V_f	735 veh/h	Adj. for lane width and shoulder width, f_{LS} (Exhibit 20-5)	____ mi/h
Free-flow speed, FFS $FFS = S_{FM} + 0.00776(\frac{V_f}{f_{HV}})$	60.7 mi/h	Adj. for access points, f_A (Exhibit 20-6)	____ mi/h
		Free-flow speed, FFS $FFS = BFFS - f_{LS} - f_A$	____ mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.7
Average travel speed, ATS (mi/h) $ATS = FFS - 0.00776v_p - f_{np}$	51.8 mph

Percent Time-Spent-Following

Grade adjustment factor, f_G (Exhibit 20-8)	1.0
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = \frac{1}{1 + P_T(E_T - 1) + P_R(E_R - 1)}$	0.998
Two-way flow rate,[1] v_p (pc/h) $v_p = \frac{V}{PHF * f_G * f_{HV}}$	800
v_p * highest directional split proportion[2] (pc/h)	400
Base percent time-spent-following, BPTSF (%) $BPTSF = 100(1 - e^{-0.000879v_p})$	50.50 %
Adj. for directional distribution and no-passing zone, $f_{d/np}$ (%) (Exhibit 20-12)	14.50
Percent time-spent-following, PTSF (%) $PTSF = BPTSF + f_{d/np}$	65.0 %

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio, v/c $v/c = \frac{v_p}{3,200}$	
Peak 15-min vehicle-miles of travel, VMT_{15} (veh-mi) $VMT_{15} = 0.25L_t(\frac{V}{PHF})$	
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $VMT_{60} = V * L_t$	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = \frac{VMT_{15}}{ATS}$	

Notes

1. If $v_p \geq 3,200$ pc/h, terminate analysis—the LOS is F.
2. If highest directional split $v_p \geq 1,700$ pc/h, terminate analysis—the LOS is F.

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information

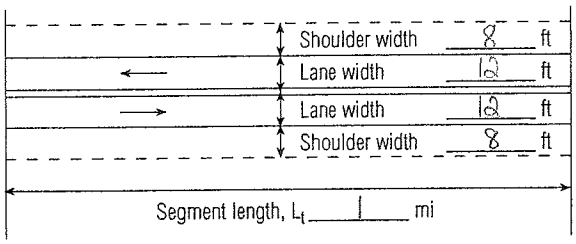
Analyst	S. Letak
Agency or Company	McIntosh & Assoc.
Date Performed	12/9/08
Analysis Time Period	ADT

Site Information

Highway	2-lane roadway
From/To	—
Jurisdiction	CoB and COK (non-CalTrans)
Analysis Year	—

☐ Operational (LOS) ☐ Design (v_p) ☒ Planning (LOS) ☐ Planning (v_p)

Input Data



☒ Class I highway ☐ Class II highway
Terrain ☒ Level ☐ Rolling
Two-way hourly volume 895 veh/h → corresponds to $895 \frac{veh}{hr}(24\ hr) =$ 21480 ADT
Directional split 50 / 50
Peak-hour factor, PHF 0.92
% Trucks and buses, P_T 2 %
% Recreational vehicles, P_R 0 %
% No-passing zone 20 %
Access points/mi 10 /mi

80% of LOS "E" capacity threshold is (0.8)(26,850) = 21,480 ADT

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.20
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.00
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = \frac{1}{1 + P_T(E_T - 1) + P_R(E_R - 1)}$	0.996
Two-way flow rate,[1] v_p (pc/h) $v_p = \frac{V}{PHF * f_G * f_{HV}}$	977
v_p * highest directional split proportion[2] (pc/h)	489

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed, S_{FM}	55 mi/h	Base free-flow speed, BFFS	mi/h
Observed volume, V_f	895 veh/h	Adj. for lane width and shoulder width, f_{LS} (Exhibit 20-5)	mi/h
Free-flow speed, FFS	62 mi/h	Adj. for access points, f_A (Exhibit 20-6)	mi/h
$FFS = S_{FM} + 0.00776(\frac{V_f}{f_{HV}})$		Free-flow speed, FFS	mi/h
		$FFS = BFFS - f_{LS} - f_A$	

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.1345
Average travel speed, ATS (mi/h) $ATS = FFS - 0.00776v_p - f_{np}$	53.3 mph

Percent Time-Spent-Following

Grade adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.10
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.00
Heavy-vehicle adjustment factor, f_{HV} $f_{HV} = \frac{1}{1 + P_T(E_T - 1) + P_R(E_R - 1)}$	0.998
Two-way flow rate,[1] v_p (pc/h) $v_p = \frac{V}{PHF * f_G * f_{HV}}$	975
v_p * highest directional split proportion[2] (pc/h)	488
Base percent time-spent-following, BPTSF (%) $BPTSF = 100(1 - e^{-0.000879v_p})$	57.56 %
Adj. for directional distribution and no-passing zone, $f_{d/np}$ (%) (Exhibit 20-12)	7.42 %
Percent time-spent-following, PTSF (%) $PTSF = BPTSF + f_{d/np}$	64.98 %

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio, v/c $v/c = \frac{v_p}{3,200}$	
Peak 15-min vehicle-miles of travel, VMT_{15} (veh-mi) $VMT_{15} = 0.25L_t(\frac{V}{PHF})$	
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $VMT_{60} = V * L_t$	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = \frac{VMT_{15}}{ATS}$	

Notes

1. If $v_p \geq 3,200$ pc/h, terminate analysis—the LOS is F.
2. If highest directional split $v_p \geq 1,700$ pc/h, terminate analysis—the LOS is F.

TRAFFIC IMPACT STUDY

FOR

99 Houghton, LLC

Portion of Section 7, Township 31 South, Range 28 East, MDM

Zone Change and General Plan Amendment

Kern County, California

Job Number 06-012

Prepared for:

99 Houghton, LLC

June 2009

Prepared by:

McINTOSH & ASSOCIATES

APPENDIX C

Appendix C

Intersection Levels of Service Calculations

Panama Lane & State Route 99 Southbound Off Ramp – AM Peak

Panama Lane & State Route 99 Southbound Off Ramp – PM Peak

Panama Lane & State Route 99 Northbound Off Ramp – AM Peak

Panama Lane & State Route 99 Northbound Off Ramp – PM Peak

Panama Lane & South H Street – AM Peak

Panama Lane & South H Street – PM Peak

Panama Lane & South Union Avenue – AM Peak

Panama Lane & South Union Avenue – PM Peak

Panama Lane & Cottonwood Road – AM Peak

Panama Lane & Cottonwood Road – PM Peak

Hosking Avenue & State Route 99 Southbound Off Ramp – AM Peak

Hosking Avenue & State Route 99 Southbound Off Ramp – PM Peak

Hosking Avenue & State Route 99 Northbound Off Ramp – AM Peak

Hosking Avenue & State Route 99 Northbound Off Ramp – PM Peak

Hosking Avenue & South H Street – AM Peak

Hosking Avenue & South H Street – PM Peak

Hosking Avenue & South Union Avenue – AM Peak

Hosking Avenue & South Union Avenue – PM Peak

Hosking Avenue & Cottonwood Road – AM Peak

Hosking Avenue & Cottonwood Road – PM Peak

Taft Highway/ State Route 119 & Wible Road – AM Peak

Taft Highway/ State Route 119 & Wible Road – PM Peak

Taft Highway/ State Route 119 & State Route 99 Southbound Off Ramp/ Compagnoni Street – AM Peak

Taft Highway/ State Route 119 & State Route 99 Southbound Off Ramp/ Compagnoni Street – PM Peak

Appendix C (continued)

Intersection Levels of Service Calculations

Taft Highway/ State Route 119 & South H Street – AM Peak

Taft Highway/ State Route 119 & South H Street – PM Peak

Taft Highway/ State Route 119/ East Panama Road & South Union Avenue – AM Peak

Taft Highway/ State Route 119/ East Panama Road & South Union Avenue – PM Peak

East Panama Road & Cottonwood Road – AM Peak

East Panama Road & Cottonwood Road – PM Peak

State Route 99 Northbound Off Ramp & South H Street – AM Peak

State Route 99 Northbound Off Ramp & South H Street – PM Peak

Curnow Road & South Union Avenue – AM Peak

Curnow Road & South Union Avenue – PM Peak

Curnow Road & Cottonwood Road – AM Peak

Curnow Road & Cottonwood Road – PM Peak

DiGiorgio Road & Chevalier Road – AM Peak

DiGiorgio Road & Chevalier Road – PM Peak

DiGiorgio Road & South Union Avenue – AM Peak

DiGiorgio Road & South Union Avenue – PM Peak

DiGiorgio Road & Cottonwood Road – AM Peak

DiGiorgio Road & Cottonwood Road – PM Peak

Lamb Avenue/ Project Entrance # 1 & Chevalier Road – AM Peak

Lamb Avenue/ Project Entrance # 1 & Chevalier Road – PM Peak

Lamb Avenue & South Union Avenue – AM Peak

Lamb Avenue & South Union Avenue – PM Peak

Project Entrance # 2 & South Union Avenue – AM Peak

Project Entrance # 2 & South Union Avenue – PM Peak

Mugsy Avenue & South Union Avenue – AM Peak

Mugsy Avenue & South Union Avenue – PM Peak

Appendix C (continued)

Intersection Levels of Service Calculations

Houghton Road & Stine Road – AM Peak

Houghton Road & Stine Road – PM Peak

Houghton Road & Wible Road – AM Peak

Houghton Road & Wible Road – PM Peak

Houghton Road & South H Street – AM Peak

Houghton Road & South H Street – PM Peak

Houghton Road & State Route 99 Southbound Ramps/ Costajo Street – AM Peak

Houghton Road & State Route 99 Southbound Ramps/ Costajo Street – PM Peak

Houghton Road & State Route 99 Northbound Ramps – AM Peak

Houghton Road & State Route 99 Northbound Ramps – PM Peak

Houghton Road & Project Entrance # 4 – AM Peak

Houghton Road & Project Entrance # 4 – PM Peak

Houghton Road & Chevalier Road – AM Peak

Houghton Road & Chevalier Road – PM Peak

Houghton Road & Project Entrance # 3 – AM Peak

Houghton Road & Project Entrance # 3 – PM Peak

Houghton Road/ Buena Vista Boulevard & South Union Avenue – AM Peak

Houghton Road/ Buena Vista Boulevard & South Union Avenue – PM Peak

Buena Vista Boulevard & Cottonwood Road – AM Peak

Buena Vista Boulevard & Cottonwood Road – PM Peak

Buena Vista Boulevard & Adobe Road – AM Peak

Buena Vista Boulevard & Adobe Road – PM Peak

Shafter Road & Chevalier Road – AM Peak

Shafter Road & Chevalier Road – PM Peak

Shafter Road & South Union Avenue – AM Peak

Shafter Road & South Union Avenue – PM Peak

Appendix C (continued)

Intersection Levels of Service Calculations

Kaiser Lane & South Union Avenue – AM Peak

Kaiser Lane & South Union Avenue – PM Peak

State Route 99 Southbound Ramps & Costajo Street – AM Peak

State Route 99 Southbound Ramps & Costajo Street – PM Peak

Bear Mountain Boulevard/ State Route 223 & Costajo Street – AM Peak

Bear Mountain Boulevard/ State Route 223 & Costajo Street – PM Peak

Bear Mountain Boulevard/ State Route 223 & State Route 99 Northbound Ramps – AM Peak

Bear Mountain Boulevard/ State Route 223 & State Route 99 Northbound Ramps – PM Peak

Bear Mountain Boulevard/ State Route 223 & South Union Avenue – AM Peak

Bear Mountain Boulevard/ State Route 223 & South Union Avenue – PM Peak

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & SR 99 Southbound Off Ramp - AM Peak
Count Date: 7/10/2007

Exist Peak Hour Volumes

S			
0	WBL	0	
3	WBT	435	
1	WBR	26	(Not Controlled)
0	EBL	0	
3	EBT	1261	
1	EBR	168	(Not Controlled)
0	NBL	0	
0	NBT	0	
0	NBR	0	
1>	SBL	191	
0	SBT	0	
1<	SBR	295	
	TOTAL	2376	

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	708
WBR	31
EBL	0
EBT	2502
EBR	269
NBL	0
NBT	0
NBR	0
SBL	348
SBT	0
SBR	596
TOTAL	4453

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	742
WBR	31
EBL	0
EBT	2502
EBR	269
NBL	0
NBT	0
NBR	0
SBL	348
SBT	0
SBR	596
TOTAL	4487

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	561
WBR	28
EBL	0
EBT	1837
EBR	215
NBL	0
NBT	0
NBR	0
SBL	264
SBT	0
SBR	435
TOTAL	3339

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	595
WBR	28
EBL	0
EBT	1837
EBR	215
NBL	0
NBT	0
NBR	0
SBL	264
SBT	0
SBR	435
TOTAL	3373

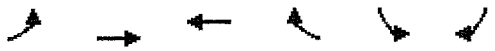
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	34	20	14
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	34	20	14

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & SR 99 Southbound Off Ramp - AM Peak						
	Count Date:	7/10/2007						
2007	ADT							
WB Approach (To)	12.41							
WB Approach (Away)	11.18							
EB Approach (To)	12.65							
EB Approach (Away)	12.23							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	5.64							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	17.2		WBL	1.19	WBT	1.65	WBR	1.19
WB Approach (Away)	17.2		0.59%	0	1.75%	708	0.59%	31
EB Approach (To)	32.2		EBL	1.77	EBT	2.04	EBR	1.77
EB Approach (Away)	23.3		1.70%	0	2.48%	2502	1.70%	269
NB Approach (To)	*1*		NBL	1.45	NBT	1.00	NBR	1.27
NB Approach (Away)	*1*		1.16%	0	0.00%	0	0.78%	0
SB Approach (To)	12.1		SBL	1.84	SBT	1.57	SBR	2.02
SB Approach (Away)	*1*		2.16%	348	1.38%	0	2.54%	596
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	19.0		WBL	1.26	WBT	1.85	WBR	1.26
WB Approach (Away)	17.1		0.77%	0	2.17%	793	0.77%	32
EB Approach (To)	27.4		EBL	1.58	EBT	1.85	EBR	1.58
EB Approach (Away)	26.5		1.40%	0	2.17%	2298	1.40%	248
NB Approach (To)	*1*		NBL	1.58	NBT	1.00	NBR	1.26
NB Approach (Away)	*1*		1.40%	0	0.00%	0	0.76%	0
SB Approach (To)	12.8		SBL	1.90	SBT	1.64	SBR	2.22
SB Approach (Away)	*1*		2.25%	356	1.49%	0	2.89%	655

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.94	0.85
Flt Protected		1.00	1.00		0.97	1.00
Satd. Flow (prot)		5085	5085		3289	1441
Flt Permitted		1.00	1.00		0.97	1.00
Satd. Flow (perm)		5085	5085		3289	1441
Volume (vph)	0	1261	435	0	191	295
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1371	473	0	208	321
RTOR Reduction (vph)	0	0	0	0	92	99
Lane Group Flow (vph)	0	1371	473	0	270	68
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		16.4	16.4		17.0	17.0
Effective Green, g (s)		18.4	18.4		18.0	18.0
Actuated g/C Ratio		0.41	0.41		0.41	0.41
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2107	2107		1333	584
v/s Ratio Prot		c0.27	0.09		c0.08	
v/s Ratio Perm						0.05
v/c Ratio		0.65	0.22		0.20	0.12
Uniform Delay, d1		10.4	8.4		8.6	8.2
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.1		0.3	0.4
Delay (s)		11.2	8.4		8.9	8.6
Level of Service		B	A		A	A
Approach Delay (s)		11.2	8.4		8.8	
Approach LOS		B	A		A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	44.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.93	0.85
Flt Protected		1.00	1.00		0.97	1.00
Satd. Flow (prot)		5085	5085		3283	1441
Flt Permitted		1.00	1.00		0.97	1.00
Satd. Flow (perm)		5085	5085		3283	1441
Volume (vph)	0	1837	561	0	264	435
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1997	610	0	287	473
RTOR Reduction (vph)	0	0	0	0	165	165
Lane Group Flow (vph)	0	1997	610	0	347	83
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		22.1	22.1		10.2	10.2
Effective Green, g (s)		24.1	24.1		11.2	11.2
Actuated g/C Ratio		0.56	0.56		0.26	0.26
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2830	2830		849	373
v/s Ratio Prot		c0.39	0.12		c0.11	
v/s Ratio Perm						0.06
v/c Ratio		0.71	0.22		0.41	0.22
Uniform Delay, d1		7.0	4.8		13.3	12.6
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.8	0.0		0.3	0.3
Delay (s)		7.8	4.9		13.6	12.9
Level of Service		A	A		B	B
Approach Delay (s)		7.8	4.9		13.4	
Approach LOS		A	A		B	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	43.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↑↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.93	0.85
Flt Protected		1.00	1.00		0.97	1.00
Satd. Flow (prot)		5085	5085		3283	1441
Flt Permitted		1.00	1.00		0.97	1.00
Satd. Flow (perm)		5085	5085		3283	1441
Volume (vph)	0	1837	595	0	264	435
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1997	647	0	287	473
RTOR Reduction (vph)	0	0	0	0	133	133
Lane Group Flow (vph)	0	1997	647	0	381	113
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		23.0	23.0		16.0	16.0
Effective Green, g (s)		25.0	25.0		17.0	17.0
Actuated g/C Ratio		0.50	0.50		0.34	0.34
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2543	2543		1116	490
v/s Ratio Prot		c0.39	0.13		c0.12	
v/s Ratio Perm						0.08
v/c Ratio		0.79	0.25		0.34	0.23
Uniform Delay, d1		10.3	7.2		12.3	11.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.7	0.1		0.8	1.1
Delay (s)		11.9	7.2		13.2	12.9
Level of Service		B	A		B	B
Approach Delay (s)		11.9	7.2		13.1	
Approach LOS		B	A		B	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.93	0.85
Flt Protected		1.00	1.00		0.97	1.00
Satd. Flow (prot)		5085	5085		3279	1441
Flt Permitted		1.00	1.00		0.97	1.00
Satd. Flow (perm)		5085	5085		3279	1441
Volume (vph)	0	2502	708	0	348	596
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2720	770	0	378	648
RTOR Reduction (vph)	0	0	0	0	144	144
Lane Group Flow (vph)	0	2720	770	0	544	194
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		33.1	33.1		14.1	14.1
Effective Green, g (s)		35.1	35.1		15.1	15.1
Actuated g/C Ratio		0.60	0.60		0.26	0.26
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		3067	3067		851	374
v/s Ratio Prot		c0.53	0.15		c0.17	
v/s Ratio Perm						0.13
v/c Ratio		0.89	0.25		0.64	0.52
Uniform Delay, d1		9.9	5.4		19.1	18.4
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		3.5	0.0		1.6	1.2
Delay (s)		13.3	5.4		20.7	19.7
Level of Service		B	A		C	B
Approach Delay (s)		13.3	5.4		20.4	
Approach LOS		B	A		C	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.93	0.85
Flt Protected		1.00	1.00		0.97	1.00
Satd. Flow (prot)		5085	5085		3279	1441
Flt Permitted		1.00	1.00		0.97	1.00
Satd. Flow (perm)		5085	5085		3279	1441
Volume (vph)	0	2502	742	0	348	596
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2720	807	0	378	648
RTOR Reduction (vph)	0	0	0	0	132	132
Lane Group Flow (vph)	0	2720	807	0	558	204
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		33.1	33.1		14.2	14.2
Effective Green, g (s)		35.1	35.1		15.2	15.2
Actuated g/C Ratio		0.60	0.60		0.26	0.26
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		3061	3061		855	376
v/s Ratio Prot		c0.53	0.16		c0.17	
v/s Ratio Perm						0.14
v/c Ratio		0.89	0.26		0.65	0.54
Uniform Delay, d1		9.9	5.5		19.2	18.6
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		3.5	0.0		1.8	1.6
Delay (s)		13.5	5.5		21.0	20.2
Level of Service		B	A		C	C
Approach Delay (s)		13.5	5.5		20.7	
Approach LOS		B	A		C	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & SR 99 Southbound Off Ramp - PM Peak
Count Date: 6/26/2007

Exist Peak Hour Volumes

S			
0	WBL	0	
3	WBT	932	
1	WBR	55	(Not Controlled)
0	EBL	0	
3	EBT	1485	
1	EBR	198	(Not Controlled)
0	NBL	0	
0	NBT	0	
0	NBR	0	
1>	SBL	663	
0	SBT	0	
1<	SBR	1382	
	TOTAL	4715	

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	1037
WBR	56
EBL	0
EBT	2016
EBR	250
NBL	0
NBT	0
NBR	0
SBL	564
SBT	0
SBR	1188
TOTAL	5110

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	1075
WBR	56
EBL	0
EBT	2016
EBR	250
NBL	0
NBT	0
NBR	0
SBL	564
SBT	0
SBR	1188
TOTAL	5148

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	981
WBR	56
EBL	0
EBT	1732
EBR	222
NBL	0
NBT	0
NBR	0
SBL	617
SBT	0
SBR	1292
TOTAL	4898

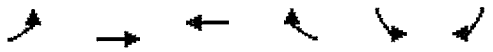
Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	1019
WBR	56
EBL	0
EBT	1732
EBR	222
NBL	0
NBT	0
NBR	0
SBL	617
SBT	0
SBR	1292
TOTAL	4936

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	38	27	11
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	38	27	11

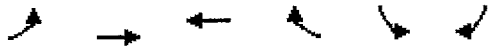
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & SR 99 Southbound Off Ramp - PM Peak						
	Count Date:	6/26/2007						
2007	ADT							
WB Approach (To)	16.50							
WB Approach (Away)	14.85							
EB Approach (To)	20.32							
EB Approach (Away)	19.65							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	19.48							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	17.2		WBL	1.02	WBT	1.11	WBR	1.02
WB Approach (Away)	17.2		0.08%	0	0.38%	1037	0.08%	56
EB Approach (To)	32.2		EBL	1.29	EBT	1.37	EBR	1.29
EB Approach (Away)	23.3		0.83%	0	1.10%	2016	0.83%	250
NB Approach (To)	*1*		NBL	1.09	NBT	1.00	NBR	1.08
NB Approach (Away)	*1*		0.30%	0	0.00%	0	0.27%	0
SB Approach (To)	12.1		SBL	0.89	SBT	0.81	SBR	0.90
SB Approach (Away)	*1*		-0.58%	564	-0.84%	0	-0.54%	1188
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	19.0		WBL	1.08	WBT	1.25	WBR	1.08
WB Approach (Away)	17.1		0.25%	0	0.79%	1162	0.25%	59
EB Approach (To)	27.4		EBL	1.18	EBT	1.25	EBR	1.18
EB Approach (Away)	26.5		0.54%	0	0.79%	1852	0.54%	230
NB Approach (To)	*1*		NBL	1.17	NBT	1.00	NBR	1.08
NB Approach (Away)	*1*		0.54%	0	0.00%	0	0.25%	0
SB Approach (To)	12.8		SBL	0.90	SBT	0.83	SBR	1.00
SB Approach (Away)	*1*		-0.49%	578	-0.74%	0	-0.20%	1306



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.92	0.85
Flt Protected		1.00	1.00		0.98	1.00
Satd. Flow (prot)		5085	5085		3257	1441
Flt Permitted		1.00	1.00		0.98	1.00
Satd. Flow (perm)		5085	5085		3257	1441
Volume (vph)	0	1485	932	0	663	1382
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1614	1013	0	721	1502
RTOR Reduction (vph)	0	0	0	0	8	8
Lane Group Flow (vph)	0	1614	1013	0	1464	743
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		18.0	18.0		31.0	31.0
Effective Green, g (s)		20.0	20.0		32.0	32.0
Actuated g/C Ratio		0.33	0.33		0.53	0.53
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1695	1695		1737	769
v/s Ratio Prot		c0.32	0.20		0.45	
v/s Ratio Perm						c0.52
v/c Ratio		0.95	0.60		0.88dr	0.97
Uniform Delay, d1		19.5	16.7		11.9	13.5
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		12.4	0.6		5.2	25.2
Delay (s)		31.9	17.2		17.0	38.7
Level of Service		C	B		B	D
Approach Delay (s)		31.9	17.2		24.4	
Approach LOS		C	B		C	

Intersection Summary			
HCM Average Control Delay	25.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

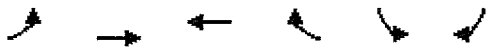
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.92	0.85
Flt Protected		1.00	1.00		0.98	1.00
Satd. Flow (prot)		5085	5085		3257	1441
Flt Permitted		1.00	1.00		0.98	1.00
Satd. Flow (perm)		5085	5085		3257	1441
Volume (vph)	0	1732	981	0	617	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1883	1066	0	671	1404
RTOR Reduction (vph)	0	0	0	0	13	13
Lane Group Flow (vph)	0	1883	1066	0	1360	689
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		23.0	23.0		31.0	31.0
Effective Green, g (s)		25.0	25.0		32.0	32.0
Actuated g/C Ratio		0.38	0.38		0.49	0.49
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1956	1956		1603	709
v/s Ratio Prot		c0.37	0.21		0.42	
v/s Ratio Perm						c0.48
v/c Ratio		0.96	0.54		0.89dr	0.97
Uniform Delay, d1		19.5	15.6		14.4	16.1
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		12.7	0.3		4.4	26.9
Delay (s)		32.2	15.9		18.8	42.9
Level of Service		C	B		B	D
Approach Delay (s)		32.2	15.9		27.0	
Approach LOS		C	B		C	

Intersection Summary			
HCM Average Control Delay	26.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

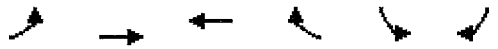
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.92	0.85
Flt Protected		1.00	1.00		0.98	1.00
Satd. Flow (prot)		5085	5085		3257	1441
Flt Permitted		1.00	1.00		0.98	1.00
Satd. Flow (perm)		5085	5085		3257	1441
Volume (vph)	0	1732	1019	0	617	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1883	1108	0	671	1404
RTOR Reduction (vph)	0	0	0	0	11	11
Lane Group Flow (vph)	0	1883	1108	0	1362	691
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		23.0	23.0		31.0	31.0
Effective Green, g (s)		25.0	25.0		32.0	32.0
Actuated g/C Ratio		0.38	0.38		0.49	0.49
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1956	1956		1603	709
v/s Ratio Prot		c0.37	0.22		0.42	
v/s Ratio Perm						c0.48
v/c Ratio		0.96	0.57		0.89dr	0.97
Uniform Delay, d1		19.5	15.7		14.4	16.1
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		12.7	0.4		4.4	27.3
Delay (s)		32.2	16.1		18.8	43.4
Level of Service		C	B		B	D
Approach Delay (s)		32.2	16.1		27.1	
Approach LOS		C	B		C	

Intersection Summary			
HCM Average Control Delay	26.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

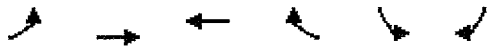
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.92	0.85
Flt Protected		1.00	1.00		0.98	1.00
Satd. Flow (prot)		5085	5085		3256	1441
Flt Permitted		1.00	1.00		0.98	1.00
Satd. Flow (perm)		5085	5085		3256	1441
Volume (vph)	0	2016	1037	0	564	1188
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2191	1127	0	613	1291
RTOR Reduction (vph)	0	0	0	0	20	20
Lane Group Flow (vph)	0	2191	1127	0	1239	627
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		29.0	29.0		30.0	30.0
Effective Green, g (s)		31.0	31.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.44	0.44
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2252	2252		1442	638
v/s Ratio Prot		c0.43	0.22		0.38	
v/s Ratio Perm						c0.43
v/c Ratio		0.97	0.50		0.89dr	0.98
Uniform Delay, d1		19.1	14.0		17.5	19.2
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		13.1	0.2		5.3	30.9
Delay (s)		32.2	14.1		22.9	50.1
Level of Service		C	B		C	D
Approach Delay (s)		32.2	14.1		32.1	
Approach LOS		C	B		C	

Intersection Summary			
HCM Average Control Delay	28.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	0.91
Frt		1.00	1.00		0.92	0.85
Flt Protected		1.00	1.00		0.98	1.00
Satd. Flow (prot)		5085	5085		3256	1441
Flt Permitted		1.00	1.00		0.98	1.00
Satd. Flow (perm)		5085	5085		3256	1441
Volume (vph)	0	2016	1075	0	564	1188
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	2191	1168	0	613	1291
RTOR Reduction (vph)	0	0	0	0	17	17
Lane Group Flow (vph)	0	2191	1168	0	1241	629
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		29.0	29.0		30.0	30.0
Effective Green, g (s)		31.0	31.0		31.0	31.0
Actuated g/C Ratio		0.44	0.44		0.44	0.44
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		2252	2252		1442	638
v/s Ratio Prot		c0.43	0.23		0.38	
v/s Ratio Perm						c0.44
v/c Ratio		0.97	0.52		0.90dr	0.99
Uniform Delay, d1		19.1	14.1		17.6	19.3
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		13.1	0.2		5.5	31.7
Delay (s)		32.2	14.3		23.0	51.0
Level of Service		C	B		C	D
Approach Delay (s)		32.2	14.3		32.5	
Approach LOS		C	B		C	

Intersection Summary			
HCM Average Control Delay	28.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & SR 99 Northbound Off Ramp - AM Peak
Count Date: 7/11/2007

Exist Peak Hour Volumes

S			
0	WBL	0	
3	WBT	318	
<	WBR	0	(Not Controlled)
0	EBL	0	
3	EBT	411	
<	EBR	0	(Not Controlled)
1	NBL	108	
0	NBT	0	
1	NBR	31	
0	SBL	0	
0	SBT	0	
0	SBR	0	
	TOTAL	868	

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	580
WBR	0
EBL	0
EBT	629
EBR	0
NBL	259
NBT	0
NBR	61
SBL	0
SBT	0
SBR	0
TOTAL	1529

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	583
WBR	0
EBL	0
EBT	629
EBR	0
NBL	290
NBT	0
NBR	61
SBL	0
SBT	0
SBR	0
TOTAL	1563

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	440
WBR	0
EBL	0
EBT	512
EBR	0
NBL	178
NBT	0
NBR	45
SBL	0
SBT	0
SBR	0
TOTAL	1175

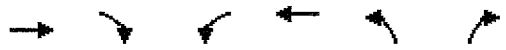
Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	443
WBR	0
EBL	0
EBT	512
EBR	0
NBL	209
NBT	0
NBR	45
SBL	0
SBT	0
SBR	0
TOTAL	1209

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	3	1	2
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	31	19	12
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	34	20	14

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & SR 99 Northbound Off Ramp - AM Peak						
	Count Date:	7/11/2007						
2006	ADT							
WB Approach (To)	13.69							
WB Approach (Away)	11.32							
EB Approach (To)	11.14							
EB Approach (Away)	7.26							
NB Approach (To)	2.4							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	8.5							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	20.0		WBL	1.23	WBT	1.92	WBR	1.22
WB Approach (Away)	17.6		0.66%	0	2.17%	580	0.62%	0
EB Approach (To)	17.2		EBL	1.26	EBT	1.55	EBR	1.27
EB Approach (Away)	17.2		0.72%	0	1.53%	629	0.76%	0
NB Approach (To)	6.2		NBL	2.48	NBT	1.78	NBR	2.07
NB Approach (Away)	*1*		3.18%	259	1.63%	0	2.44%	61
SB Approach (To)	*1*		SBL	1.28	SBT	1.00	SBR	1.69
SB Approach (Away)	8.3		0.77%	0	0.00%	0	1.51%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	18.3		WBL	1.17	WBT	1.98	WBR	1.04
WB Approach (Away)	17.6		0.50%	0	2.18%	582	-0.01%	0
EB Approach (To)	17.1		EBL	1.14	EBT	1.54	EBR	1.27
EB Approach (Away)	19.0		0.24%	0	1.51%	625	0.74%	0
NB Approach (To)	7.9		NBL	2.96	NBT	2.02	NBR	2.43
NB Approach (Away)	*1*		3.78%	305	1.59%	0	2.86%	68
SB Approach (To)	*1*		SBL	1.28	SBT	1.00	SBR	1.81
SB Approach (Away)	6.3		0.76%	0	0.00%	0	1.68%	0



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↖	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	411	0	0	318	108	31
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	447	0	0	346	117	34
RTOR Reduction (vph)	0	0	0	0	0	23
Lane Group Flow (vph)	447	0	0	346	117	11
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	7.7			7.7	7.1	7.1
Effective Green, g (s)	9.7			9.7	8.1	8.1
Actuated g/C Ratio	0.38			0.38	0.31	0.31
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1912			1912	556	497
v/s Ratio Prot	c0.09			0.07	c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.23			0.18	0.21	0.02
Uniform Delay, d1	5.5			5.4	6.5	6.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.0	0.2	0.0
Delay (s)	5.6			5.4	6.7	6.1
Level of Service	A			A	A	A
Approach Delay (s)	5.6			5.4	6.6	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	5.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	25.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	512	0	0	440	178	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	0	0	478	193	49
RTOR Reduction (vph)	0	0	0	0	0	33
Lane Group Flow (vph)	557	0	0	478	193	16
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	8.6			8.6	8.3	8.3
Effective Green, g (s)	10.6			10.6	9.3	9.3
Actuated g/C Ratio	0.38			0.38	0.33	0.33
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1932			1932	590	528
v/s Ratio Prot	c0.11			0.09	c0.11	
v/s Ratio Perm						0.01
v/c Ratio	0.29			0.25	0.33	0.03
Uniform Delay, d1	6.0			5.9	7.0	6.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.3	0.0
Delay (s)	6.1			6.0	7.3	6.3
Level of Service	A			A	A	A
Approach Delay (s)	6.1			6.0	7.1	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	27.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	512	0	0	443	209	45
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	0	0	482	227	49
RTOR Reduction (vph)	0	0	0	0	0	32
Lane Group Flow (vph)	557	0	0	482	227	17
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	8.7			8.7	8.9	8.9
Effective Green, g (s)	10.7			10.7	9.9	9.9
Actuated g/C Ratio	0.37			0.37	0.35	0.35
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1902			1902	613	548
v/s Ratio Prot	c0.11			0.09	c0.13	
v/s Ratio Perm						0.01
v/c Ratio	0.29			0.25	0.37	0.03
Uniform Delay, d1	6.3			6.2	7.0	6.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.4	0.0
Delay (s)	6.4			6.3	7.4	6.2
Level of Service	A			A	A	A
Approach Delay (s)	6.4			6.3	7.2	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	6.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	28.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	629	0	0	580	259	61
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	684	0	0	630	282	66
RTOR Reduction (vph)	0	0	0	0	0	42
Lane Group Flow (vph)	684	0	0	630	282	24
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	10.1			10.1	10.4	10.4
Effective Green, g (s)	12.1			12.1	11.4	11.4
Actuated g/C Ratio	0.38			0.38	0.36	0.36
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1953			1953	641	573
v/s Ratio Prot	c0.13			0.12	c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.35			0.32	0.44	0.04
Uniform Delay, d1	6.9			6.8	7.6	6.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.5	0.0
Delay (s)	7.0			6.9	8.1	6.5
Level of Service	A			A	A	A
Approach Delay (s)	7.0			6.9	7.8	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	7.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	31.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	629	0	0	583	290	61
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	684	0	0	634	315	66
RTOR Reduction (vph)	0	0	0	0	0	42
Lane Group Flow (vph)	684	0	0	634	315	24
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	10.2			10.2	10.9	10.9
Effective Green, g (s)	12.2			12.2	11.9	11.9
Actuated g/C Ratio	0.38			0.38	0.37	0.37
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1933			1933	656	587
v/s Ratio Prot	c0.13			0.12	c0.18	
v/s Ratio Perm						0.02
v/c Ratio	0.35			0.33	0.48	0.04
Uniform Delay, d1	7.1			7.0	7.7	6.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.1			0.1	0.6	0.0
Delay (s)	7.2			7.1	8.3	6.5
Level of Service	A			A	A	A
Approach Delay (s)	7.2			7.1	8.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	32.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & SR 99 Northbound Off Ramp - PM Peak
Count Date: 6/27/2007

Exist Peak Hour Volumes

S			
0	WBL	0	
3	WBT	555	
<	WBR	0	(Not Controlled)
0	EBL	0	
3	EBT	993	
<	EBR	0	(Not Controlled)
1	NBL	173	
0	NBT	0	
1	NBR	120	
0	SBL	0	
0	SBT	0	
0	SBR	0	
	TOTAL	1841	

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	1014
WBR	0
EBL	0
EBT	1520
EBR	0
NBL	416
NBT	0
NBR	236
SBL	0
SBT	0
SBR	0
TOTAL	3185

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	1020
WBR	0
EBL	0
EBT	1520
EBR	0
NBL	448
NBT	0
NBR	237
SBL	0
SBT	0
SBR	0
TOTAL	3224

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	768
WBR	0
EBL	0
EBT	1238
EBR	0
NBL	286
NBT	0
NBR	174
SBL	0
SBT	0
SBR	0
TOTAL	2465

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	774
WBR	0
EBL	0
EBT	1238
EBR	0
NBL	318
NBT	0
NBR	175
SBL	0
SBT	0
SBR	0
TOTAL	2504

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	6	3	3
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	32	24	8
NBT	0	0	0
NBR	1	1	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	39	28	11

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & SR 99 Northbound Off Ramp - PM Peak						
	Count Date:	6/27/2007						
2006	ADT							
WB Approach (To)	13.69							
WB Approach (Away)	11.32							
EB Approach (To)	11.14							
EB Approach (Away)	7.26							
NB Approach (To)	2.4							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	8.5							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	20.0		WBL	1.23	WBT	1.92	WBR	1.22
WB Approach (Away)	17.6		0.66%	0	2.17%	1014	0.62%	0
EB Approach (To)	17.2		EBL	1.26	EBT	1.55	EBR	1.27
EB Approach (Away)	17.2		0.72%	0	1.53%	1520	0.76%	0
NB Approach (To)	6.2		NBL	2.48	NBT	1.78	NBR	2.07
NB Approach (Away)	*1*		3.18%	416	1.63%	0	2.44%	236
SB Approach (To)	*1*		SBL	1.28	SBT	1.00	SBR	1.69
SB Approach (Away)	8.3		0.77%	0	0.00%	0	1.51%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	18.3		WBL	1.17	WBT	1.98	WBR	1.04
WB Approach (Away)	17.6		0.50%	0	2.18%	1017	-0.01%	0
EB Approach (To)	17.1		EBL	1.14	EBT	1.54	EBR	1.27
EB Approach (Away)	19.0		0.24%	0	1.51%	1510	0.74%	0
NB Approach (To)	7.9		NBL	2.96	NBT	2.02	NBR	2.43
NB Approach (Away)	*1*		3.78%	490	1.59%	0	2.86%	265
SB Approach (To)	*1*		SBL	1.28	SBT	1.00	SBR	1.81
SB Approach (Away)	6.3		0.76%	0	0.00%	0	1.68%	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	993	0	0	555	173	120
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1079	0	0	603	188	130
RTOR Reduction (vph)	0	0	0	0	0	20
Lane Group Flow (vph)	1079	0	0	603	188	110
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	14.9			14.9	17.0	17.0
Effective Green, g (s)	16.9			16.9	18.0	18.0
Actuated g/C Ratio	0.39			0.39	0.42	0.42
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2003			2003	743	664
v/s Ratio Prot	c0.21			0.12	c0.11	
v/s Ratio Perm						0.07
v/c Ratio	0.54			0.30	0.25	0.17
Uniform Delay, d1	10.0			8.9	8.1	7.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.1	0.8	0.5
Delay (s)	10.3			9.0	8.9	8.3
Level of Service	B			A	A	A
Approach Delay (s)	10.3			9.0	8.7	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	42.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	1238	0	0	768	286	174
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1346	0	0	835	311	189
RTOR Reduction (vph)	0	0	0	0	0	8
Lane Group Flow (vph)	1346	0	0	835	311	181
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	16.4			16.4	17.0	17.0
Effective Green, g (s)	18.4			18.4	18.0	18.0
Actuated g/C Ratio	0.41			0.41	0.41	0.41
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2107			2107	718	642
v/s Ratio Prot	c0.26			0.16	c0.18	
v/s Ratio Perm						0.11
v/c Ratio	0.64			0.40	0.43	0.28
Uniform Delay, d1	10.4			9.1	9.5	8.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.6			0.1	1.9	1.1
Delay (s)	11.0			9.2	11.4	10.0
Level of Service	B			A	B	A
Approach Delay (s)	11.0			9.2	10.9	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	44.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	1238	0	0	774	318	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1346	0	0	841	346	190
RTOR Reduction (vph)	0	0	0	0	0	9
Lane Group Flow (vph)	1346	0	0	841	346	181
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	15.5			15.5	12.5	12.5
Effective Green, g (s)	17.5			17.5	13.5	13.5
Actuated g/C Ratio	0.45			0.45	0.35	0.35
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2282			2282	613	548
v/s Ratio Prot	c0.26			0.17	c0.20	
v/s Ratio Perm						0.11
v/c Ratio	0.59			0.37	0.56	0.33
Uniform Delay, d1	8.1			7.1	10.4	9.4
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			0.1	1.2	0.4
Delay (s)	8.5			7.2	11.6	9.8
Level of Service	A			A	B	A
Approach Delay (s)	8.5			7.2	10.9	
Approach LOS	A			A	B	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	39.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	1520	0	0	1014	416	236
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1652	0	0	1102	452	257
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	1652	0	0	1102	452	254
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	18.4			18.4	15.7	15.7
Effective Green, g (s)	20.4			20.4	16.7	16.7
Actuated g/C Ratio	0.45			0.45	0.37	0.37
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2300			2300	655	586
v/s Ratio Prot	c0.32			0.22	c0.26	
v/s Ratio Perm						0.16
v/c Ratio	0.72			0.48	0.69	0.43
Uniform Delay, d1	10.0			8.6	12.0	10.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.1			0.2	3.1	0.5
Delay (s)	11.1			8.8	15.1	11.2
Level of Service	B			A	B	B
Approach Delay (s)	11.1			8.8	13.7	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	45.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑			↑↑↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	0.91			0.91	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	5085			5085	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	5085			5085	1770	1583
Volume (vph)	1520	0	0	1020	448	237
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1652	0	0	1109	487	258
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	1652	0	0	1109	487	255
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	18.4			18.4	16.3	16.3
Effective Green, g (s)	20.4			20.4	17.3	17.3
Actuated g/C Ratio	0.45			0.45	0.38	0.38
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2270			2270	670	599
v/s Ratio Prot	c0.32			0.22	c0.28	
v/s Ratio Perm						0.16
v/c Ratio	0.73			0.49	0.73	0.43
Uniform Delay, d1	10.4			9.0	12.2	10.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.2			0.2	3.9	0.5
Delay (s)	11.6			9.1	16.1	11.0
Level of Service	B			A	B	B
Approach Delay (s)	11.6			9.1	14.3	
Approach LOS	B			A	B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	45.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & South H St - AM Peak
Count Date: 1/30/2008

Exist Peak Hour Volumes

S		
1	WBL	19
2	WBT	552
1	WBR	103
1	EBL	90
2	EBT	425
1	EBR	190
1	NBL	301
2	NBT	347
1	NBR	21
1	SBL	83
2	SBT	283
<	SBR	105
	TOTAL	2519

Year 2035
Fut. Volumes w/o Proj

WBL	48
WBT	1281
WBR	205
EBL	157
EBT	924
EBR	426
NBL	672
NBT	662
NBR	50
SBL	175
SBT	615
SBR	207
TOTAL	5422

Year 2035 Fut. Vol
+ Project Traffic

WBL	48
WBT	1281
WBR	205
EBL	157
EBT	929
EBR	427
NBL	673
NBT	663
NBR	51
SBL	179
SBT	615
SBR	207
TOTAL	5435

Year 2020
Fut. Volumes w/o Proj

WBL	32
WBT	882
WBR	149
EBL	120
EBT	651
EBR	297
NBL	469
NBT	490
NBR	34
SBL	125
SBT	433
SBR	151
TOTAL	3834

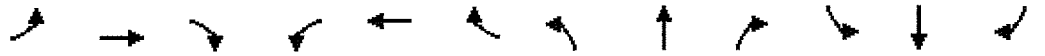
Year 2020 Fut. Vol
+ Project Traffic

WBL	32
WBT	882
WBR	149
EBL	120
EBT	656
EBR	298
NBL	470
NBT	491
NBR	35
SBL	129
SBT	433
SBR	151
TOTAL	3847

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	5	5	0
EBR	1	1	0
NBL	1	1	0
NBT	1	1	0
NBR	1	1	0
SBL	4	4	0
SBT	0	0	0
SBR	0	0	0
TOTAL	13	13	0

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Panama Ln & South H St - AM Peak					
	Count Date:	1/30/2008					
2006	ADT						
WB Approach (To)	6.12						
WB Approach (Away)	5.91						
EB Approach (To)	8.18						
EB Approach (Away)	8.45						
NB Approach (To)	5.80						
NB Approach (Away)	5.81						
SB Approach (To)	5.07						
SB Approach (Away)	5.04						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	16.4		WBL	2.68	WBT	2.44	WBR 2.13
WB Approach (Away)	14.9		3.47%	48	3.12%	1281	2.53% 205
EB Approach (To)	16.6		EBL	1.81	EBT	2.28	EBR 2.36
EB Approach (Away)	18.6		2.04%	157	2.87%	924	2.98% 426
NB Approach (To)	14.3		NBL	2.33	NBT	2.02	NBR 2.49
NB Approach (Away)	15.6		2.97%	672	2.38%	662	3.21% 50
SB Approach (To)	9.7		SBL	2.21	SBT	2.29	SBR 2.05
SB Approach (Away)	8.0		2.76%	175	2.87%	615	2.51% 207
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	15.1		WBL	2.56	WBT	2.24	WBR 2.18
WB Approach (Away)	14.6		3.31%	46	2.81%	1181	2.72% 215
EB Approach (To)	16.5		EBL	1.96	EBT	2.24	EBR 2.33
EB Approach (Away)	17.0		2.36%	171	2.81%	910	2.95% 421
NB Approach (To)	15.4		NBL	2.33	NBT	2.28	NBR 2.56
NB Approach (Away)	15.4		2.95%	668	2.85%	751	3.31% 51
SB Approach (To)	9.7		SBL	2.19	SBT	2.28	SBR 1.96
SB Approach (Away)	9.6		2.72%	173	2.85%	612	2.36% 199

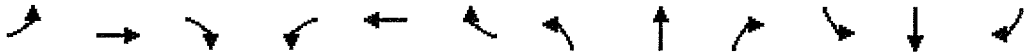


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3396	
Volume (vph)	90	425	190	19	552	103	301	347	21	83	283	105
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	462	207	21	600	112	327	377	23	90	308	114
RTOR Reduction (vph)	0	0	135	0	0	81	0	0	15	0	48	0
Lane Group Flow (vph)	98	462	72	21	600	31	327	377	8	90	374	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	6.8	23.3	23.3	1.4	17.9	17.9	14.6	21.8	21.8	6.4	13.6	
Effective Green, g (s)	6.8	25.3	25.3	1.4	19.9	19.9	14.6	23.8	23.8	6.4	15.6	
Actuated g/C Ratio	0.09	0.35	0.35	0.02	0.27	0.27	0.20	0.33	0.33	0.09	0.21	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	165	1228	549	34	966	432	354	1155	517	155	727	
v/s Ratio Prot	c0.06	0.13		0.01	c0.17		c0.18	0.11		0.05	c0.11	
v/s Ratio Perm			0.05			0.02			0.00			
v/c Ratio	0.59	0.38	0.13	0.62	0.62	0.07	0.92	0.33	0.01	0.58	0.51	
Uniform Delay, d1	31.7	17.9	16.3	35.5	23.2	19.6	28.6	18.5	16.6	32.0	25.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.6	0.2	0.1	29.0	1.2	0.1	29.1	0.2	0.0	5.4	0.6	
Delay (s)	37.4	18.1	16.4	64.5	24.4	19.7	57.7	18.7	16.6	37.4	25.9	
Level of Service	D	B	B	E	C	B	E	B	B	D	C	
Approach Delay (s)		20.1			24.9			36.2			27.9	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

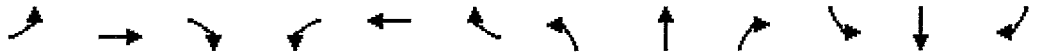
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3402	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3402	
Volume (vph)	120	651	297	32	882	149	469	490	34	125	433	151
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	708	323	35	959	162	510	533	37	136	471	164
RTOR Reduction (vph)	0	0	213	0	0	115	0	0	25	0	39	0
Lane Group Flow (vph)	130	708	110	35	959	47	510	533	12	136	596	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	7.0	29.2	29.2	2.4	24.6	24.6	24.0	28.9	28.9	11.1	16.0	
Effective Green, g (s)	7.0	31.2	31.2	2.4	26.6	26.6	24.0	30.9	30.9	11.1	18.0	
Actuated g/C Ratio	0.08	0.34	0.34	0.03	0.29	0.29	0.26	0.34	0.34	0.12	0.20	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	135	1205	539	46	1028	460	464	1194	534	214	669	
v/s Ratio Prot	c0.07	0.20		0.02	c0.27		c0.29	0.15		0.08	c0.18	
v/s Ratio Perm			0.07			0.03			0.01			
v/c Ratio	0.96	0.59	0.20	0.76	0.93	0.10	1.10	0.45	0.02	0.64	0.89	
Uniform Delay, d1	42.2	24.9	21.4	44.3	31.6	23.8	33.8	23.7	20.3	38.3	35.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	65.7	0.7	0.2	52.3	14.6	0.1	71.5	0.3	0.0	6.1	14.1	
Delay (s)	107.8	25.6	21.6	96.6	46.2	23.9	105.3	23.9	20.3	44.4	50.0	
Level of Service	F	C	C	F	D	C	F	C	C	D	D	
Approach Delay (s)		33.7			44.6			62.2			49.0	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM Average Control Delay	46.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	91.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3402	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3402	
Volume (vph)	120	651	297	32	882	149	469	490	34	125	433	151
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	708	323	35	959	162	510	533	37	136	471	164
RTOR Reduction (vph)	0	0	198	0	0	108	0	0	27	0	43	0
Lane Group Flow (vph)	130	708	125	35	959	54	510	533	10	136	592	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	7.0	29.5	29.5	2.4	24.9	24.9	13.0	20.5	20.5	8.8	16.3	
Effective Green, g (s)	7.0	31.5	31.5	2.4	26.9	26.9	13.0	22.5	22.5	8.8	18.3	
Actuated g/C Ratio	0.09	0.39	0.39	0.03	0.33	0.33	0.16	0.28	0.28	0.11	0.23	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	153	1373	614	52	1172	524	550	981	439	192	767	
v/s Ratio Prot	c0.07	0.20		0.02	c0.27		c0.15	0.15		0.08	c0.17	
v/s Ratio Perm			0.08			0.03			0.01			
v/c Ratio	0.85	0.52	0.20	0.67	0.82	0.10	0.93	0.54	0.02	0.71	0.77	
Uniform Delay, d1	36.6	19.0	16.5	39.0	24.9	18.8	33.6	25.0	21.4	35.0	29.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.2	0.3	0.2	29.2	4.6	0.1	21.8	0.6	0.0	11.3	4.8	
Delay (s)	69.8	19.3	16.7	68.3	29.5	18.9	55.5	25.6	21.4	46.3	34.3	
Level of Service	E	B	B	E	C	B	E	C	C	D	C	
Approach Delay (s)		24.2			29.2			39.6			36.4	
Approach LOS		C			C			D			D	

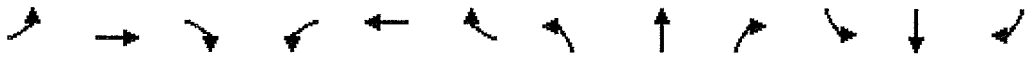
Intersection Summary			
HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3402	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3402	
Volume (vph)	120	656	298	32	882	149	470	491	35	129	433	151
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	713	324	35	959	162	511	534	38	140	471	164
RTOR Reduction (vph)	0	0	198	0	0	108	0	0	28	0	43	0
Lane Group Flow (vph)	130	713	126	35	959	54	511	534	10	140	592	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	7.0	29.5	29.5	2.4	24.9	24.9	13.0	20.4	20.4	8.9	16.3	
Effective Green, g (s)	7.0	31.5	31.5	2.4	26.9	26.9	13.0	22.4	22.4	8.9	18.3	
Actuated g/C Ratio	0.09	0.39	0.39	0.03	0.33	0.33	0.16	0.28	0.28	0.11	0.23	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	153	1373	614	52	1172	524	550	976	437	194	767	
v/s Ratio Prot	c0.07	0.20		0.02	c0.27		c0.15	0.15		0.08	c0.17	
v/s Ratio Perm			0.08			0.03			0.01			
v/c Ratio	0.85	0.52	0.20	0.67	0.82	0.10	0.93	0.55	0.02	0.72	0.77	
Uniform Delay, d1	36.6	19.0	16.5	39.0	24.9	18.8	33.6	25.1	21.4	35.0	29.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	33.2	0.3	0.2	29.2	4.6	0.1	22.1	0.6	0.0	12.4	4.8	
Delay (s)	69.8	19.4	16.7	68.3	29.5	18.9	55.7	25.7	21.5	47.4	34.3	
Level of Service	E	B	B	E	C	B	E	C	C	D	C	
Approach Delay (s)		24.2			29.2			39.7			36.7	
Approach LOS		C			C			D			D	

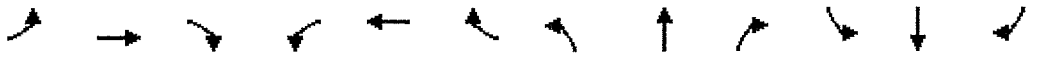
Intersection Summary			
HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3405	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3405	
Volume (vph)	157	924	426	48	1281	205	672	662	50	175	615	207
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	1004	463	52	1392	223	730	720	54	190	668	225
RTOR Reduction (vph)	0	0	268	0	0	100	0	0	38	0	28	0
Lane Group Flow (vph)	171	1004	195	52	1392	123	730	720	16	190	865	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	10.0	48.0	48.0	4.8	42.8	42.8	23.0	32.7	32.7	15.3	25.0	
Effective Green, g (s)	10.0	50.0	50.0	4.8	44.8	44.8	23.0	34.7	34.7	15.3	27.0	
Actuated g/C Ratio	0.08	0.41	0.41	0.04	0.37	0.37	0.19	0.29	0.29	0.13	0.22	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	147	1465	655	70	1312	587	654	1017	455	224	761	
v/s Ratio Prot	c0.10	0.28		0.03	c0.39		c0.21	0.20		0.11	c0.25	
v/s Ratio Perm			0.12			0.08			0.01			
v/c Ratio	1.16	0.69	0.30	0.74	1.06	0.21	1.12	0.71	0.03	0.85	1.14	
Uniform Delay, d1	55.4	29.0	23.7	57.4	38.0	25.9	48.9	38.5	31.0	51.6	46.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	124.8	1.3	0.3	34.2	42.8	0.2	71.6	2.3	0.0	24.6	77.2	
Delay (s)	180.2	30.3	23.9	91.6	80.8	26.1	120.5	40.8	31.0	76.2	124.1	
Level of Service	F	C	C	F	F	C	F	D	C	E	F	
Approach Delay (s)		44.2			73.8			79.1			115.7	
Approach LOS		D			E			E			F	

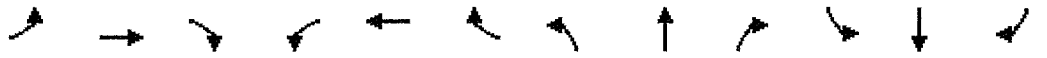
Intersection Summary			
HCM Average Control Delay	74.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	157	924	426	48	1281	205	672	662	50	175	615	207
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	167	983	453	51	1363	218	715	704	53	188	661	223
RTOR Reduction (vph)	0	0	298	0	0	148	0	0	35	0	0	78
Lane Group Flow (vph)	167	983	155	51	1363	70	715	704	18	188	661	145
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.0	29.2	29.2	3.1	27.3	27.3	20.3	29.4	29.4	8.6	17.7	17.7
Effective Green, g (s)	5.0	30.2	30.2	3.1	28.3	28.3	20.3	30.4	30.4	8.6	18.7	18.7
Actuated g/C Ratio	0.06	0.34	0.34	0.04	0.32	0.32	0.23	0.34	0.34	0.10	0.21	0.21
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	1210	541	62	1630	507	789	1218	545	334	749	335
v/s Ratio Prot	c0.05	c0.28		0.03	0.27		c0.21	0.20		0.05	c0.19	
v/s Ratio Perm			0.10			0.04			0.01			0.09
v/c Ratio	0.86	0.81	0.29	0.82	0.84	0.14	0.91	0.58	0.03	0.56	0.88	0.43
Uniform Delay, d1	41.3	26.5	21.2	42.3	27.8	21.3	33.1	23.7	19.2	38.1	33.7	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.1	4.3	0.3	56.2	3.9	0.1	13.9	0.7	0.0	2.2	11.9	0.9
Delay (s)	71.4	30.7	21.5	98.6	31.7	21.5	47.0	24.4	19.2	40.2	45.6	31.1
Level of Service	E	C	C	F	C	C	D	C	B	D	D	C
Approach Delay (s)		32.4			32.5			35.2			41.7	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	5085	1583	3433	3539	1583	3433	3539	1583
Volume (vph)	157	929	427	48	1281	205	673	663	51	179	615	207
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	167	988	454	51	1363	218	716	705	54	192	661	223
RTOR Reduction (vph)	0	0	299	0	0	148	0	0	35	0	0	77
Lane Group Flow (vph)	167	988	155	51	1363	70	716	705	19	192	661	146
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.0	29.2	29.2	3.1	27.3	27.3	20.3	29.4	29.4	8.6	17.7	17.7
Effective Green, g (s)	5.0	30.2	30.2	3.1	28.3	28.3	20.3	30.4	30.4	8.6	18.7	18.7
Actuated g/C Ratio	0.06	0.34	0.34	0.04	0.32	0.32	0.23	0.34	0.34	0.10	0.21	0.21
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	194	1210	541	62	1630	507	789	1218	545	334	749	335
v/s Ratio Prot	c0.05	c0.28		0.03	0.27		c0.21	0.20		0.06	c0.19	
v/s Ratio Perm			0.10			0.04			0.01			0.09
v/c Ratio	0.86	0.82	0.29	0.82	0.84	0.14	0.91	0.58	0.03	0.57	0.88	0.44
Uniform Delay, d1	41.3	26.5	21.2	42.3	27.8	21.3	33.1	23.7	19.2	38.1	33.7	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.1	4.4	0.3	56.2	3.9	0.1	14.1	0.7	0.0	2.4	11.9	0.9
Delay (s)	71.4	30.9	21.5	98.6	31.7	21.5	47.1	24.4	19.2	40.5	45.6	31.1
Level of Service	E	C	C	F	C	C	D	C	B	D	D	C
Approach Delay (s)		32.4			32.5			35.2			41.7	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & South H St - PM Peak
Count Date: 1/16/2008

Exist Peak Hour Volumes

S		
1	WBL	7
2	WBT	301
1	WBR	48
1	EBL	99
2	EBT	390
1	EBR	141
1	NBL	116
2	NBT	121
1	NBR	16
1	SBL	78
2	SBT	249
<	SBR	107
	TOTAL	1673

Year 2035
Fut. Volumes w/o Proj

WBL	23
WBT	799
WBR	109
EBL	197
EBT	969
EBR	401
NBL	329
NBT	293
NBR	48
SBL	188
SBT	688
SBR	242
TOTAL	4286

Year 2035 Fut. Vol
+ Project Traffic

WBL	23
WBT	804
WBR	114
EBL	197
EBT	971
EBR	403
NBL	329
NBT	293
NBR	48
SBL	192
SBT	689
SBR	242
TOTAL	4305

Year 2020
Fut. Volumes w/o Proj

WBL	14
WBT	527
WBR	76
EBL	144
EBT	652
EBR	259
NBL	212
NBT	199
NBR	31
SBL	128
SBT	448
SBR	168
TOTAL	2858

Year 2020 Fut. Vol
+ Project Traffic

WBL	14
WBT	532
WBR	81
EBL	144
EBT	654
EBR	261
NBL	212
NBT	199
NBR	31
SBL	132
SBT	449
SBR	168
TOTAL	2877

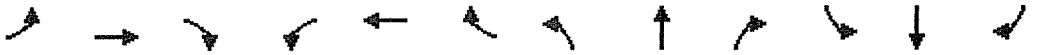
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	5	5	0
WBR	5	5	0
EBL	0	0	0
EBT	2	2	0
EBR	2	2	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	4	4	0
SBT	1	1	0
SBR	0	0	0
TOTAL	19	19	0

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & South H St - PM Peak						
	Count Date:	1/16/2008						
2006	ADT							
WB Approach (To)	5.34							
WB Approach (Away)	5.16							
EB Approach (To)	7.1							
EB Approach (Away)	7.33							
NB Approach (To)	4.06							
NB Approach (Away)	4.06							
SB Approach (To)	4.4							
SB Approach (Away)	4.37							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	16.4		WBL	3.45	WBT	2.80	WBR	2.44
WB Approach (Away)	14.9		4.37%	23	3.62%	799	3.03%	109
EB Approach (To)	16.6		EBL	2.08	EBT	2.61	EBR	3.09
EB Approach (Away)	18.6		2.54%	197	3.37%	969	3.88%	401
NB Approach (To)	14.3		NBL	3.03	NBT	2.67	NBR	3.20
NB Approach (Away)	15.6		3.86%	329	3.28%	293	4.10%	48
SB Approach (To)	9.7		SBL	2.54	SBT	3.02	SBR	2.36
SB Approach (Away)	8.0		3.25%	188	3.77%	688	3.02%	242
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	15.1		WBL	3.31	WBT	2.57	WBR	2.51
WB Approach (Away)	14.6		4.20%	22	3.31%	736	3.21%	114
EB Approach (To)	16.5		EBL	2.26	EBT	2.57	EBR	3.06
EB Approach (Away)	17.0		2.86%	215	3.31%	954	3.84%	397
NB Approach (To)	15.4		NBL	3.06	NBT	3.00	NBR	3.31
NB Approach (Away)	15.4		3.84%	327	3.75%	333	4.20%	50
SB Approach (To)	9.7		SBL	2.51	SBT	3.00	SBR	2.26
SB Approach (Away)	9.6		3.21%	186	3.75%	684	2.86%	232

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3380	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3380	
Volume (vph)	99	390	141	7	301	48	116	121	16	78	249	107
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	424	153	8	327	52	126	132	17	85	271	116
RTOR Reduction (vph)	0	0	98	0	0	38	0	0	12	0	59	0
Lane Group Flow (vph)	108	424	55	8	327	14	126	132	5	85	328	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	6.4	19.3	19.3	0.6	13.5	13.5	7.4	15.1	15.1	4.4	12.1	
Effective Green, g (s)	6.4	21.3	21.3	0.6	15.5	15.5	7.4	17.1	17.1	4.4	14.1	
Actuated g/C Ratio	0.11	0.36	0.36	0.01	0.26	0.26	0.12	0.29	0.29	0.07	0.24	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	1269	568	18	923	413	221	1019	456	131	802	
v/s Ratio Prot	c0.06	c0.12		0.00	0.09		c0.07	c0.04		0.05	c0.10	
v/s Ratio Perm			0.03			0.01			0.00			
v/c Ratio	0.57	0.33	0.10	0.44	0.35	0.03	0.57	0.13	0.01	0.65	0.41	
Uniform Delay, d1	25.2	13.9	12.7	29.2	17.9	16.4	24.5	15.6	15.1	26.7	19.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	0.2	0.1	16.5	0.2	0.0	3.5	0.1	0.0	10.6	0.3	
Delay (s)	29.0	14.0	12.7	45.7	18.1	16.4	28.0	15.7	15.1	37.3	19.5	
Level of Service	C	B	B	D	B	B	C	B	B	D	B	
Approach Delay (s)		16.1			18.5			21.3			22.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3394	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3394	
Volume (vph)	144	652	259	14	527	76	212	199	31	128	448	168
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	709	282	15	573	83	230	216	34	139	487	183
RTOR Reduction (vph)	0	0	174	0	0	60	0	0	24	0	51	0
Lane Group Flow (vph)	157	709	108	15	573	23	230	216	10	139	619	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	8.7	25.4	25.4	0.7	17.4	17.4	9.4	18.5	18.5	6.7	15.8	
Effective Green, g (s)	8.7	27.4	27.4	0.7	19.4	19.4	9.4	20.5	20.5	6.7	17.8	
Actuated g/C Ratio	0.12	0.38	0.38	0.01	0.27	0.27	0.13	0.29	0.29	0.09	0.25	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	216	1360	608	17	963	431	233	1018	455	166	847	
v/s Ratio Prot	c0.09	0.20		0.01	c0.16		c0.13	c0.06		0.08	c0.18	
v/s Ratio Perm			0.07			0.01			0.01			
v/c Ratio	0.73	0.52	0.18	0.88	0.60	0.05	0.99	0.21	0.02	0.84	0.73	
Uniform Delay, d1	30.2	16.9	14.5	35.3	22.5	19.2	30.9	19.3	18.2	31.8	24.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.5	0.4	0.1	159.7	1.0	0.1	54.8	0.1	0.0	29.1	3.3	
Delay (s)	41.7	17.3	14.6	195.0	23.5	19.2	85.7	19.4	18.2	60.8	27.8	
Level of Service	D	B	B	F	C	B	F	B	B	E	C	
Approach Delay (s)		20.0			26.8			51.1			33.5	
Approach LOS		B			C			D			C	

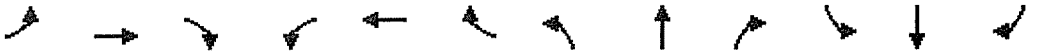
Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3394	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3394	
Volume (vph)	144	654	261	14	532	81	212	199	31	132	449	168
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	711	284	15	578	88	230	216	34	143	488	183
RTOR Reduction (vph)	0	0	175	0	0	64	0	0	24	0	51	0
Lane Group Flow (vph)	157	711	109	15	578	24	230	216	10	143	620	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	8.7	25.4	25.4	0.7	17.4	17.4	9.4	18.6	18.6	6.7	15.9	
Effective Green, g (s)	8.7	27.4	27.4	0.7	19.4	19.4	9.4	20.6	20.6	6.7	17.9	
Actuated g/C Ratio	0.12	0.38	0.38	0.01	0.27	0.27	0.13	0.29	0.29	0.09	0.25	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	216	1358	607	17	962	430	233	1021	457	166	851	
v/s Ratio Prot	c0.09	0.20		0.01	c0.16		c0.13	c0.06		0.08	c0.18	
v/s Ratio Perm			0.07			0.02			0.01			
v/c Ratio	0.73	0.52	0.18	0.88	0.60	0.06	0.99	0.21	0.02	0.86	0.73	
Uniform Delay, d1	30.2	17.0	14.6	35.3	22.6	19.2	30.9	19.2	18.2	31.9	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.5	0.4	0.1	159.7	1.1	0.1	54.8	0.1	0.0	33.9	3.1	
Delay (s)	41.7	17.3	14.7	195.0	23.7	19.3	85.8	19.4	18.2	65.8	27.7	
Level of Service	D	B	B	F	C	B	F	B	B	E	C	
Approach Delay (s)		20.0			26.9			51.1			34.4	
Approach LOS		C			C			D			C	

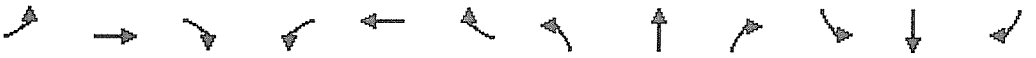
Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	71.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3401	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3401	
Volume (vph)	197	969	401	23	799	109	329	293	48	188	688	242
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1053	436	25	868	118	358	318	52	204	748	263
RTOR Reduction (vph)	0	0	273	0	0	87	0	0	35	0	33	0
Lane Group Flow (vph)	214	1053	163	25	868	31	358	318	17	204	979	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	13.0	38.2	38.2	2.4	27.6	27.6	22.0	34.2	34.2	16.8	29.0	
Effective Green, g (s)	13.0	40.2	40.2	2.4	29.6	29.6	22.0	36.2	36.2	16.8	31.0	
Actuated g/C Ratio	0.12	0.36	0.36	0.02	0.27	0.27	0.20	0.32	0.32	0.15	0.28	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	206	1275	570	38	939	420	349	1148	513	266	945	
v/s Ratio Prot	c0.12	0.30		0.01	c0.25		c0.20	0.09		0.12	c0.29	
v/s Ratio Perm			0.10			0.02			0.01			
v/c Ratio	1.04	0.83	0.29	0.66	0.92	0.07	1.03	0.28	0.03	0.77	1.04	
Uniform Delay, d1	49.3	32.5	25.5	54.2	39.9	30.7	44.8	28.0	25.7	45.5	40.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	73.2	4.5	0.3	34.3	14.4	0.1	54.9	0.1	0.0	12.4	38.8	
Delay (s)	122.5	37.0	25.7	88.5	54.3	30.8	99.7	28.1	25.8	57.9	79.1	
Level of Service	F	D	C	F	D	C	F	C	C	E	E	
Approach Delay (s)		44.9			52.4			63.2			75.6	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM Average Control Delay	57.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	111.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	197	969	401	23	799	109	329	293	48	188	688	242
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1053	436	25	868	118	358	318	52	204	748	263
RTOR Reduction (vph)	0	0	249	0	0	81	0	0	40	0	0	164
Lane Group Flow (vph)	214	1053	187	25	868	37	358	318	12	204	748	99
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	11.0	33.1	33.1	1.6	23.7	23.7	10.0	16.2	16.2	10.8	17.0	17.0
Effective Green, g (s)	11.0	35.1	35.1	1.6	25.7	25.7	10.0	18.2	18.2	10.8	19.0	19.0
Actuated g/C Ratio	0.13	0.43	0.43	0.02	0.31	0.31	0.12	0.22	0.22	0.13	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	238	1520	680	35	1113	498	420	788	353	234	823	368
v/s Ratio Prot	c0.12	0.30		0.01	c0.25		0.10	0.09		c0.12	c0.21	
v/s Ratio Perm			0.12			0.02			0.01			0.06
v/c Ratio	0.90	0.69	0.28	0.71	0.78	0.07	0.85	0.40	0.03	0.87	0.91	0.27
Uniform Delay, d1	34.8	18.9	15.1	39.8	25.4	19.7	35.1	27.1	24.9	34.8	30.5	25.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.4	1.4	0.2	51.0	3.5	0.1	15.3	0.3	0.0	27.9	13.7	0.4
Delay (s)	67.2	20.3	15.3	90.8	29.0	19.7	50.4	27.5	24.9	62.7	44.2	26.1
Level of Service	E	C	B	F	C	B	D	C	C	E	D	C
Approach Delay (s)		24.9			29.4			38.6			43.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	197	971	403	23	804	114	329	293	48	192	689	242
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	1055	438	25	874	124	358	318	52	209	749	263
RTOR Reduction (vph)	0	0	250	0	0	85	0	0	40	0	0	163
Lane Group Flow (vph)	214	1055	188	25	874	39	358	318	12	209	749	100
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	11.0	33.1	33.1	1.6	23.7	23.7	10.0	16.1	16.1	10.9	17.0	17.0
Effective Green, g (s)	11.0	35.1	35.1	1.6	25.7	25.7	10.0	18.1	18.1	10.9	19.0	19.0
Actuated g/C Ratio	0.13	0.43	0.43	0.02	0.31	0.31	0.12	0.22	0.22	0.13	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	238	1520	680	35	1113	498	420	784	351	236	823	368
v/s Ratio Prot	c0.12	0.30		0.01	c0.25		0.10	0.09		c0.12	c0.21	
v/s Ratio Perm			0.12			0.02			0.01			0.06
v/c Ratio	0.90	0.69	0.28	0.71	0.79	0.08	0.85	0.41	0.03	0.89	0.91	0.27
Uniform Delay, d1	34.8	18.9	15.1	39.8	25.5	19.7	35.1	27.2	24.9	34.8	30.5	25.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.4	1.4	0.2	51.0	3.7	0.1	15.3	0.3	0.0	30.1	14.1	0.4
Delay (s)	67.2	20.3	15.3	90.8	29.2	19.7	50.4	27.5	25.0	64.9	44.6	26.1
Level of Service	E	C	B	F	C	B	D	C	C	E	D	C
Approach Delay (s)		24.9			29.6			38.6			44.1	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	33.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & South Union Ave - AM Peak
Count Date: 1/31/2008

Exist Peak Hour Volumes

S		
1	WBL	37
1	WBT	121
1	WBR	41
1	EBL	172
1	EBT	182
1	EBR	153
1	NBL	122
2	NBT	432
1	NBR	60
1	SBL	59
2	SBT	419
1	SBR	90
	TOTAL	1888

Year 2035
Fut. Volumes w/o Proj

WBL	113
WBT	403
WBR	124
EBL	396
EBT	599
EBR	355
NBL	283
NBT	912
NBR	181
SBL	187
SBT	935
SBR	219
TOTAL	4708

Year 2035 Fut. Vol
+ Project Traffic

WBL	122
WBT	403
WBR	124
EBL	396
EBT	599
EBR	385
NBL	285
NBT	917
NBR	181
SBL	187
SBT	967
SBR	219
TOTAL	4786

Year 2020
Fut. Volumes w/o Proj

WBL	71
WBT	248
WBR	79
EBL	273
EBT	371
EBR	245
NBL	195
NBT	649
NBR	115
SBL	117
SBT	653
SBR	148
TOTAL	3165

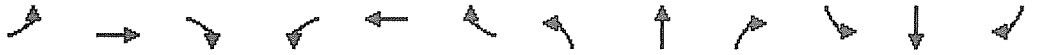
Year 2020 Fut. Vol
+ Project Traffic

WBL	80
WBT	248
WBR	79
EBL	273
EBT	371
EBR	275
NBL	197
NBT	654
NBR	115
SBL	117
SBT	685
SBR	148
TOTAL	3243

Project Generated Trips - Year 2035

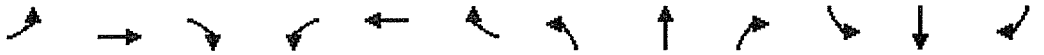
	Total	Indus.	Commer.
WBL	9	8	1
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	30	27	3
NBL	2	1	1
NBT	5	5	0
NBR	0	0	0
SBL	0	0	0
SBT	32	30	2
SBR	0	0	0
TOTAL	78	71	7

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & South Union Ave - AM Peak						
	Count Date:	1/31/2008						
2006	ADT							
WB Approach (To)	2.69							
WB Approach (Away)	2.31							
EB Approach (To)	4.15							
EB Approach (Away)	4.25							
NB Approach (To)	5.94							
NB Approach (Away)	6.29							
SB Approach (To)	5.97							
SB Approach (Away)	6.16							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	12.4		WBL	3.44	WBT	3.66	WBR	3.41
WB Approach (Away)	10.9		4.15%	113	4.48%	403	4.12%	124
EB Approach (To)	10.8		EBL	2.41	EBT	3.65	EBR	2.43
EB Approach (Away)	11.5		3.09%	396	4.44%	599	3.12%	355
NB Approach (To)	12.9		NBL	2.44	NBT	2.19	NBR	3.43
NB Approach (Away)	14.2		3.12%	283	2.76%	912	4.11%	181
SB Approach (To)	14.3		SBL	3.55	SBT	2.33	SBR	2.55
SB Approach (Away)	13.7		4.29%	187	2.97%	935	3.30%	219
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	12.2		WBL	3.57	WBT	3.54	WBR	3.59
WB Approach (Away)	10.5		4.38%	120	4.34%	388	4.41%	134
EB Approach (To)	10.6		EBL	2.61	EBT	3.55	EBR	2.59
EB Approach (Away)	10.8		3.38%	428	4.34%	584	3.35%	378
NB Approach (To)	15.6		NBL	2.58	NBT	2.64	NBR	3.58
NB Approach (Away)	16.5		3.35%	301	3.42%	1087	4.39%	195
SB Approach (To)	15.9		SBL	3.60	SBT	2.64	SBR	2.61
SB Approach (Away)	16.4		4.42%	193	3.42%	1055	3.37%	224



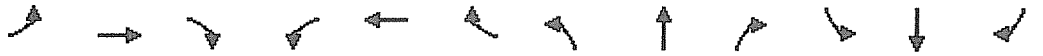
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	172	182	153	37	121	41	122	432	60	59	419	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	198	166	40	132	45	133	470	65	64	455	98
RTOR Reduction (vph)	0	0	119	0	0	36	0	0	40	0	0	65
Lane Group Flow (vph)	187	198	47	40	132	9	133	470	25	64	455	33
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	15.0	15.0	1.9	9.7	9.7	5.0	21.0	21.0	2.4	18.4	18.4
Effective Green, g (s)	7.2	17.0	17.0	1.9	11.7	11.7	5.0	23.0	23.0	2.4	20.4	20.4
Actuated g/C Ratio	0.12	0.28	0.28	0.03	0.19	0.19	0.08	0.38	0.38	0.04	0.34	0.34
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	211	525	446	56	361	307	147	1350	604	70	1197	536
v/s Ratio Prot	c0.11	c0.11		0.02	0.07		c0.08	c0.13		0.04	0.13	
v/s Ratio Perm			0.03			0.01			0.02			0.02
v/c Ratio	0.89	0.38	0.10	0.71	0.37	0.03	0.90	0.35	0.04	0.91	0.38	0.06
Uniform Delay, d1	26.1	17.4	16.0	28.9	21.1	19.7	27.4	13.3	11.7	28.8	15.1	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.8	0.5	0.1	35.0	0.6	0.0	46.7	0.2	0.0	77.8	0.2	0.0
Delay (s)	58.9	17.9	16.1	63.9	21.7	19.7	74.2	13.5	11.7	106.7	15.4	13.5
Level of Service	E	B	B	E	C	B	E	B	B	F	B	B
Approach Delay (s)		31.3			29.1			25.4			24.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	273	371	245	71	248	79	195	649	115	117	653	148
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	403	266	77	270	86	212	705	125	127	710	161
RTOR Reduction (vph)	0	0	175	0	0	67	0	0	86	0	0	120
Lane Group Flow (vph)	297	403	91	77	270	19	212	705	39	127	710	41
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.5	25.0	25.0	4.6	15.1	15.1	10.8	22.7	22.7	6.2	18.1	18.1
Effective Green, g (s)	14.5	27.0	27.0	4.6	17.1	17.1	10.8	24.7	24.7	6.2	20.1	20.1
Actuated g/C Ratio	0.18	0.34	0.34	0.06	0.22	0.22	0.14	0.31	0.31	0.08	0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	327	641	544	104	406	345	244	1114	498	140	906	405
v/s Ratio Prot	c0.17	c0.22		0.04	0.14		c0.12	0.20		0.07	c0.20	
v/s Ratio Perm			0.06			0.01			0.02			0.03
v/c Ratio	0.91	0.63	0.17	0.74	0.67	0.05	0.87	0.63	0.08	0.91	0.78	0.10
Uniform Delay, d1	31.3	21.6	17.9	36.4	28.1	24.3	33.2	23.0	18.9	35.9	27.2	22.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.5	1.9	0.1	24.3	4.1	0.1	26.2	1.2	0.1	48.7	4.5	0.1
Delay (s)	58.8	23.5	18.1	60.7	32.2	24.4	59.4	24.2	19.0	84.6	31.7	22.4
Level of Service	E	C	B	E	C	C	E	C	B	F	C	C
Approach Delay (s)		32.9			35.7			30.7			36.9	
Approach LOS		C			D			C			D	

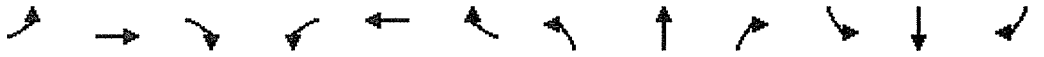
Intersection Summary			
HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	78.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	273	371	275	80	248	79	197	654	115	117	685	148
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	403	299	87	270	86	214	711	125	127	745	161
RTOR Reduction (vph)	0	0	197	0	0	67	0	0	85	0	0	120
Lane Group Flow (vph)	297	403	102	87	270	19	214	711	40	127	745	41
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.6	25.0	25.0	4.7	15.1	15.1	10.9	23.0	23.0	6.2	18.3	18.3
Effective Green, g (s)	14.6	27.0	27.0	4.7	17.1	17.1	10.9	25.0	25.0	6.2	20.3	20.3
Actuated g/C Ratio	0.19	0.34	0.34	0.06	0.22	0.22	0.14	0.32	0.32	0.08	0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	328	638	542	105	404	343	245	1121	502	139	911	407
v/s Ratio Prot	c0.17	c0.22		0.05	0.14		c0.12	0.20		0.07	c0.21	
v/s Ratio Perm			0.06			0.01			0.03			0.03
v/c Ratio	0.91	0.63	0.19	0.83	0.67	0.05	0.87	0.63	0.08	0.91	0.82	0.10
Uniform Delay, d1	31.5	21.8	18.2	36.7	28.3	24.5	33.3	23.0	18.9	36.1	27.6	22.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.0	2.0	0.2	39.1	4.2	0.1	27.2	1.2	0.1	50.8	5.8	0.1
Delay (s)	58.5	23.8	18.4	75.8	32.5	24.6	60.5	24.2	19.0	86.9	33.3	22.5
Level of Service	E	C	B	E	C	C	E	C	B	F	C	C
Approach Delay (s)		32.5			39.4			31.0			38.2	
Approach LOS		C			D			C			D	

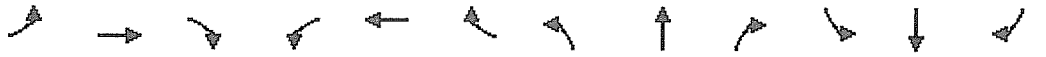
Intersection Summary			
HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	396	599	355	113	403	124	283	912	181	187	935	219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	651	386	123	438	135	308	991	197	203	1016	238
RTOR Reduction (vph)	0	0	201	0	0	107	0	0	136	0	0	160
Lane Group Flow (vph)	430	651	185	123	438	28	308	991	61	203	1016	78
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	24.0	37.0	37.0	8.0	21.0	21.0	17.0	32.0	32.0	13.0	28.0	28.0
Effective Green, g (s)	24.0	39.0	39.0	8.0	23.0	23.0	17.0	34.0	34.0	13.0	30.0	30.0
Actuated g/C Ratio	0.22	0.35	0.35	0.07	0.21	0.21	0.15	0.31	0.31	0.12	0.27	0.27
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	386	661	561	129	390	331	274	1094	489	209	965	432
v/s Ratio Prot	c0.24	0.35		0.07	c0.24		c0.17	c0.28		0.11	c0.29	
v/s Ratio Perm			0.12			0.02			0.04			0.05
v/c Ratio	1.11	0.98	0.33	0.95	1.12	0.09	1.12	0.91	0.12	0.97	1.05	0.18
Uniform Delay, d1	43.0	35.2	25.9	50.8	43.5	35.0	46.5	36.5	27.3	48.3	40.0	30.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	80.4	30.9	0.3	64.5	83.4	0.1	92.0	10.6	0.1	53.8	43.9	0.2
Delay (s)	123.4	66.2	26.3	115.3	126.9	35.1	138.5	47.1	27.4	102.1	83.9	30.8
Level of Service	F	E	C	F	F	D	F	D	C	F	F	C
Approach Delay (s)		72.4			107.0			63.3			77.8	
Approach LOS		E			F			E			E	

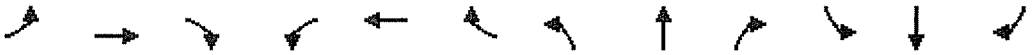
Intersection Summary			
HCM Average Control Delay	76.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	396	599	355	113	403	124	283	912	181	187	935	219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	651	386	123	438	135	308	991	197	203	1016	238
RTOR Reduction (vph)	0	0	211	0	0	108	0	0	133	0	0	154
Lane Group Flow (vph)	430	651	175	123	438	27	308	991	64	203	1016	84
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.7	21.5	21.5	6.9	15.7	15.7	9.8	26.4	26.4	12.2	28.8	28.8
Effective Green, g (s)	12.7	23.5	23.5	6.9	17.7	17.7	9.8	28.4	28.4	12.2	30.8	30.8
Actuated g/C Ratio	0.15	0.27	0.27	0.08	0.20	0.20	0.11	0.33	0.33	0.14	0.35	0.35
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	501	956	428	140	720	322	387	1155	517	248	1253	560
v/s Ratio Prot	c0.13	c0.18		0.07	0.12		0.09	0.28		c0.11	c0.29	
v/s Ratio Perm			0.11			0.02			0.04			0.05
v/c Ratio	0.86	0.68	0.41	0.88	0.61	0.09	0.80	0.86	0.12	0.82	0.81	0.15
Uniform Delay, d1	36.3	28.4	26.1	39.6	31.5	28.1	37.6	27.4	20.6	36.3	25.5	19.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.6	2.0	0.6	41.8	1.5	0.1	10.8	6.5	0.1	18.6	4.1	0.1
Delay (s)	49.9	30.4	26.7	81.4	33.0	28.2	48.4	33.9	20.7	54.9	29.6	19.3
Level of Service	D	C	C	F	C	C	D	C	C	D	C	B
Approach Delay (s)		35.1			40.6			35.2			31.4	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	3433	3539	1583	1770	3539	1583
Volume (vph)	396	599	385	122	403	124	285	917	181	187	967	219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	651	418	133	438	135	310	997	197	203	1051	238
RTOR Reduction (vph)	0	0	214	0	0	108	0	0	133	0	0	155
Lane Group Flow (vph)	430	651	204	133	438	27	310	997	64	203	1051	83
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.4	19.7	19.7	8.7	15.0	15.0	9.9	26.0	26.0	12.2	28.3	28.3
Effective Green, g (s)	13.4	21.7	21.7	8.7	17.0	17.0	9.9	28.0	28.0	12.2	30.3	30.3
Actuated g/C Ratio	0.15	0.25	0.25	0.10	0.20	0.20	0.11	0.32	0.32	0.14	0.35	0.35
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	531	887	397	178	695	311	392	1144	512	249	1238	554
v/s Ratio Prot	c0.13	c0.18		0.08	0.12		0.09	0.28		c0.11	c0.30	
v/s Ratio Perm			0.13			0.02			0.04			0.05
v/c Ratio	0.81	0.73	0.51	0.75	0.63	0.09	0.79	0.87	0.12	0.82	0.85	0.15
Uniform Delay, d1	35.4	29.8	27.9	37.9	31.9	28.4	37.3	27.6	20.7	36.1	26.0	19.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.9	3.2	1.1	15.7	1.9	0.1	10.4	7.5	0.1	18.2	5.6	0.1
Delay (s)	44.3	33.0	29.0	53.5	33.8	28.6	47.8	35.1	20.8	54.3	31.6	19.4
Level of Service	D	C	C	D	C	C	D	D	C	D	C	B
Approach Delay (s)		35.1			36.5			35.8			32.8	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & South Union Ave - PM Peak
Count Date: 1/17/2008

Exist Peak Hour Volumes

S		
1	WBL	29
1	WBT	128
1	WBR	23
1	EBL	50
1	EBT	82
1	EBR	17
1	NBL	37
2	NBT	152
1	NBR	17
1	SBL	38
2	SBT	212
1	SBR	62
	TOTAL	847

Year 2035
Fut. Volumes w/o Proj

WBL	141
WBT	628
WBR	103
EBL	201
EBT	398
EBR	74
NBL	162
NBT	607
NBR	82
SBL	178
SBT	897
SBR	264
TOTAL	3735

Year 2035 Fut. Vol
+ Project Traffic

WBL	151
WBT	628
WBR	103
EBL	201
EBT	398
EBR	82
NBL	176
NBT	646
NBR	90
SBL	178
SBT	918
SBR	264
TOTAL	3835

Year 2020
Fut. Volumes w/o Proj

WBL	80
WBT	355
WBR	59
EBL	119
EBT	225
EBR	43
NBL	94
NBT	358
NBR	46
SBL	102
SBT	523
SBR	154
TOTAL	2157

Year 2020 Fut. Vol
+ Project Traffic

WBL	90
WBT	355
WBR	59
EBL	119
EBT	225
EBR	51
NBL	108
NBT	397
NBR	54
SBL	102
SBT	544
SBR	154
TOTAL	2257

Project Generated Trips - Year 2035

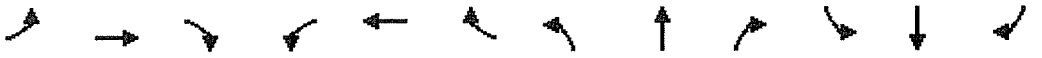
	Total	Indus.	Commer.
WBL	10	10	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	8	7	1
NBL	14	14	0
NBT	39	39	0
NBR	8	8	0
SBL	0	0	0
SBT	21	19	2
SBR	0	0	0
TOTAL	100	97	3

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & South Union Ave - PM Peak						
	Count Date:	1/17/2008						
2006	ADT							
WB Approach (To)	2.13							
WB Approach (Away)	1.83							
EB Approach (To)	2.32							
EB Approach (Away)	2.38							
NB Approach (To)	2.82							
NB Approach (Away)	2.98							
SB Approach (To)	3.30							
SB Approach (Away)	3.41							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	12.4		WBL	5.30	WBT	5.33	WBR	4.92
WB Approach (Away)	10.9		5.93%	141	5.96%	628	5.61%	103
EB Approach (To)	10.8		EBL	4.33	EBT	5.29	EBR	4.72
EB Approach (Away)	11.5		5.20%	201	5.92%	398	5.52%	74
NB Approach (To)	12.9		NBL	4.71	NBT	4.29	NBR	5.25
NB Approach (Away)	14.2		5.51%	162	5.17%	607	5.88%	82
SB Approach (To)	14.3		SBL	5.13	SBT	4.55	SBR	4.59
SB Approach (Away)	13.7		5.79%	178	5.39%	897	5.42%	264
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	12.2		WBL	5.62	WBT	5.14	WBR	5.26
WB Approach (Away)	10.5		6.17%	150	5.81%	604	5.91%	111
EB Approach (To)	10.6		EBL	4.69	EBT	5.15	EBR	5.05
EB Approach (Away)	10.8		5.50%	218	5.82%	388	5.76%	79
NB Approach (To)	15.6		NBL	5.04	NBT	5.16	NBR	5.62
NB Approach (Away)	16.5		5.75%	172	5.85%	724	6.17%	88
SB Approach (To)	15.9		SBL	5.27	SBT	5.17	SBR	4.68
SB Approach (Away)	16.4		5.92%	184	5.85%	1011	5.50%	270

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	50	82	17	29	128	23	37	152	17	38	212	62
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	89	18	32	139	25	40	165	18	41	230	67
RTOR Reduction (vph)	0	0	15	0	0	21	0	0	9	0	0	35
Lane Group Flow (vph)	54	89	3	32	139	4	40	165	9	41	230	32
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	1.7	7.8	7.8	1.7	7.8	7.8	1.7	25.2	25.2	1.7	25.2	25.2
Effective Green, g (s)	1.7	9.8	9.8	1.7	9.8	9.8	1.7	27.2	27.2	1.7	27.2	27.2
Actuated g/C Ratio	0.03	0.17	0.17	0.03	0.17	0.17	0.03	0.48	0.48	0.03	0.48	0.48
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	53	324	275	53	324	275	53	1707	763	53	1707	763
v/s Ratio Prot	c0.03	0.05		0.02	c0.07		0.02	0.05		c0.02	c0.06	
v/s Ratio Perm			0.00			0.00			0.01			0.02
v/c Ratio	1.02	0.27	0.01	0.60	0.43	0.02	0.75	0.10	0.01	0.77	0.13	0.04
Uniform Delay, d1	27.4	20.2	19.3	27.0	20.8	19.3	27.1	7.9	7.6	27.2	8.1	7.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	129.1	0.5	0.0	17.9	0.9	0.0	45.2	0.0	0.0	49.7	0.0	0.0
Delay (s)	156.5	20.7	19.3	44.9	21.7	19.3	72.4	8.0	7.6	76.9	8.1	7.7
Level of Service	F	C	B	D	C	B	E	A	A	E	A	A
Approach Delay (s)		66.1			25.2			19.5			16.4	
Approach LOS		E			C			B			B	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



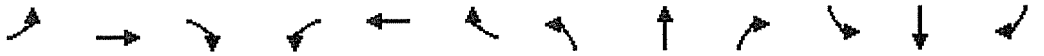
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	119	225	43	80	355	59	94	358	46	102	523	154
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	245	47	87	386	64	102	389	50	111	568	167
RTOR Reduction (vph)	0	0	32	0	0	45	0	0	37	0	0	122
Lane Group Flow (vph)	129	245	15	87	386	19	102	389	13	111	568	45
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	18.9	18.9	6.0	17.7	17.7	6.1	16.0	16.0	6.1	16.0	16.0
Effective Green, g (s)	7.2	20.9	20.9	6.0	19.7	19.7	6.1	18.0	18.0	6.1	18.0	18.0
Actuated g/C Ratio	0.11	0.31	0.31	0.09	0.29	0.29	0.09	0.27	0.27	0.09	0.27	0.27
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	581	494	159	548	465	161	951	425	161	951	425
v/s Ratio Prot	c0.07	0.13		0.05	c0.21		0.06	0.11		c0.06	c0.16	
v/s Ratio Perm			0.01			0.01			0.01			0.03
v/c Ratio	0.68	0.42	0.03	0.55	0.70	0.04	0.63	0.41	0.03	0.69	0.60	0.11
Uniform Delay, d1	28.8	18.3	16.0	29.2	21.1	16.9	29.4	20.1	18.1	29.5	21.3	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.3	0.5	0.0	3.8	4.1	0.0	7.9	0.3	0.0	11.6	1.0	0.1
Delay (s)	38.1	18.8	16.0	33.0	25.2	16.9	37.3	20.4	18.1	41.2	22.4	18.6
Level of Service	D	B	B	C	C	B	D	C	B	D	C	B
Approach Delay (s)		24.4			25.4			23.4			24.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	119	225	51	90	355	59	108	397	54	102	544	154
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	129	245	55	98	386	64	117	432	59	111	591	167
RTOR Reduction (vph)	0	0	38	0	0	45	0	0	43	0	0	122
Lane Group Flow (vph)	129	245	17	98	386	19	117	432	16	111	591	45
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.3	19.0	19.0	6.1	17.8	17.8	6.2	16.3	16.3	6.1	16.2	16.2
Effective Green, g (s)	7.3	21.0	21.0	6.1	19.8	19.8	6.2	18.3	18.3	6.1	18.2	18.2
Actuated g/C Ratio	0.11	0.31	0.31	0.09	0.29	0.29	0.09	0.27	0.27	0.09	0.27	0.27
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	191	580	492	160	546	464	163	959	429	160	954	427
v/s Ratio Prot	c0.07	0.13		0.06	c0.21		c0.07	0.12		0.06	c0.17	
v/s Ratio Perm			0.01			0.01			0.01			0.03
v/c Ratio	0.68	0.42	0.03	0.61	0.71	0.04	0.72	0.45	0.04	0.69	0.62	0.11
Uniform Delay, d1	29.0	18.4	16.2	29.6	21.3	17.1	29.8	20.4	18.1	29.8	21.6	18.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.5	0.0	6.8	4.2	0.0	14.0	0.3	0.0	12.3	1.2	0.1
Delay (s)	38.0	18.9	16.2	36.3	25.4	17.1	43.8	20.8	18.1	42.1	22.8	18.6
Level of Service	D	B	B	D	C	B	D	C	B	D	C	B
Approach Delay (s)		24.3			26.4			24.9			24.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



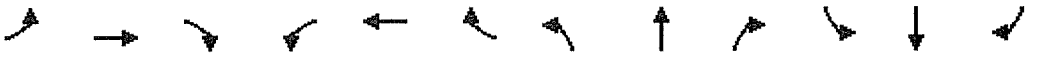
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	201	398	74	141	628	103	162	607	82	178	897	264
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	433	80	153	683	112	176	660	89	193	975	287
RTOR Reduction (vph)	0	0	51	0	0	59	0	0	67	0	0	201
Lane Group Flow (vph)	218	433	29	153	683	53	176	660	22	193	975	86
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	13.0	37.7	37.7	12.3	37.0	37.0	11.0	25.6	25.6	14.4	29.0	29.0
Effective Green, g (s)	13.0	39.7	39.7	12.3	39.0	39.0	11.0	27.6	27.6	14.4	31.0	31.0
Actuated g/C Ratio	0.12	0.36	0.36	0.11	0.35	0.35	0.10	0.25	0.25	0.13	0.28	0.28
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	209	672	571	198	661	561	177	888	397	232	997	446
v/s Ratio Prot	c0.12	0.23		0.09	c0.37		c0.10	0.19		0.11	c0.28	
v/s Ratio Perm			0.02			0.03			0.01			0.05
v/c Ratio	1.04	0.64	0.05	0.77	1.03	0.09	0.99	0.74	0.06	0.83	0.98	0.19
Uniform Delay, d1	48.5	29.3	22.9	47.5	35.5	23.7	49.5	37.9	31.3	46.6	39.2	30.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	74.0	2.1	0.0	16.9	43.9	0.1	65.7	3.4	0.1	21.7	23.0	0.2
Delay (s)	122.5	31.4	22.9	64.4	79.4	23.8	115.1	41.3	31.4	68.3	62.1	30.2
Level of Service	F	C	C	E	E	C	F	D	C	E	E	C
Approach Delay (s)		57.6			70.4			54.4			56.7	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM Average Control Delay	59.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	201	398	74	141	628	103	162	607	82	178	897	264
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	433	80	153	683	112	176	660	89	193	975	287
RTOR Reduction (vph)	0	0	61	0	0	84	0	0	62	0	0	195
Lane Group Flow (vph)	218	433	19	153	683	28	176	660	27	193	975	92
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	15.4	15.4	8.0	16.4	16.4	9.0	20.1	20.1	10.5	21.6	21.6
Effective Green, g (s)	7.0	17.4	17.4	8.0	18.4	18.4	9.0	22.1	22.1	10.5	23.6	23.6
Actuated g/C Ratio	0.09	0.24	0.24	0.11	0.25	0.25	0.12	0.30	0.30	0.14	0.32	0.32
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	325	832	372	191	880	394	215	1057	473	251	1129	505
v/s Ratio Prot	0.06	0.12		c0.09	c0.19		0.10	0.19		c0.11	c0.28	
v/s Ratio Perm			0.01			0.02			0.02			0.06
v/c Ratio	0.67	0.52	0.05	0.80	0.78	0.07	0.82	0.62	0.06	0.77	0.86	0.18
Uniform Delay, d1	32.4	24.7	21.9	32.2	25.9	21.3	31.7	22.4	18.5	30.6	23.7	18.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.6	0.1	20.9	4.3	0.1	20.9	1.2	0.0	13.2	7.0	0.2
Delay (s)	37.7	25.3	22.0	53.1	30.2	21.3	52.6	23.5	18.6	43.8	30.7	18.4
Level of Service	D	C	C	D	C	C	D	C	B	D	C	B
Approach Delay (s)		28.6			32.9			28.6			30.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	30.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	74.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	201	398	82	151	628	103	176	646	90	178	918	264
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	433	89	164	683	112	191	702	98	193	998	287
RTOR Reduction (vph)	0	0	69	0	0	84	0	0	67	0	0	194
Lane Group Flow (vph)	218	433	20	164	683	28	191	702	31	193	998	93
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.0	15.3	15.3	8.9	17.2	17.2	10.6	22.6	22.6	11.3	23.3	23.3
Effective Green, g (s)	7.0	17.3	17.3	8.9	19.2	19.2	10.6	24.6	24.6	11.3	25.3	25.3
Actuated g/C Ratio	0.09	0.22	0.22	0.11	0.25	0.25	0.14	0.31	0.31	0.14	0.32	0.32
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	308	784	351	202	870	389	240	1115	499	256	1146	513
v/s Ratio Prot	0.06	0.12		c0.09	c0.19		0.11	0.20		c0.11	c0.28	
v/s Ratio Perm			0.01			0.02			0.02			0.06
v/c Ratio	0.71	0.55	0.06	0.81	0.79	0.07	0.80	0.63	0.06	0.75	0.87	0.18
Uniform Delay, d1	34.6	27.0	24.0	33.8	27.5	22.6	32.7	22.9	18.7	32.1	24.9	19.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.2	0.8	0.1	21.4	4.7	0.1	16.5	1.1	0.1	11.9	7.4	0.2
Delay (s)	41.8	27.8	24.0	55.2	32.2	22.7	49.2	24.0	18.7	43.9	32.3	19.1
Level of Service	D	C	C	E	C	C	D	C	B	D	C	B
Approach Delay (s)		31.5			35.0			28.3			31.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	78.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & Cottonwood Rd - AM Peak
Count Date: 8/8/2008

Exist Peak Hour Volumes

AWS		
>	WBL	16
1	WBT	109
<	WBR	37
>	EBL	95
1	EBT	163
<	EBR	14
>	NBL	10
1	NBT	99
<	NBR	22
>	SBL	31
1	SBT	70
<	SBR	33
	TOTAL	699

Year 2035
Fut. Volumes w/o Proj

WBL	32
WBT	347
WBR	95
EBL	280
EBT	542
EBR	32
NBL	21
NBT	164
NBR	41
SBL	87
SBT	136
SBR	101
TOTAL	1879

Year 2035 Fut. Vol
+ Project Traffic

WBL	45
WBT	349
WBR	95
EBL	280
EBT	542
EBR	32
NBL	22
NBT	172
NBR	41
SBL	88
SBT	170
SBR	105
TOTAL	1942

Year 2020
Fut. Volumes w/o Proj

WBL	23
WBT	214
WBR	63
EBL	177
EBT	331
EBR	22
NBL	15
NBT	128
NBR	31
SBL	56
SBT	99
SBR	63
TOTAL	1221

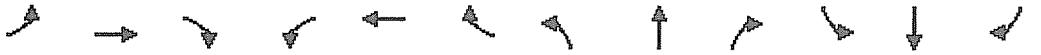
Year 2020 Fut. Vol
+ Project Traffic

WBL	36
WBT	216
WBR	63
EBL	177
EBT	331
EBR	22
NBL	16
NBT	136
NBR	31
SBL	57
SBT	133
SBR	67
TOTAL	1284

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	13	12	1
WBT	2	2	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	1	0	1
NBT	8	6	2
NBR	0	0	0
SBL	1	0	1
SBT	34	28	6
SBR	4	4	0
TOTAL	63	52	11

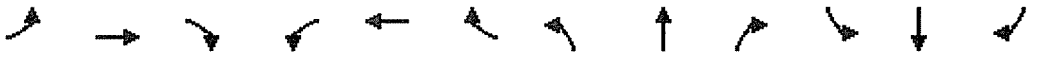
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & Cottonwood Rd - AM Peak						
	Count Date:	8/8/2008						
2006	ADT							
WB Approach (To)	2.47							
WB Approach (Away)	2.26							
EB Approach (To)	2.46							
EB Approach (Away)	2.84							
NB Approach (To)	1.63							
NB Approach (Away)	1.26							
SB Approach (To)	2.31							
SB Approach (Away)	2.25							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	7.6		WBL	2.27	WBT	3.49	WBR	2.78
WB Approach (Away)	7.3		2.66%	32	4.40%	347	3.58%	95
EB Approach (To)	10.0		EBL	3.27	EBT	3.65	EBR	2.77
EB Approach (Away)	11.1		4.09%	280	4.57%	542	3.17%	32
NB Approach (To)	1.9		NBL	2.55	NBT	1.84	NBR	2.22
NB Approach (Away)	1.9		2.72%	21	1.90%	164	2.38%	41
SB Approach (To)	6.5		SBL	3.02	SBT	2.14	SBR	3.35
SB Approach (Away)	5.6		3.89%	87	2.49%	136	4.23%	101
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	7.5		WBL	2.46	WBT	3.44	WBR	2.96
WB Approach (Away)	6.9		3.07%	36	4.36%	343	3.83%	102
EB Approach (To)	9.4		EBL	3.35	EBT	3.45	EBR	2.85
EB Approach (Away)	10.9		4.25%	291	4.36%	514	3.48%	35
NB Approach (To)	3.0		NBL	2.85	NBT	2.37	NBR	2.46
NB Approach (Away)	2.4		3.48%	25	2.95%	217	3.06%	50
SB Approach (To)	6.6		SBL	2.96	SBT	2.37	SBR	3.35
SB Approach (Away)	6.5		3.83%	85	2.95%	153	4.24%	101



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	95	163	14	16	109	37	10	99	22	31	70	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	177	15	17	118	40	11	108	24	34	76	36

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	296	176	142	146
Volume Left (vph)	103	17	11	34
Volume Right (vph)	15	40	24	36
Hadj (s)	0.07	-0.08	-0.05	-0.07
Departure Headway (s)	5.0	5.0	5.3	5.3
Degree Utilization, x	0.41	0.25	0.21	0.21
Capacity (veh/h)	678	661	605	615
Control Delay (s)	11.5	9.7	9.7	9.7
Approach Delay (s)	11.5	9.7	9.7	9.7
Approach LOS	B	A	A	A

Intersection Summary			
Delay	10.4		
HCM Level of Service	B		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	177	331	22	23	214	63	15	128	31	56	99	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	360	24	25	233	68	16	139	34	61	108	68

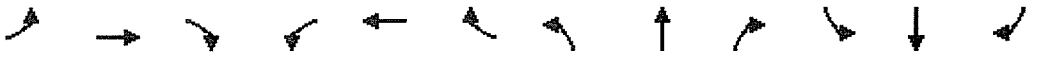
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	576	326	189	237
Volume Left (vph)	192	25	16	61
Volume Right (vph)	24	68	34	68
Hadj (s)	0.08	-0.08	-0.06	-0.09
Departure Headway (s)	6.4	6.7	7.4	7.2
Degree Utilization, x	1.02	0.60	0.39	0.48
Capacity (veh/h)	554	515	447	471
Control Delay (s)	68.7	19.4	15.1	16.6
Approach Delay (s)	68.7	19.4	15.1	16.6
Approach LOS	F	C	C	C

Intersection Summary				
Delay			39.7	
HCM Level of Service			E	
Intersection Capacity Utilization		79.8%	ICU Level of Service	D
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	177	331	22	23	214	63	15	128	31	56	99	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	360	24	25	233	68	16	139	34	61	108	68

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	192	384	326	189	237
Volume Left (vph)	192	0	25	16	61
Volume Right (vph)	0	24	68	34	68
Hadj (s)	0.53	-0.01	-0.08	-0.06	-0.09
Departure Headway (s)	7.2	6.7	6.5	7.1	6.9
Degree Utilization, x	0.39	0.71	0.59	0.37	0.45
Capacity (veh/h)	481	522	516	448	464
Control Delay (s)	13.5	23.1	18.4	14.2	15.4
Approach Delay (s)	19.9		18.4	14.2	15.4
Approach LOS	C		C	B	C

Intersection Summary			
Delay	17.9		
HCM Level of Service	C		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	177	331	22	36	216	63	16	136	31	57	133	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	360	24	39	235	68	17	148	34	62	145	73

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	192	384	342	199	279
Volume Left (vph)	192	0	39	17	62
Volume Right (vph)	0	24	68	34	73
Hadj (s)	0.53	-0.01	-0.06	-0.05	-0.08
Departure Headway (s)	7.6	7.0	6.9	7.5	7.1
Degree Utilization, x	0.41	0.75	0.66	0.41	0.55
Capacity (veh/h)	458	493	490	412	455
Control Delay (s)	14.5	27.0	22.0	15.6	18.6
Approach Delay (s)	22.8		22.0	15.6	18.6
Approach LOS	C		C	C	C

Intersection Summary				
Delay	20.8			
HCM Level of Service	C			
Intersection Capacity Utilization	73.3%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	280	542	32	32	347	95	21	164	41	87	136	101
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	589	35	35	377	103	23	178	45	95	148	110

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	304	624	515	246	352
Volume Left (vph)	304	0	35	23	95
Volume Right (vph)	0	35	103	45	110
Hadj (s)	0.53	-0.01	-0.07	-0.06	-0.10
Departure Headway (s)	9.0	8.5	8.2	9.0	8.4
Degree Utilization, x	0.76	1.47	1.17	0.62	0.83
Capacity (veh/h)	390	437	444	383	413
Control Delay (s)	34.6	246.0	126.7	25.4	40.6
Approach Delay (s)	176.7		126.7	25.4	40.6
Approach LOS	F		F	D	E

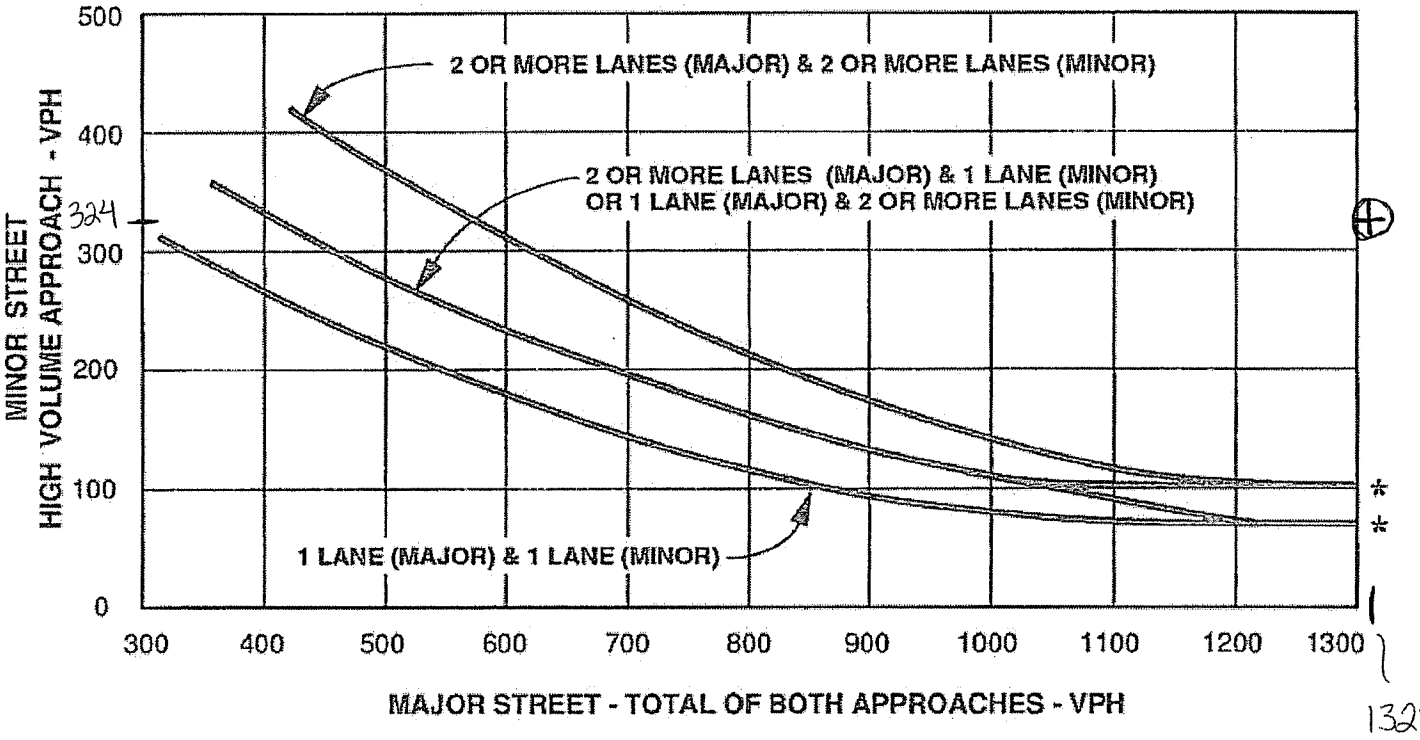
Intersection Summary			
Delay	122.4		
HCM Level of Service	F		
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		

Panama Ln & Cottonwood Rd

2035 without Project - AM Peak

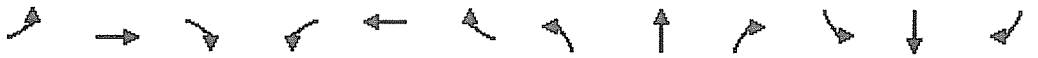
Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



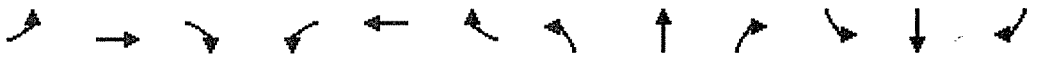
*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

SATISFIED YES ☒ NO ☐



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.97			0.98			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1847		1770	1803			1808			1761	
Flt Permitted	0.95	1.00		0.95	1.00			0.95			0.79	
Satd. Flow (perm)	1770	1847		1770	1803			1724			1414	
Volume (vph)	280	542	32	32	347	95	21	164	41	87	136	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	589	35	35	377	103	23	178	45	95	148	110
RTOR Reduction (vph)	0	3	0	0	15	0	0	13	0	0	26	0
Lane Group Flow (vph)	304	621	0	35	465	0	0	233	0	0	327	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	12.4	30.2		1.5	19.3			16.2			16.2	
Effective Green, g (s)	12.4	32.2		1.5	21.3			17.2			17.2	
Actuated g/C Ratio	0.20	0.51		0.02	0.34			0.27			0.27	
Clearance Time (s)	4.0	6.0		4.0	6.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	349	946		42	611			471			387	
v/s Ratio Prot	c0.17	0.34		0.02	c0.26							
v/s Ratio Perm								0.14			c0.23	
v/c Ratio	0.87	0.66		0.83	0.76			0.49			0.84	
Uniform Delay, d1	24.5	11.3		30.6	18.5			19.2			21.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	20.4	1.7		77.0	5.6			0.8			15.4	
Delay (s)	44.9	12.9		107.6	24.1			20.0			37.0	
Level of Service	D	B		F	C			C			D	
Approach Delay (s)		23.4			29.8			20.0			37.0	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	62.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.97			0.98			0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1847		1770	1803			1810			1769	
Flt Permitted	0.95	1.00		0.95	1.00			0.94			0.81	
Satd. Flow (perm)	1770	1847		1770	1803			1717			1457	
Volume (vph)	280	542	32	45	349	95	22	172	41	88	170	105
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	589	35	49	379	103	24	187	45	96	185	114
RTOR Reduction (vph)	0	3	0	0	15	0	0	12	0	0	23	0
Lane Group Flow (vph)	304	621	0	49	467	0	0	244	0	0	372	0
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases							2			6		
Actuated Green, G (s)	12.5	28.8		2.3	18.6			17.4			17.4	
Effective Green, g (s)	12.5	30.8		2.3	20.6			18.4			18.4	
Actuated g/C Ratio	0.20	0.49		0.04	0.32			0.29			0.29	
Clearance Time (s)	4.0	6.0		4.0	6.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	348	896		64	585			498			422	
v/s Ratio Prot	c0.17	0.34		0.03	c0.26							
v/s Ratio Perm								0.14			c0.26	
v/c Ratio	0.87	0.69		0.77	0.80			0.49			0.88	
Uniform Delay, d1	24.7	12.7		30.3	19.6			18.7			21.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	20.7	2.3		41.2	7.5			0.8			19.0	
Delay (s)	45.5	15.0		71.6	27.1			19.4			40.5	
Level of Service	D	B		E	C			B			D	
Approach Delay (s)		25.0			31.2			19.4			40.5	
Approach LOS		C			C			B			D	

Intersection Summary			
HCM Average Control Delay	28.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Panama Ln & Cottonwood Rd - PM Peak
Count Date: 8/8/2008

Exist Peak Hour Volumes

AWS		
>	WBL	12
1	WBT	187
<	WBR	71
>	EBL	56
1	EBT	156
<	EBR	9
>	NBL	16
1	NBT	125
<	NBR	19
>	SBL	52
1	SBT	124
<	SBR	71
	TOTAL	898

Year 2035
Fut. Volumes w/o Proj

WBL	23
WBT	602
WBR	172
EBL	163
EBT	523
EBR	21
NBL	33
NBT	194
NBR	34
SBL	136
SBT	225
SBR	215
TOTAL	2341

Year 2035 Fut. Vol
+ Project Traffic

WBL	27
WBT	604
WBR	172
EBL	164
EBT	528
EBR	23
NBL	34
NBT	203
NBR	44
SBL	136
SBT	241
SBR	220
TOTAL	2396

Year 2020
Fut. Volumes w/o Proj

WBL	17
WBT	371
WBR	115
EBL	103
EBT	318
EBR	14
NBL	24
NBT	155
NBR	26
SBL	89
SBT	169
SBR	135
TOTAL	1536

Year 2020 Fut. Vol
+ Project Traffic

WBL	21
WBT	373
WBR	115
EBL	104
EBT	323
EBR	16
NBL	25
NBT	164
NBR	36
SBL	89
SBT	185
SBR	140
TOTAL	1591

Project Generated Trips - Year 2035

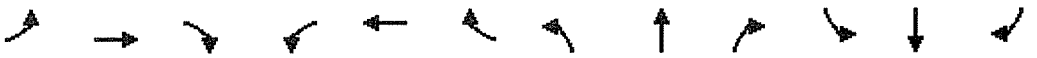
	Total	Indus.	Commer.
WBL	4	4	0
WBT	2	2	0
WBR	0	0	0
EBL	1	1	0
EBT	5	5	0
EBR	2	2	0
NBL	1	0	1
NBT	9	8	1
NBR	10	10	0
SBL	0	0	0
SBT	16	16	0
SBR	5	5	0
TOTAL	55	53	2

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Panama Ln & Cottonwood Rd - PM Peak						
	Count Date:	8/8/2008						
2006	ADT							
WB Approach (To)	2.59							
WB Approach (Away)	2.38							
EB Approach (To)	2.30							
EB Approach (Away)	2.65							
NB Approach (To)	1.72							
NB Approach (Away)	1.33							
SB Approach (To)	2.52							
SB Approach (Away)	2.47							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	7.6		WBL	2.16	WBT	3.56	WBR	2.59
WB Approach (Away)	7.3		2.48%	23	4.44%	602	3.33%	172
EB Approach (To)	10.0		EBL	3.30	EBT	3.71	EBR	2.87
EB Approach (Away)	11.1		4.05%	163	4.60%	523	3.20%	21
NB Approach (To)	1.9		NBL	2.66	NBT	1.70	NBR	2.10
NB Approach (Away)	1.9		2.75%	33	1.64%	194	2.19%	34
SB Approach (To)	6.5		SBL	2.82	SBT	1.98	SBR	3.38
SB Approach (Away)	5.6		3.64%	136	2.24%	225	4.20%	215
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	7.5		WBL	2.34	WBT	3.51	WBR	2.76
WB Approach (Away)	6.9		2.88%	26	4.40%	595	3.58%	183
EB Approach (To)	9.4		EBL	3.36	EBT	3.50	EBR	2.94
EB Approach (Away)	10.9		4.20%	170	4.39%	495	3.51%	23
NB Approach (To)	3.0		NBL	2.94	NBT	2.19	NBR	2.33
NB Approach (Away)	2.4		3.51%	40	2.69%	255	2.87%	41
SB Approach (To)	6.6		SBL	2.76	SBT	2.20	SBR	3.37
SB Approach (Away)	6.5		3.58%	134	2.70%	254	4.21%	215

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	56	156	9	12	187	71	16	125	19	52	124	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	61	170	10	13	203	77	17	136	21	57	135	77

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	240	293	174	268
Volume Left (vph)	61	13	17	57
Volume Right (vph)	10	77	21	77
Hadj (s)	0.06	-0.11	-0.02	-0.10
Departure Headway (s)	5.8	5.5	5.9	5.7
Degree Utilization, x	0.39	0.45	0.29	0.42
Capacity (veh/h)	565	600	531	577
Control Delay (s)	12.4	13.0	11.3	12.8
Approach Delay (s)	12.4	13.0	11.3	12.8
Approach LOS	B	B	B	B

Intersection Summary			
Delay	12.5		
HCM Level of Service	B		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	103	318	14	17	371	115	24	155	26	89	169	135
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	112	346	15	18	403	125	26	168	28	97	184	147

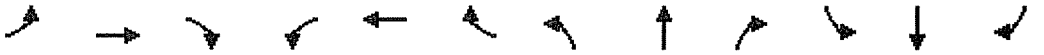
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	473	547	223	427
Volume Left (vph)	112	18	26	97
Volume Right (vph)	15	125	28	147
Hadj (s)	0.06	-0.10	-0.02	-0.13
Departure Headway (s)	8.6	8.4	9.5	8.4
Degree Utilization, x	1.13	1.28	0.59	0.99
Capacity (veh/h)	424	435	368	422
Control Delay (s)	112.2	168.1	25.3	71.3
Approach Delay (s)	112.2	168.1	25.3	71.3
Approach LOS	F	F	D	F

Intersection Summary			
Delay	108.4		
HCM Level of Service	F		
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	103	318	14	17	371	115	24	155	26	89	169	135
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	112	346	15	18	403	125	26	168	28	97	184	147

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total (vph)	112	361	422	125	110	113	97	184	147
Volume Left (vph)	112	0	18	0	26	0	97	0	0
Volume Right (vph)	0	15	0	125	0	28	0	0	147
Hadj (s)	0.53	0.00	0.06	-0.67	0.15	-0.14	0.53	0.03	-0.67
Departure Headway (s)	7.7	7.2	7.1	6.4	8.1	7.8	8.4	7.9	3.2
Degree Utilization, x	0.24	0.72	0.84	0.22	0.25	0.24	0.22	0.40	0.13
Capacity (veh/h)	450	485	492	540	405	427	406	424	1121
Control Delay (s)	11.9	25.4	35.8	10.1	12.6	12.2	12.6	14.8	5.5
Approach Delay (s)	22.2		29.9		12.4		11.1		
Approach LOS	C		D		B		B		

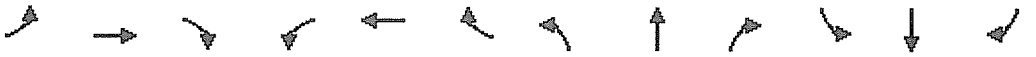
Intersection Summary			
Delay	20.6		
HCM Level of Service	C		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	104	323	16	21	373	115	25	164	36	89	185	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	351	17	23	405	125	27	178	39	97	201	152

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total (vph)	113	368	428	125	116	128	97	201	152
Volume Left (vph)	113	0	23	0	27	0	97	0	0
Volume Right (vph)	0	17	0	125	0	39	0	0	152
Hadj (s)	0.53	0.00	0.06	-0.67	0.15	-0.18	0.53	0.03	-0.67
Departure Headway (s)	7.9	7.4	7.3	6.6	8.3	8.0	8.5	8.0	3.2
Degree Utilization, x	0.25	0.76	0.87	0.23	0.27	0.28	0.23	0.45	0.14
Capacity (veh/h)	439	474	481	525	413	428	400	419	1121
Control Delay (s)	12.3	28.6	41.5	10.4	13.1	12.9	12.8	16.1	5.5
Approach Delay (s)	24.8		34.5		13.0		11.8		
Approach LOS	C		D		B		B		

Intersection Summary			
Delay	22.9		
HCM Level of Service	C		
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	163	523	21	23	602	172	33	194	34	136	225	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	568	23	25	654	187	36	211	37	148	245	234

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total (vph)	177	591	679	187	141	142	148	245	234
Volume Left (vph)	177	0	25	0	36	0	148	0	0
Volume Right (vph)	0	23	0	187	0	37	0	0	234
Hadj (s)	0.53	0.01	0.05	-0.67	0.16	-0.15	0.53	0.03	-0.67
Departure Headway (s)	8.7	8.2	8.2	7.5	9.2	8.9	9.3	8.8	3.2
Degree Utilization, x	0.43	1.34	1.55	0.39	0.36	0.35	0.38	0.60	0.21
Capacity (veh/h)	409	449	441	471	384	396	381	397	1122
Control Delay (s)	16.8	190.7	279.8	14.1	16.1	15.4	16.7	22.8	5.8
Approach Delay (s)	150.6		222.4		15.8		15.0		
Approach LOS	F		F		C		C		

Intersection Summary			
Delay	126.7		
HCM Level of Service	F		
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

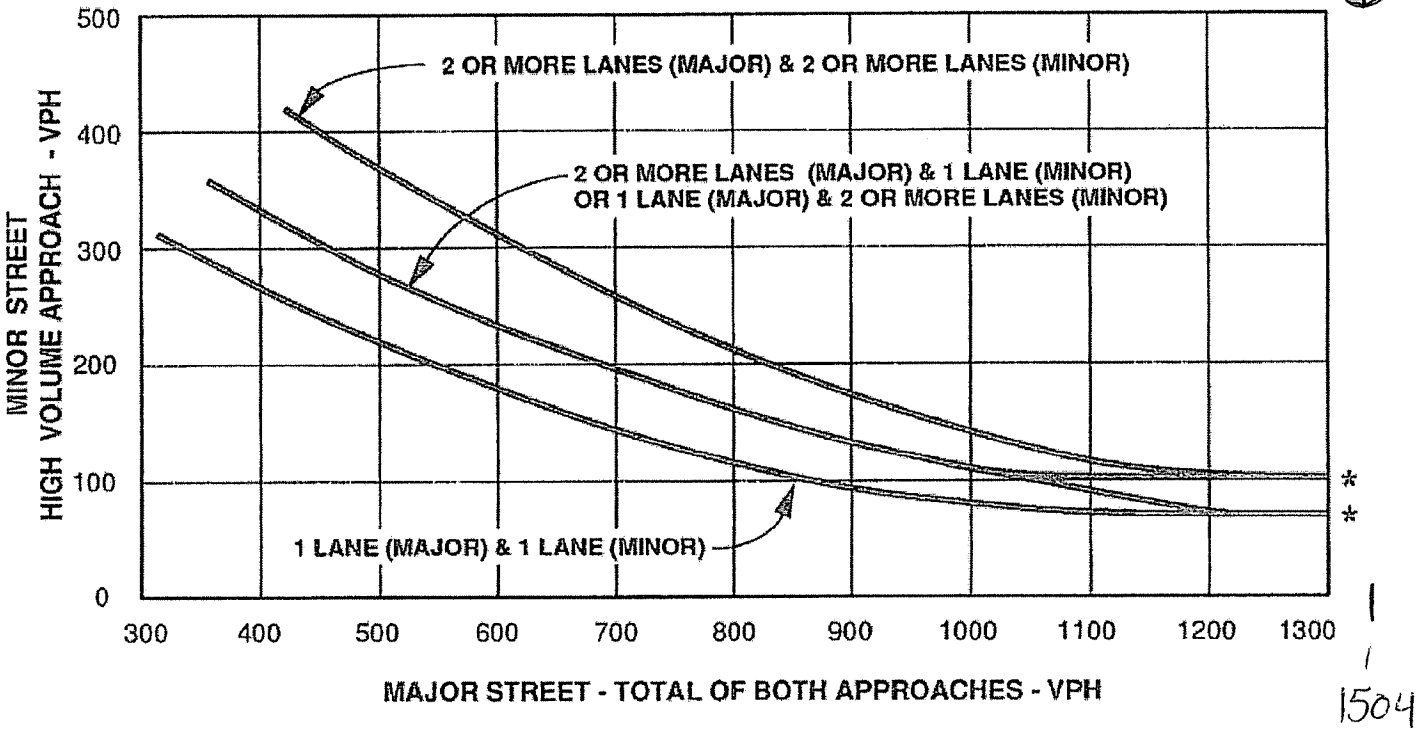
Panama Ln & Cottonwood Rd

2035 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

576



1504

*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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 17600	2 or More 6500
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 17600	2 or More 6500
1	2 or More

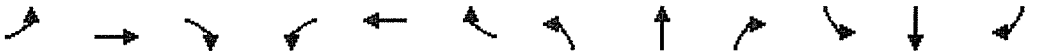
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00		0.95		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1770	1852		1770	3539	1583		3448		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.88		0.40	1.00	1.00
Satd. Flow (perm)	1770	1852		1770	3539	1583		3068		746	1863	1583
Volume (vph)	163	523	21	23	602	172	33	194	34	136	225	215
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	568	23	25	654	187	36	211	37	148	245	234
RTOR Reduction (vph)	0	1	0	0	0	134	0	12	0	0	0	133
Lane Group Flow (vph)	177	590	0	25	654	53	0	272	0	148	245	101
Turn Type	Prot			Prot		Perm	Perm			pm+pt		Perm
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	13.4	36.1		3.0	25.7	25.7		17.2		39.3	39.3	39.3
Effective Green, g (s)	14.4	37.1		4.0	26.7	26.7		18.2		40.3	40.3	40.3
Actuated g/C Ratio	0.15	0.40		0.04	0.29	0.29		0.19		0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	273	736		76	1012	453		598		520	804	683
v/s Ratio Prot	c0.10	c0.32		0.01	0.18					0.06	c0.13	
v/s Ratio Perm						0.03		c0.09		0.07		0.06
v/c Ratio	0.65	0.80		0.33	0.65	0.12		0.45		0.28	0.30	0.15
Uniform Delay, d1	37.1	24.9		43.4	29.2	24.6		33.2		16.8	17.4	16.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	5.2	6.3		2.5	1.4	0.1		2.5		1.4	1.0	0.5
Delay (s)	42.3	31.2		45.9	30.6	24.8		35.7		18.1	18.4	16.6
Level of Service	D	C		D	C	C		D		B	B	B
Approach Delay (s)		33.7			29.8			35.7			17.6	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM Average Control Delay	28.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	93.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00		0.95		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	1770	1851		1770	3539	1583		3435		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.88		0.38	1.00	1.00
Satd. Flow (perm)	1770	1851		1770	3539	1583		3054		703	1863	1583
Volume (vph)	164	528	23	27	604	172	34	203	44	136	241	220
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	574	25	29	657	187	37	221	48	148	262	239
RTOR Reduction (vph)	0	1	0	0	0	134	0	15	0	0	0	136
Lane Group Flow (vph)	178	598	0	29	657	53	0	291	0	148	262	103
Turn Type	Prot			Prot		Perm	Perm			pm+pt		Perm
Protected Phases	5	2		1	6			8		7	4	
Permitted Phases						6	8			4		4
Actuated Green, G (s)	13.4	36.0		3.1	25.7	25.7		17.2		39.3	39.3	39.3
Effective Green, g (s)	14.4	37.0		4.1	26.7	26.7		18.2		40.3	40.3	40.3
Actuated g/C Ratio	0.15	0.40		0.04	0.29	0.29		0.19		0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	273	733		78	1012	453		595		510	804	683
v/s Ratio Prot	c0.10	c0.32		0.02	0.19					0.06	c0.14	
v/s Ratio Perm						0.03		c0.10		0.07		0.07
v/c Ratio	0.65	0.82		0.37	0.65	0.12		0.49		0.29	0.33	0.15
Uniform Delay, d1	37.1	25.2		43.4	29.2	24.6		33.5		16.8	17.6	16.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	7.0		3.0	1.4	0.1		2.9		1.4	1.1	0.5
Delay (s)	42.6	32.1		46.4	30.7	24.8		36.3		18.2	18.6	16.6
Level of Service	D	C		D	C	C		D		B	B	B
Approach Delay (s)		34.5			29.9			36.3			17.8	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	93.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & SR 99 Southbound Off Ramp - AM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

0	WBL	0
1	WBT	300
0	WBR	0
0	EBL	0
1	EBT	405
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	705

Year 2035 Fut. Volumes w/o Proj

WBL	0
WBT	331
WBR	0
EBL	0
EBT	943
EBR	0
NBL	0
NBT	0
NBR	0
SBL	202
SBT	0
SBR	731
TOTAL	2207

Year 2035 Fut. Vol + Project Traffic

WBL	0
WBT	331
WBR	0
EBL	0
EBT	1012
EBR	0
NBL	0
NBT	0
NBR	0
SBL	204
SBT	0
SBR	731
TOTAL	2278

Year 2020 Fut. Volumes w/o Proj

S		
0	WBL	0
3	WBT	315
0	WBR	0
0	EBL	0
3	EBT	665
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
2	SBL	98
0	SBT	0
1	SBR	353
	TOTAL	1430

Year 2020 Fut. Vol + Project Traffic

WBL	0
WBT	315
WBR	0
EBL	0
EBT	734
EBR	0
NBL	0
NBT	0
NBR	0
SBL	100
SBT	0
SBR	353
TOTAL	1501

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	69	60	9
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	2	2	0
SBT	0	0	0
SBR	0	0	0
TOTAL	71	62	9

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & SR 99 Southbound Off Ramp - AM Peak						
	Count Date:	Future Intersection						
2006	ADT							
WB Approach (To)	1.39							
WB Approach (Away)	1.09							
EB Approach (To)	1.09							
EB Approach (Away)	1.39							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	4.1		WBL	1.97	WBT	6.26	WBR	1.97
WB Approach (Away)	14.3		1.90%	0	5.95%	0	1.90%	0
EB Approach (To)	11.8		EBL	5.91	EBT	11.97	EBR	5.91
EB Approach (Away)	13.3		4.28%	0	8.91%	0	4.28%	0
NB Approach (To)	*1*		NBL	5.28	NBT	1.00	NBR	7.06
NB Approach (Away)	*1*		4.05%	0	0.00%	0	4.64%	0
SB Approach (To)	11.7		SBL	12.41	SBT	6.35	SBR	10.63
SB Approach (Away)	*1*		9.06%	0	4.42%	0	8.47%	0
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	10.4		WBL	4.24	WBT	8.56	WBR	4.24
WB Approach (Away)	11.8		3.59%	0	7.65%	0	3.59%	0
EB Approach (To)	12.1		EBL	6.05	EBT	10.96	EBR	6.05
EB Approach (Away)	13.4		4.32%	0	8.60%	0	4.32%	0
NB Approach (To)	*1*		NBL	5.32	NBT	1.00	NBR	5.91
NB Approach (Away)	*1*		4.06%	0	0.00%	0	4.28%	0
SB Approach (To)	9.5		SBL	10.16	SBT	5.25	SBR	9.57
SB Approach (Away)	*1*		8.31%	0	4.03%	0	8.09%	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	665	315	0	98	353
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	723	342	0	107	384
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	342				1065	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342				1065	342
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				57	45
cM capacity (veh/h)	1217				246	700

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	723	342	490
Volume Left	0	0	107
Volume Right	0	0	384
cSH	1700	1700	500
Volume to Capacity	0.43	0.20	0.98
Queue Length 95th (ft)	0	0	324
Control Delay (s)	0.0	0.0	64.3
Lane LOS			F
Approach Delay (s)	0.0	0.0	64.3
Approach LOS			F

Intersection Summary			
Average Delay	20.3	HCM Level of Service	C
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	734	315	0	100	353
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	798	342	0	109	384
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	342				1140	342
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	342				1140	342
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				51	45
cM capacity (veh/h)	1217				222	700

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	798	342	492
Volume Left	0	0	109
Volume Right	0	0	384
cSH	1700	1700	475
Volume to Capacity	0.47	0.20	1.04
Queue Length 95th (ft)	0	0	368
Control Delay (s)	0.0	0.0	81.1
Lane LOS			F
Approach Delay (s)	0.0	0.0	81.1
Approach LOS			F

Intersection Summary			
Average Delay	24.4	HCM Level of Service	C
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	943	331	0	202	731
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1025	360	0	220	795
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	360				1385	360
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360				1385	360
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	0
cM capacity (veh/h)	1199				158	685

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1025	360	1014
Volume Left	0	0	220
Volume Right	0	0	795
cSH	1700	1700	398
Volume to Capacity	0.60	0.21	2.55
Queue Length 95th (ft)	0	0	2043
Control Delay (s)	0.0	0.0	726.1
Lane LOS			F
Approach Delay (s)	0.0	0.0	726.1
Approach LOS			F

Intersection Summary			
Average Delay	307.0	HCM Level of Service	F
Intersection Capacity Utilization	112.6%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	943	331	0	202	731
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1025	360	0	220	795
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	360				872	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360				872	180
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				24	4
cM capacity (veh/h)	1195				290	832

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	512	512	180	180	220	795
Volume Left	0	0	0	0	220	0
Volume Right	0	0	0	0	0	795
cSH	1700	1700	1700	1700	290	832
Volume to Capacity	0.30	0.30	0.11	0.11	0.76	0.96
Queue Length 95th (ft)	0	0	0	0	142	377
Control Delay (s)	0.0	0.0	0.0	0.0	47.8	43.5
Lane LOS					E	E
Approach Delay (s)	0.0		0.0		44.4	
Approach LOS					E	

Intersection Summary			
Average Delay	18.8	HCM Level of Service	C
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1012	331	0	204	731
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1100	360	0	222	795
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	360				910	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360				910	180
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				19	4
cM capacity (veh/h)	1195				274	832

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	550	550	180	180	222	795
Volume Left	0	0	0	0	222	0
Volume Right	0	0	0	0	0	795
cSH	1700	1700	1700	1700	274	832
Volume to Capacity	0.32	0.32	0.11	0.11	0.81	0.96
Queue Length 95th (ft)	0	0	0	0	160	377
Control Delay (s)	0.0	0.0	0.0	0.0	56.5	43.5
Lane LOS					F	E
Approach Delay (s)	0.0		0.0		46.4	
Approach LOS					E	

Intersection Summary			
Average Delay	19.0	HCM Level of Service	C
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

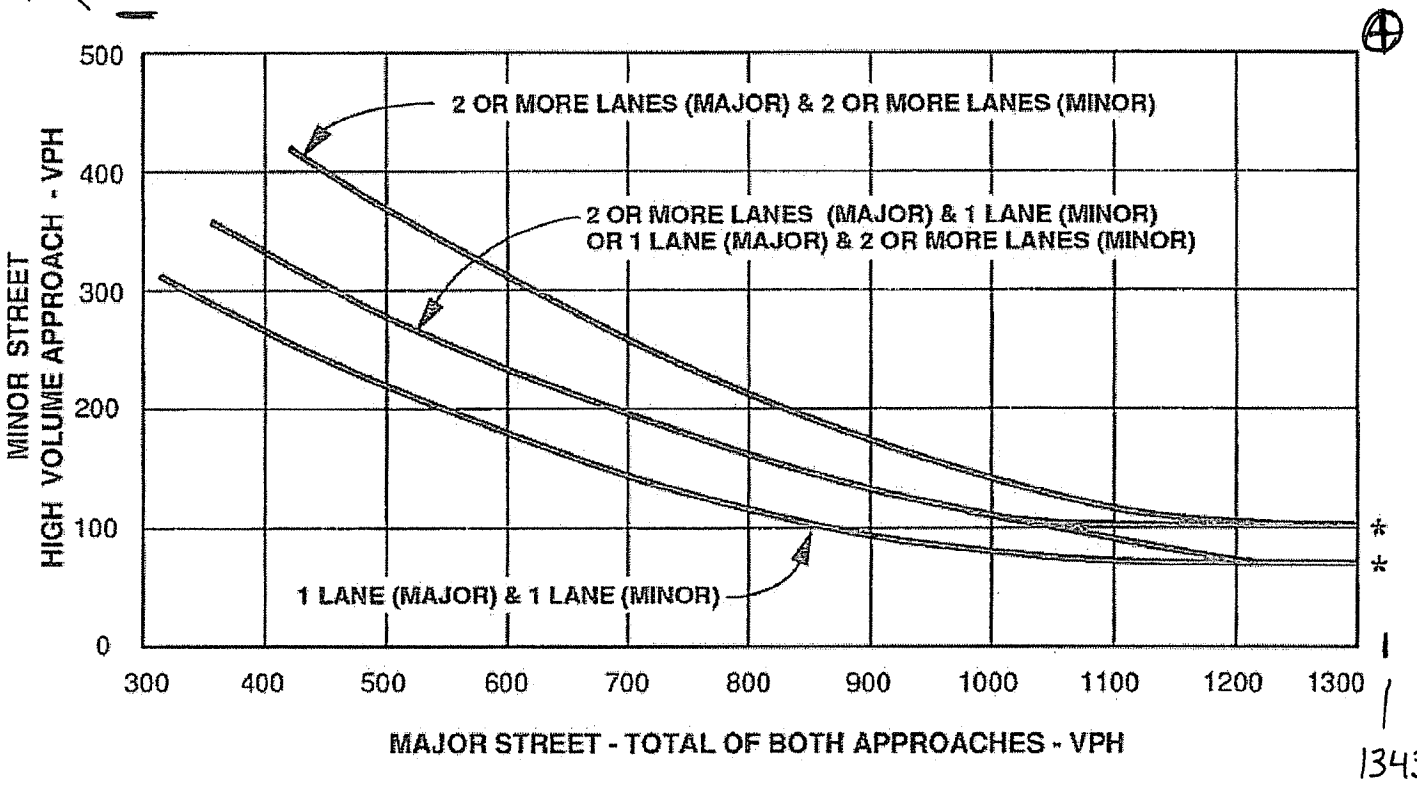
Hosking Ave & SR 99 SB off Ramp

2035 with Project - ~~AM~~ Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

931



1343

*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.

SATISFIED YES ☒ NO ☐

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & SR 99 Southbound Off Ramp - PM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

0	WBL	0
1	WBT	313
0	WBR	0
0	EBL	0
1	EBT	303
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	616

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	414
WBR	0
EBL	0
EBT	1179
EBR	0
NBL	0
NBT	0
NBR	0
SBL	253
SBT	0
SBR	914
TOTAL	2760

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	459
WBR	0
EBL	0
EBT	1266
EBR	0
NBL	0
NBT	0
NBR	0
SBL	253
SBT	0
SBR	914
TOTAL	2892

Year 2020

S	Fut. Volumes w/o Proj	
0	WBL	0
3	WBT	362
0	WBR	0
0	EBL	0
3	EBT	726
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
2	SBL	122
0	SBT	0
1	SBR	441
	TOTAL	1651

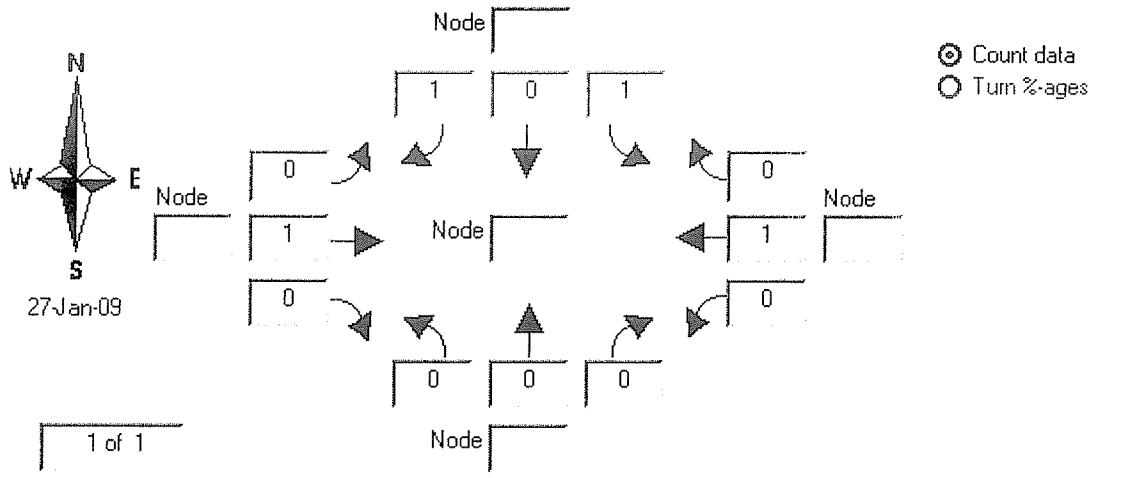
Year 2020 Fut. Vol
+ Project Traffic

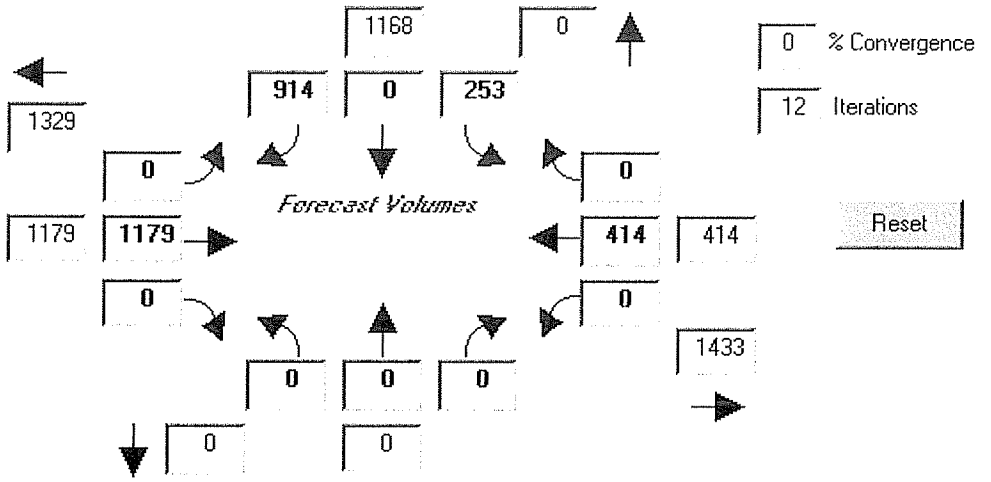
WBL	0
WBT	407
WBR	0
EBL	0
EBT	813
EBR	0
NBL	0
NBT	0
NBR	0
SBL	122
SBT	0
SBR	441
TOTAL	1783

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	45	38	7
WBR	0	0	0
EBL	0	0	0
EBT	87	84	3
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	132	122	10

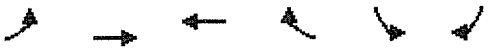
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & SR 99 Southbound Off Ramp - PM Peak						
	Count Date:	Future Intersection						
2006	ADT							
WB Approach (To)	1.39							
WB Approach (Away)	1.09							
EB Approach (To)	1.09							
EB Approach (Away)	1.39							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	4.1		WBL	1.99	WBT	6.29	WBR	1.99
WB Approach (Away)	14.3		1.92%	0	5.97%	0	1.92%	0
EB Approach (To)	11.8		EBL	5.90	EBT	11.97	EBR	5.90
EB Approach (Away)	13.3		4.27%	0	8.91%	0	4.27%	0
NB Approach (To)	*1*		NBL	5.30	NBT	1.00	NBR	7.07
NB Approach (Away)	*1*		4.05%	0	0.00%	0	4.64%	0
SB Approach (To)	11.7		SBL	12.41	SBT	6.34	SBR	10.64
SB Approach (Away)	*1*		9.06%	0	4.42%	0	8.47%	0
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	10.4		WBL	4.26	WBT	8.59	WBR	4.26
WB Approach (Away)	11.8		3.60%	0	7.67%	0	3.60%	0
EB Approach (To)	12.1		EBL	6.05	EBT	10.93	EBR	6.05
EB Approach (Away)	13.4		4.32%	0	8.59%	0	4.32%	0
NB Approach (To)	*1*		NBL	5.34	NBT	1.00	NBR	5.88
NB Approach (Away)	*1*		4.07%	0	0.00%	0	4.27%	0
SB Approach (To)	9.5		SBL	10.15	SBT	5.26	SBR	9.60
SB Approach (Away)	*1*		8.31%	0	4.04%	0	8.11%	0





Hosking Ave + SR 99 Southbound Off Ramp

2035 without Project - PM Peak



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	726	362	0	122	441
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	789	393	0	133	479
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	393				1183	393
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	393				1183	393
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				37	27
cM capacity (veh/h)	1165				209	655

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	789	393	612
Volume Left	0	0	133
Volume Right	0	0	479
cSH	1700	1700	449
Volume to Capacity	0.46	0.23	1.36
Queue Length 95th (ft)	0	0	712
Control Delay (s)	0.0	0.0	202.9
Lane LOS			F
Approach Delay (s)	0.0	0.0	202.9
Approach LOS			F

Intersection Summary			
Average Delay	69.2	HCM Level of Service	F
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	726	362	0	122	441
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	789	393	0	133	479
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	393				1183	393
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	393				1183	393
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				37	27
cM capacity (veh/h)	1165				209	655

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	789	393	133	479
Volume Left	0	0	133	0
Volume Right	0	0	0	479
cSH	1700	1700	209	655
Volume to Capacity	0.46	0.23	0.63	0.73
Queue Length 95th (ft)	0	0	93	158
Control Delay (s)	0.0	0.0	47.8	23.9
Lane LOS			E	C
Approach Delay (s)	0.0	0.0	29.1	
Approach LOS			D	

Intersection Summary			
Average Delay	9.9	HCM Level of Service	A
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	813	407	0	122	441
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	884	442	0	133	479
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	442				1326	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442				1326	442
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				23	22
cM capacity (veh/h)	1118				172	615

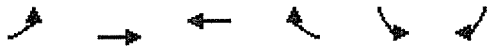
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	884	442	133	479
Volume Left	0	0	133	0
Volume Right	0	0	0	479
cSH	1700	1700	172	615
Volume to Capacity	0.52	0.26	0.77	0.78
Queue Length 95th (ft)	0	0	126	184
Control Delay (s)	0.0	0.0	74.5	28.4
Lane LOS			F	D
Approach Delay (s)	0.0	0.0	38.4	
Approach LOS			E	

Intersection Summary			
Average Delay	12.1	HCM Level of Service	B
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1179	414	0	253	914
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1282	450	0	275	993
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	450				1732	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450				1732	450
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	0
cM capacity (veh/h)	1110				97	609

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	1282	450	275	993
Volume Left	0	0	275	0
Volume Right	0	0	0	993
cSH	1700	1700	97	609
Volume to Capacity	0.75	0.26	2.84	1.63
Queue Length 95th (ft)	0	0	655	1371
Control Delay (s)	0.0	0.0	924.8	309.4
Lane LOS			F	F
Approach Delay (s)	0.0	0.0	442.8	
Approach LOS			F	

Intersection Summary			
Average Delay	187.2	HCM Level of Service	F
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1179	414	0	253	914
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1282	450	0	275	993
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			959			
pX, platoon unblocked						
vC, conflicting volume	450				877	150
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450				877	150
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				4	0
cM capacity (veh/h)	1107				288	870

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	SB 3
Volume Total	427	427	427	150	150	150	138	138	993
Volume Left	0	0	0	0	0	0	138	138	0
Volume Right	0	0	0	0	0	0	0	0	993
cSH	1700	1700	1700	1700	1700	1700	288	288	870
Volume to Capacity	0.25	0.25	0.25	0.09	0.09	0.09	0.48	0.48	1.14
Queue Length 95th (ft)	0	0	0	0	0	0	61	61	714
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	28.5	28.5	97.4
Lane LOS							D	D	F
Approach Delay (s)	0.0			0.0			82.5		
Approach LOS							F		

Intersection Summary			
Average Delay	34.9	HCM Level of Service	D
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

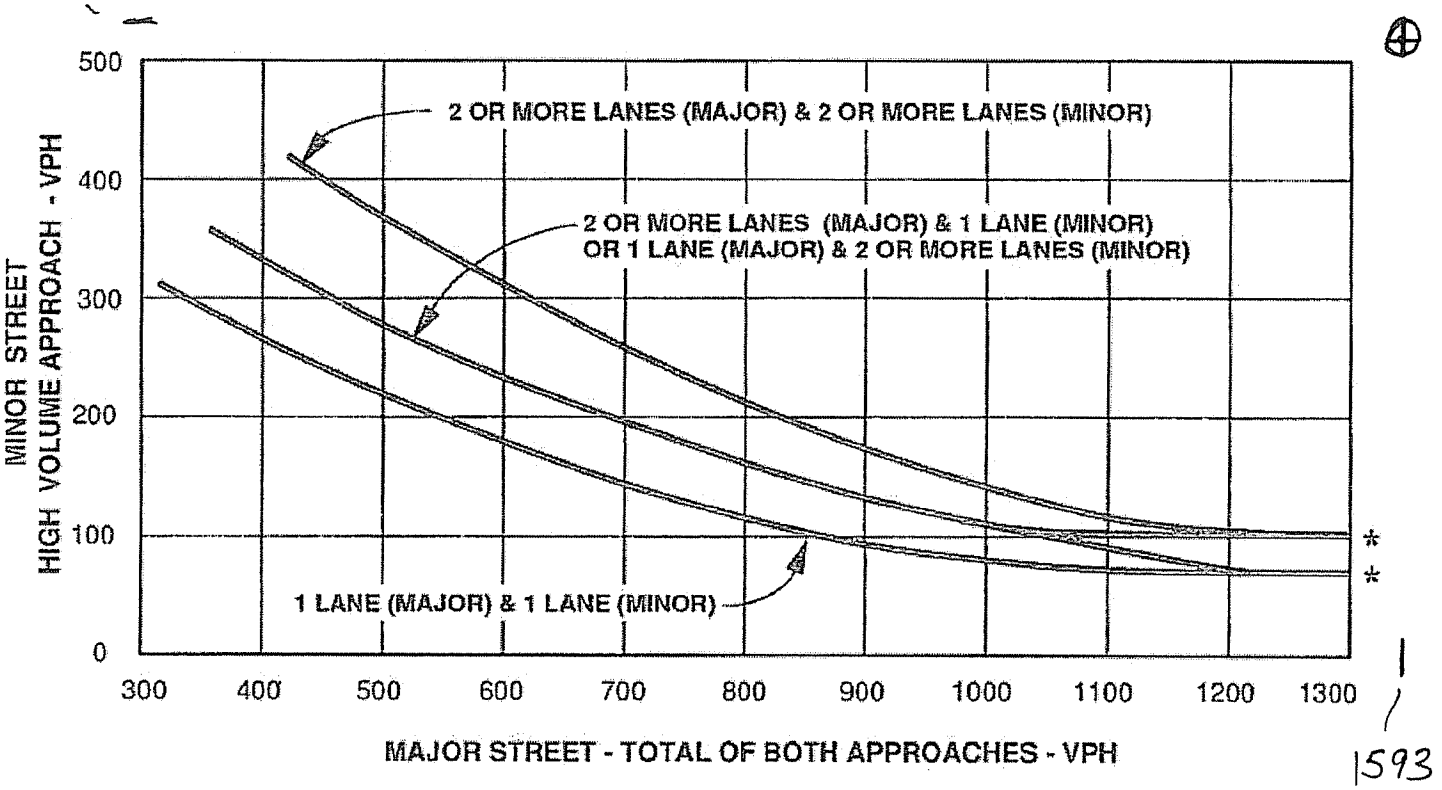
Hosking Ave + SR 99 SB Off Ramp

2035 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

1167



1593

*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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL.....X.....

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....15,900.....	2 or More.....9500.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....15,900.....	2 or More.....9500.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... ___ (A) ___ (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5085	5085		3433	1583
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5085	5085		3433	1583
Volume (vph)	0	1179	414	0	253	914
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1282	450	0	275	993
RTOR Reduction (vph)	0	0	0	0	0	66
Lane Group Flow (vph)	0	1282	450	0	275	927
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		16.0	16.0		33.0	33.0
Effective Green, g (s)		18.0	18.0		34.0	34.0
Actuated g/C Ratio		0.30	0.30		0.57	0.57
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1526	1526		1945	897
v/s Ratio Prot		c0.25	0.09		0.08	
v/s Ratio Perm						c0.59
v/c Ratio		0.84	0.29		0.14	1.03
Uniform Delay, d1		19.7	16.1		6.1	13.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		4.3	0.1		0.2	39.0
Delay (s)		24.0	16.2		6.3	52.0
Level of Service		C	B		A	D
Approach Delay (s)		24.0	16.2		42.1	
Approach LOS		C	B		D	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑↑		↰↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		0.91	0.91		0.97	1.00
Frt		1.00	1.00		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		5085	5085		3433	1583
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		5085	5085		3433	1583
Volume (vph)	0	1266	459	0	253	914
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1376	499	0	275	993
RTOR Reduction (vph)	0	0	0	0	0	46
Lane Group Flow (vph)	0	1376	499	0	275	947
Turn Type						Perm
Protected Phases		4	8		6	
Permitted Phases						6
Actuated Green, G (s)		20.0	20.0		44.0	44.0
Effective Green, g (s)		22.0	22.0		45.0	45.0
Actuated g/C Ratio		0.29	0.29		0.60	0.60
Clearance Time (s)		6.0	6.0		5.0	5.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1492	1492		2060	950
v/s Ratio Prot		c0.27	0.10		0.08	
v/s Ratio Perm						c0.60
v/c Ratio		0.92	0.33		0.13	1.00
Uniform Delay, d1		25.7	20.8		6.5	14.9
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		9.8	0.1		0.0	28.2
Delay (s)		35.4	20.9		6.6	43.1
Level of Service		D	C		A	D
Approach Delay (s)		35.4	20.9		35.2	
Approach LOS		D	C		D	

Intersection Summary			
HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & SR 99 Northbound Off Ramp - AM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

0	WBL	0
1	WBT	300
0	WBR	0
0	EBL	0
1	EBT	405
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	705

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	1324
WBR	0
EBL	0
EBT	982
EBR	0
NBL	215
NBT	0
NBR	23
SBL	0
SBT	0
SBR	0
TOTAL	2544

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	1326
WBR	0
EBL	0
EBT	993
EBR	0
NBL	215
NBT	0
NBR	24
SBL	0
SBT	0
SBR	0
TOTAL	2558

Year 2020

S	**Fut. Volumes w/o Proj**	
0	WBL	0
3	WBT	794
0	WBR	0
0	EBL	0
3	EBT	684
0	EBR	0
2	NBL	104
0	NBT	0
1	NBR	11
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	1593

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	796
WBR	0
EBL	0
EBT	695
EBR	0
NBL	104
NBT	0
NBR	12
SBL	0
SBT	0
SBR	0
TOTAL	1607

Project Generated Trips - Year 2035

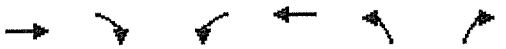
	Total	Indus.	Commer.
WBL	0	0	0
WBT	2	2	0
WBR	0	0	0
EBL	0	0	0
EBT	11	7	4
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	1	0	1
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	14	9	5

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & SR 99 Northbound Off Ramp - AM Peak						
	Count Date:	Future Intersection						
2006	ADT							
WB Approach (To)	1.39							
WB Approach (Away)	1.09							
EB Approach (To)	1.09							
EB Approach (Away)	1.39							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	16.6		WBL	6.47	WBT	12.92	WBR	6.47
WB Approach (Away)	12.6		4.46%	0	9.21%	0	4.46%	0
EB Approach (To)	12.3		EBL	6.12	EBT	11.38	EBR	6.12
EB Approach (Away)	19.3		4.35%	0	8.74%	0	4.35%	0
NB Approach (To)	3.0		NBL	8.44	NBT	1.99	NBR	7.25
NB Approach (Away)	*1*		6.66%	0	1.92%	0	6.31%	0
SB Approach (To)	*1*		SBL	6.26	SBT	1.00	SBR	7.45
SB Approach (Away)	*1*		4.39%	0	0.00%	0	4.75%	0
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	14.7		WBL	5.80	WBT	9.05	WBR	5.80
WB Approach (Away)	12.5		4.24%	0	7.84%	0	4.24%	0
EB Approach (To)	11.8		EBL	5.88	EBT	11.12	EBR	5.88
EB Approach (Away)	10.4		4.27%	0	8.65%	0	4.27%	0
NB Approach (To)	4.6		NBL	6.08	NBT	2.82	NBR	8.05
NB Approach (Away)	*1*		6.31%	0	2.71%	0	7.10%	0
SB Approach (To)	*1*		SBL	6.23	SBT	1.00	SBR	4.26
SB Approach (Away)	*1*		4.38%	0	0.00%	0	3.60%	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↰	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	684	0	0	794	104	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	743	0	0	863	113	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			743		1607	743
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			743		1607	743
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		2	97
cM capacity (veh/h)			864		116	415

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	743	863	125
Volume Left	0	0	113
Volume Right	0	0	12
cSH	1700	1700	124
Volume to Capacity	0.44	0.51	1.01
Queue Length 95th (ft)	0	0	172
Control Delay (s)	0.0	0.0	150.1
Lane LOS			F
Approach Delay (s)	0.0	0.0	150.1
Approach LOS			F

Intersection Summary			
Average Delay	10.8	HCM Level of Service	B
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	695	0	0	796	104	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	755	0	0	865	113	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				930		
pX, platoon unblocked					0.85	
vC, conflicting volume			755		1621	755
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			755		1731	755
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	97
cM capacity (veh/h)			855		82	408

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	755	865	126
Volume Left	0	0	113
Volume Right	0	0	13
cSH	1700	1700	90
Volume to Capacity	0.44	0.51	1.41
Queue Length 95th (ft)	0	0	238
Control Delay (s)	0.0	0.0	321.0
Lane LOS			F
Approach Delay (s)	0.0	0.0	321.0
Approach LOS			F

Intersection Summary			
Average Delay	23.2	HCM Level of Service	C
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	982	0	0	1324	215	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1067	0	0	1439	234	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1067		2507	1067
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1067		2507	1067
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	91
cM capacity (veh/h)			653		31	270

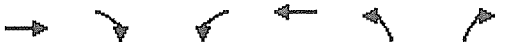
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1067	1439	259
Volume Left	0	0	234
Volume Right	0	0	25
cSH	1700	1700	34
Volume to Capacity	0.63	0.85	7.53
Queue Length 95th (ft)	0	0	Err
Control Delay (s)	0.0	0.0	Err
Lane LOS			F
Approach Delay (s)	0.0	0.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	935.4	HCM Level of Service	F
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↰↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	982	0	0	1324	215	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1067	0	0	1439	234	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	959			930		
pX, platoon unblocked					0.94	
vC, conflicting volume			1067		1547	534
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1067		1451	534
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	95
cM capacity (veh/h)			649		114	491

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3
Volume Total	534	534	480	480	480	117	117	25
Volume Left	0	0	0	0	0	117	117	0
Volume Right	0	0	0	0	0	0	0	25
cSH	1700	1700	1700	1700	1700	114	114	491
Volume to Capacity	0.31	0.31	0.28	0.28	0.28	1.02	1.02	0.05
Queue Length 95th (ft)	0	0	0	0	0	170	170	4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	163.0	163.0	12.7
Lane LOS						F	F	B
Approach Delay (s)	0.0		0.0			148.5		
Approach LOS						F		

Intersection Summary			
Average Delay	13.9	HCM Level of Service	B
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑↑	↰↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	993	0	0	1326	215	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1079	0	0	1441	234	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	959			930		
pX, platoon unblocked					0.94	
vC, conflicting volume			1079		1560	540
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1079		1461	540
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	95
cM capacity (veh/h)			642		112	486

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3
Volume Total	540	540	480	480	480	117	117	26
Volume Left	0	0	0	0	0	117	117	0
Volume Right	0	0	0	0	0	0	0	26
cSH	1700	1700	1700	1700	1700	112	112	486
Volume to Capacity	0.32	0.32	0.28	0.28	0.28	1.04	1.04	0.05
Queue Length 95th (ft)	0	0	0	0	0	173	173	4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	170.1	170.1	12.8
Lane LOS						F	F	B
Approach Delay (s)	0.0		0.0			154.3		
Approach LOS						F		

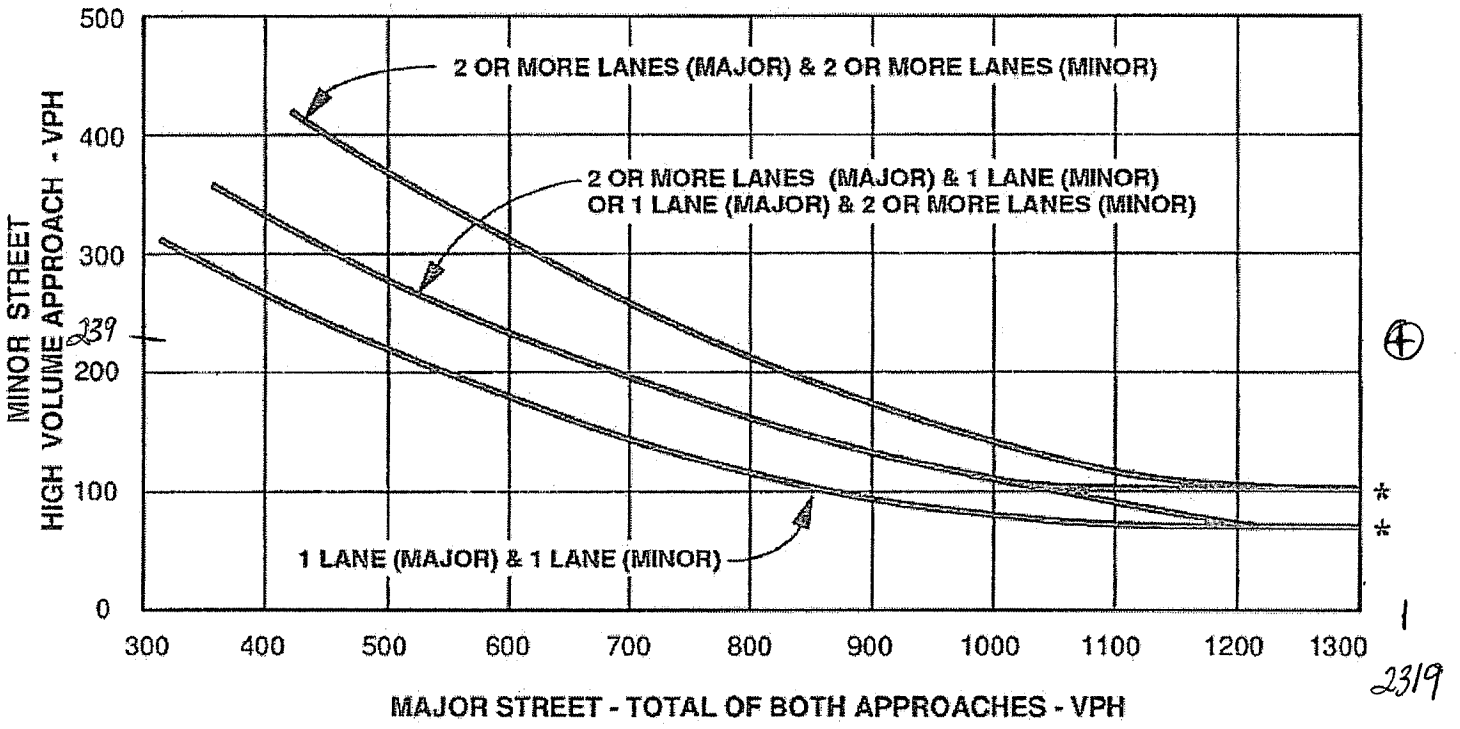
Intersection Summary			
Average Delay	14.4	HCM Level of Service	B
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

Hosking Ave + SR 99 Northbound Off Ramp

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

ALTERNATIVE IMPROVEMENTS AS REQUIRED BY PM ANALYSIS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			3539	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			3539	1770	1583
Volume (vph)	982	0	0	1324	215	23
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1067	0	0	1439	234	25
RTOR Reduction (vph)	0	0	0	0	0	19
Lane Group Flow (vph)	1067	0	0	1439	234	6
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	36.3			36.3	12.4	12.4
Effective Green, g (s)	38.3			38.3	13.4	13.4
Actuated g/C Ratio	0.64			0.64	0.22	0.22
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1195			2270	397	355
v/s Ratio Prot	c0.57			0.41	c0.13	
v/s Ratio Perm						0.00
v/c Ratio	0.89			0.63	0.59	0.02
Uniform Delay, d1	9.0			6.5	20.7	18.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	8.8			0.6	2.2	0.0
Delay (s)	17.7			7.1	22.9	18.0
Level of Service	B			A	C	B
Approach Delay (s)	17.7			7.1	22.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

ALTERNATE IMPROVEMENTS AS REQUIRED BY PM ANALYSIS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			3539	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			3539	1770	1583
Volume (vph)	993	0	0	1326	215	24
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1079	0	0	1441	234	26
RTOR Reduction (vph)	0	0	0	0	0	20
Lane Group Flow (vph)	1079	0	0	1441	234	6
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	36.8			36.8	12.4	12.4
Effective Green, g (s)	38.8			38.8	13.4	13.4
Actuated g/C Ratio	0.64			0.64	0.22	0.22
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1201			2281	394	352
v/s Ratio Prot	c0.58			0.41	c0.13	
v/s Ratio Perm						0.00
v/c Ratio	0.90			0.63	0.59	0.02
Uniform Delay, d1	9.0			6.4	21.0	18.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	9.1			0.6	2.4	0.0
Delay (s)	18.1			7.0	23.4	18.3
Level of Service	B			A	C	B
Approach Delay (s)	18.1			7.0	22.9	
Approach LOS	B			A	C	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & SR 99 Northbound Off Ramp - PM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

0	WBL	0
1	WBT	313
0	WBR	0
0	EBL	0
1	EBT	303
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	616

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	1655
WBR	0
EBL	0
EBT	1227
EBR	0
NBL	269
NBT	0
NBR	29
SBL	0
SBT	0
SBR	0
TOTAL	3180

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	1657
WBR	0
EBL	0
EBT	1233
EBR	0
NBL	312
NBT	0
NBR	29
SBL	0
SBT	0
SBR	0
TOTAL	3231

Year 2020

S	**Fut. Volumes w/o Proj**	
0	WBL	0
3	WBT	961
0	WBR	0
0	EBL	0
3	EBT	749
0	EBR	0
2	NBL	130
0	NBT	0
1	NBR	14
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	1854

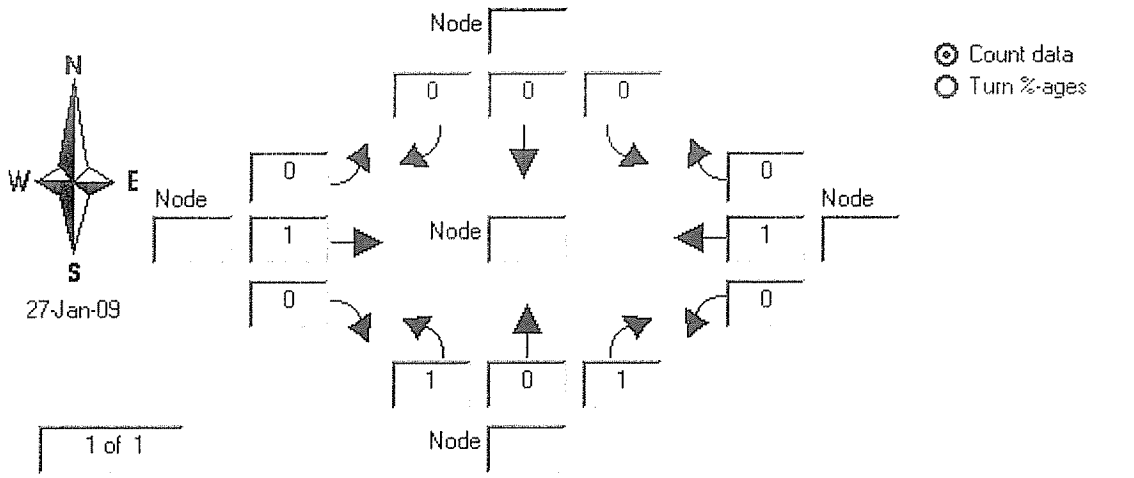
Year 2020 Fut. Vol
+ Project Traffic

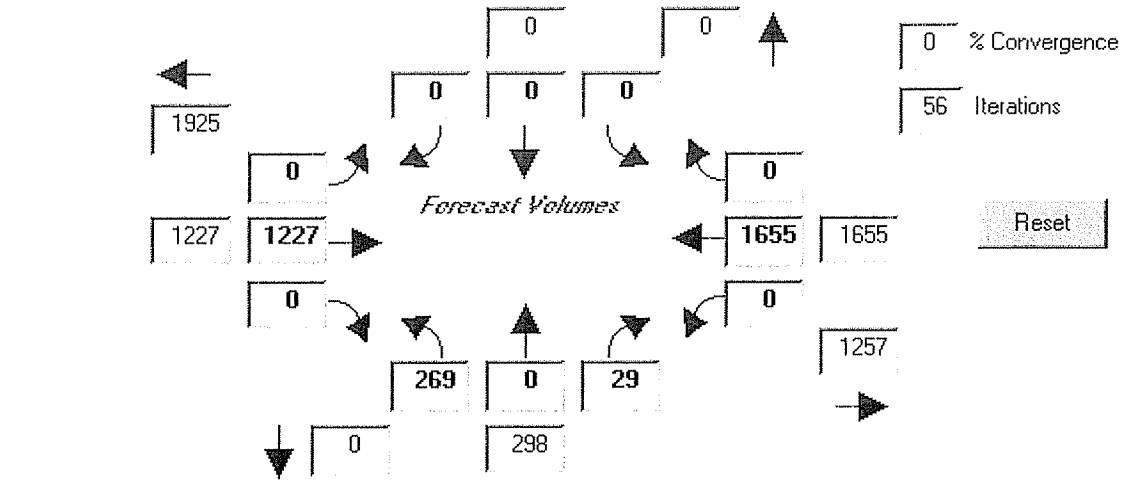
WBL	0
WBT	963
WBR	0
EBL	0
EBT	755
EBR	0
NBL	173
NBT	0
NBR	14
SBL	0
SBT	0
SBR	0
TOTAL	1905

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	2	2	0
WBR	0	0	0
EBL	0	0	0
EBT	6	6	0
EBR	0	0	0
NBL	43	36	7
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	51	44	7

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & SR 99 Northbound Off Ramp - PM Peak						
	Count Date:	Future Intersection						
2006	ADT							
WB Approach (To)	1.39							
WB Approach (Away)	1.09							
EB Approach (To)	1.09							
EB Approach (Away)	1.39							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	16.6		WBL	6.47	WBT	12.92	WBR	6.47
WB Approach (Away)	12.6		4.46%	0	9.21%	0	4.46%	0
EB Approach (To)	12.3		EBL	6.12	EBT	11.38	EBR	6.12
EB Approach (Away)	19.3		4.35%	0	8.74%	0	4.35%	0
NB Approach (To)	3.0		NBL	8.44	NBT	1.99	NBR	7.25
NB Approach (Away)	*1*		6.66%	0	1.92%	0	6.31%	0
SB Approach (To)	*1*		SBL	6.26	SBT	1.00	SBR	7.45
SB Approach (Away)	*1*		4.39%	0	0.00%	0	4.75%	0
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	14.7		WBL	5.80	WBT	9.05	WBR	5.80
WB Approach (Away)	12.5		4.24%	0	7.84%	0	4.24%	0
EB Approach (To)	11.8		EBL	5.88	EBT	11.12	EBR	5.88
EB Approach (Away)	10.4		4.27%	0	8.65%	0	4.27%	0
NB Approach (To)	4.6		NBL	6.08	NBT	2.82	NBR	8.05
NB Approach (Away)	*1*		6.31%	0	2.71%	0	7.10%	0
SB Approach (To)	*1*		SBL	6.23	SBT	1.00	SBR	4.26
SB Approach (Away)	*1*		4.38%	0	0.00%	0	3.60%	0





Hosking Ave & SR 99 Northbound Off Ramp

2035 without Project - PM Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	749	0	0	961	130	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	814	0	0	1045	141	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			814		1859	814
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			814		1859	814
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	96
cM capacity (veh/h)			813		81	378

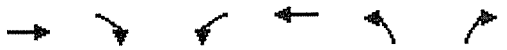
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	814	1045	157
Volume Left	0	0	141
Volume Right	0	0	15
cSH	1700	1700	87
Volume to Capacity	0.48	0.61	1.79
Queue Length 95th (ft)	0	0	328
Control Delay (s)	0.0	0.0	479.3
Lane LOS			F
Approach Delay (s)	0.0	0.0	479.3
Approach LOS			F

Intersection Summary			
Average Delay	37.2	HCM Level of Service	E
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	749	0	0	961	130	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	814	0	0	1045	141	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			814		1336	814
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			814		1336	814
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		2	95
cM capacity (veh/h)			809		145	321

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	814	522	522	141	15
Volume Left	0	0	0	141	0
Volume Right	0	0	0	0	15
cSH	1700	1700	1700	145	321
Volume to Capacity	0.48	0.31	0.31	0.98	0.05
Queue Length 95th (ft)	0	0	0	177	4
Control Delay (s)	0.0	0.0	0.0	129.4	16.8
Lane LOS				F	C
Approach Delay (s)	0.0	0.0		118.5	
Approach LOS				F	

Intersection Summary			
Average Delay	9.2	HCM Level of Service	A
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	755	0	0	963	173	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	821	0	0	1047	188	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			821		1344	821
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			821		1344	821
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	95
cM capacity (veh/h)			804		143	318

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	821	523	523	188	15
Volume Left	0	0	0	188	0
Volume Right	0	0	0	0	15
cSH	1700	1700	1700	143	318
Volume to Capacity	0.48	0.31	0.31	1.32	0.05
Queue Length 95th (ft)	0	0	0	292	4
Control Delay (s)	0.0	0.0	0.0	242.3	16.9
Lane LOS				F	C
Approach Delay (s)	0.0	0.0		225.4	
Approach LOS				F	

Intersection Summary			
Average Delay	22.1	HCM Level of Service	C
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1227	0	0	1655	269	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1334	0	0	1799	292	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1334		2233	1334
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1334		2233	1334
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	78
cM capacity (veh/h)			513		36	144

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	1334	899	899	292	32
Volume Left	0	0	0	292	0
Volume Right	0	0	0	0	32
cSH	1700	1700	1700	36	144
Volume to Capacity	0.78	0.53	0.53	8.09	0.22
Queue Length 95th (ft)	0	0	0	Err	20
Control Delay (s)	0.0	0.0	0.0	Err	36.8
Lane LOS				F	E
Approach Delay (s)	0.0	0.0		9029.5	
Approach LOS				F	

Intersection Summary			
Average Delay	846.2	HCM Level of Service	F
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1227	0	0	1655	269	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1334	0	0	1799	292	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	959			930		
pX, platoon unblocked					0.98	
vC, conflicting volume			1334		1933	445
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1334		1909	445
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	94
cM capacity (veh/h)			513		59	561

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3
Volume Total	445	445	445	600	600	600	146	146	32
Volume Left	0	0	0	0	0	0	146	146	0
Volume Right	0	0	0	0	0	0	0	0	32
cSH	1700	1700	1700	1700	1700	1700	59	59	561
Volume to Capacity	0.26	0.26	0.26	0.35	0.35	0.35	2.49	2.49	0.06
Queue Length 95th (ft)	0	0	0	0	0	0	367	367	4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	827.3	827.3	11.8
Lane LOS							F	F	B
Approach Delay (s)	0.0			0.0			748.0		
Approach LOS							F		

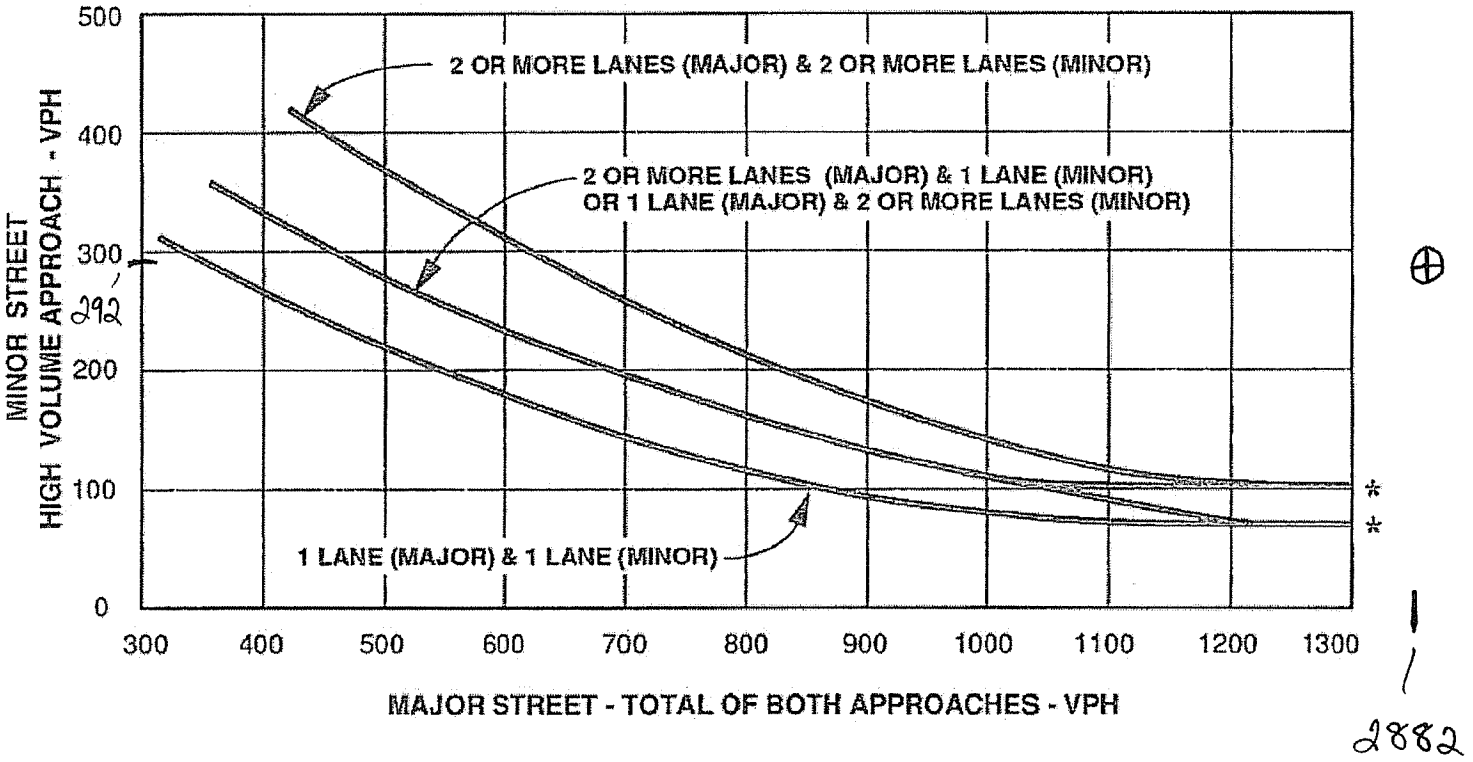
Intersection Summary			
Average Delay	70.1	HCM Level of Service	F
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

Hosking Ave + SR 99 Northbound Off Ramp

2035 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL...X...

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More....28,900....	2 or More....3000....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More....28,900....	2 or More....3000....
1.....	2 or More.....

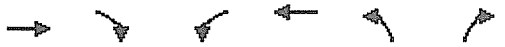
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ (A) _____ (B)

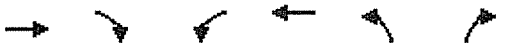
2 CONDITIONS 80%	2 CONDITIONS 80%



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			3539	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			3539	1770	1583
Volume (vph)	1227	0	0	1655	269	29
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1334	0	0	1799	292	32
RTOR Reduction (vph)	0	0	0	0	0	26
Lane Group Flow (vph)	1334	0	0	1799	292	6
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	63.0			63.0	15.8	15.8
Effective Green, g (s)	65.0			65.0	16.8	16.8
Actuated g/C Ratio	0.72			0.72	0.19	0.19
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1348			2562	331	296
v/s Ratio Prot	c0.72			0.51	c0.17	
v/s Ratio Perm						0.00
v/c Ratio	0.99			0.70	0.88	0.02
Uniform Delay, d1	12.1			7.0	35.5	29.8
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	21.8			0.9	23.0	0.0
Delay (s)	33.8			7.9	58.5	29.8
Level of Service	C			A	E	C
Approach Delay (s)	33.8			7.9	55.7	
Approach LOS	C			A	E	

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			0.95	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1863			3539	1770	1583
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1863			3539	1770	1583
Volume (vph)	1233	0	0	1657	312	29
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1340	0	0	1801	339	32
RTOR Reduction (vph)	0	0	0	0	0	26
Lane Group Flow (vph)	1340	0	0	1801	339	6
Turn Type						Perm
Protected Phases	4			8	2	
Permitted Phases						2
Actuated Green, G (s)	62.0			62.0	17.0	17.0
Effective Green, g (s)	64.0			64.0	18.0	18.0
Actuated g/C Ratio	0.71			0.71	0.20	0.20
Clearance Time (s)	6.0			6.0	5.0	5.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1325			2517	354	317
v/s Ratio Prot	c0.72			0.51	c0.19	
v/s Ratio Perm						0.00
v/c Ratio	1.01			0.72	0.96	0.02
Uniform Delay, d1	13.0			7.6	35.6	28.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	27.5			1.0	36.4	0.0
Delay (s)	40.5			8.6	72.0	28.9
Level of Service	D			A	E	C
Approach Delay (s)	40.5			8.6	68.3	
Approach LOS	D			A	E	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & South H St - AM Peak
Count Date: 5/14/2008

Exist Peak Hour Volumes

AWS		
>	WBL	23
1	WBT	180
1	WBR	199
>	EBL	88
1	EBT	258
1	EBR	59
1	NBL	58
1	NBT	107
<	NBR	7
1	SBL	181
1	SBT	99
<	SBR	62
	TOTAL	1321

Year 2035
Fut. Volumes w/o Proj

WBL	75
WBT	539
WBR	512
EBL	310
EBT	702
EBR	264
NBL	276
NBT	439
NBR	22
SBL	467
SBT	421
SBR	241
TOTAL	4268

Year 2035 Fut. Vol
+ Project Traffic

WBL	76
WBT	541
WBR	513
EBL	310
EBT	712
EBR	268
NBL	276
NBT	444
NBR	22
SBL	473
SBT	422
SBR	241
TOTAL	4298

Year 2020
Fut. Volumes w/o Proj

WBL	46
WBT	341
WBR	339
EBL	187
EBT	457
EBR	151
NBL	156
NBT	255
NBR	14
SBL	309
SBT	243
SBR	142
TOTAL	2639

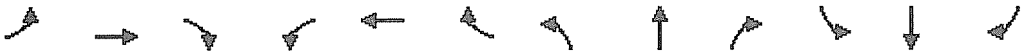
Year 2020 Fut. Vol
+ Project Traffic

WBL	47
WBT	343
WBR	340
EBL	187
EBT	467
EBR	155
NBL	156
NBT	260
NBR	14
SBL	315
SBT	244
SBR	142
TOTAL	2669

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	1	0	1
WBT	2	2	0
WBR	1	1	0
EBL	0	0	0
EBT	10	7	3
EBR	4	2	2
NBL	0	0	0
NBT	5	5	0
NBR	0	0	0
SBL	6	5	1
SBT	1	0	1
SBR	0	0	0
TOTAL	30	22	8

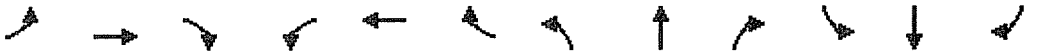
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & South H St - AM Peak						
	Count Date:	5/14/2008						
2008	ADT							
WB Approach (To)	4.26							
WB Approach (Away)	4.22							
EB Approach (To)	3.24							
EB Approach (Away)	3.81							
NB Approach (To)	1.85							
NB Approach (Away)	1.68							
SB Approach (To)	3.85							
SB Approach (Away)	3.51							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	8.8		WBL	3.62	WBT	3.20	WBR	2.63
WB Approach (Away)	8.0		4.47%	75	4.12%	539	3.54%	512
EB Approach (To)	12.6		EBL	3.54	EBT	2.89	EBR	4.53
EB Approach (Away)	16.5		4.75%	310	3.76%	702	5.68%	264
NB Approach (To)	9.7		NBL	4.78	NBT	4.22	NBR	3.57
NB Approach (Away)	8.7		5.92%	276	5.34%	439	4.34%	22
SB Approach (To)	13.4		SBL	2.69	SBT	4.33	SBR	3.91
SB Approach (Away)	11.3		3.55%	467	5.47%	421	5.13%	241
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	7.7		WBL	3.57	WBT	2.83	WBR	2.59
WB Approach (Away)	7.6		4.28%	72	3.65%	476	3.39%	492
EB Approach (To)	12.5		EBL	3.62	EBT	2.83	EBR	4.59
EB Approach (Away)	14.7		4.85%	318	3.65%	682	5.73%	268
NB Approach (To)	9.9		NBL	4.59	NBT	4.36	NBR	3.57
NB Approach (Away)	9.0		5.73%	263	5.48%	455	4.28%	22
SB Approach (To)	13.0		SBL	2.59	SBT	4.36	SBR	3.62
SB Approach (Away)	11.9		3.39%	448	5.48%	421	4.84%	224



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	88	258	59	23	180	199	58	107	7	181	99	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	280	64	25	196	216	63	116	8	197	108	67

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	376	64	221	216	63	124	197	175
Volume Left (vph)	96	0	25	0	63	0	197	0
Volume Right (vph)	0	64	0	216	0	8	0	67
Hadj (s)	0.16	-0.67	0.09	-0.67	0.53	-0.01	0.53	-0.24
Departure Headway (s)	7.2	6.4	7.2	6.5	8.3	7.7	7.9	7.1
Degree Utilization, x	0.75	0.11	0.44	0.39	0.15	0.27	0.43	0.35
Capacity (veh/h)	489	539	480	535	406	433	435	480
Control Delay (s)	27.8	9.0	14.6	12.3	11.5	12.3	15.6	12.7
Approach Delay (s)	25.0		13.5		12.0		14.2	
Approach LOS	D		B		B		B	

Intersection Summary			
Delay	17.0		
HCM Level of Service	C		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	187	247	151	46	341	339	156	255	14	309	243	142
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	203	268	164	50	371	368	170	277	15	336	264	154

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	472	164	421	368	170	292	336	418
Volume Left (vph)	203	0	50	0	170	0	336	0
Volume Right (vph)	0	164	0	368	0	15	0	154
Hadj (s)	0.25	-0.67	0.09	-0.67	0.53	0.00	0.53	-0.22
Departure Headway (s)	10.3	9.4	9.7	9.0	10.7	10.2	10.1	9.4
Degree Utilization, x	1.34	0.43	1.13	0.92	0.51	0.83	0.94	1.09
Capacity (veh/h)	358	364	366	395	323	347	347	392
Control Delay (s)	199.6	18.0	117.8	55.9	23.0	46.4	65.8	102.3
Approach Delay (s)	152.7		88.9		37.8		86.1	
Approach LOS	F		F		E		F	

Intersection Summary				
Delay	94.5			
HCM Level of Service	F			
Intersection Capacity Utilization	88.6%	ICU Level of Service	E	
Analysis Period (min)	15			

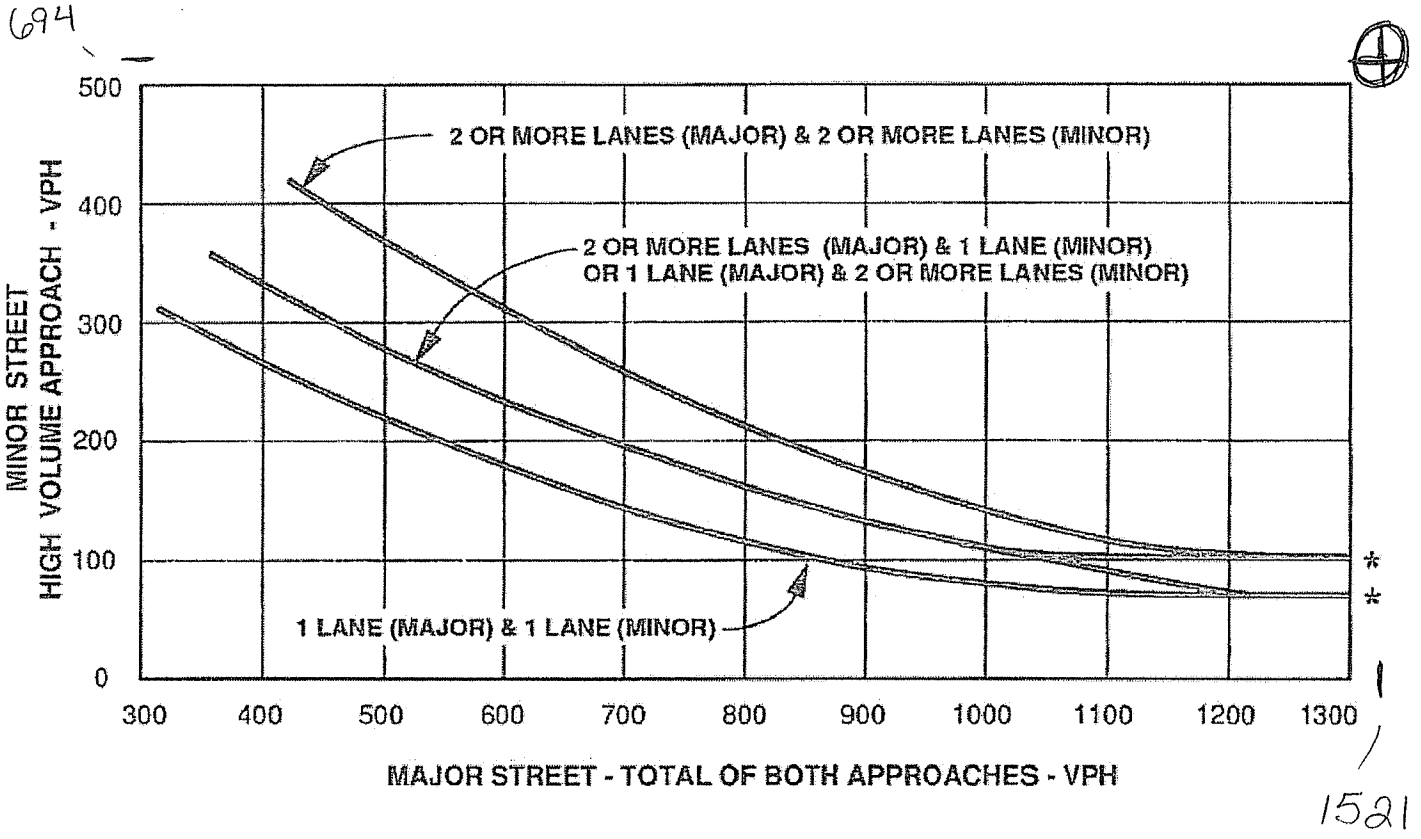
Hosking Ave & South H St

2020 without Project- AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

694



1521

*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.

SATISFIED YES ☒ NO ☐

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	187	247	151	46	341	339	156	255	14	309	243	142
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	268	164	50	371	368	170	277	15	336	264	154
RTOR Reduction (vph)	0	0	113	0	0	287	0	0	12	0	0	107
Lane Group Flow (vph)	203	268	51	50	371	81	170	277	3	336	264	47
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	10.1	21.6	21.6	3.4	14.9	14.9	10.0	15.3	15.3	16.2	21.5	21.5
Effective Green, g (s)	10.1	23.6	23.6	3.4	16.9	16.9	10.0	17.3	17.3	16.2	23.5	23.5
Actuated g/C Ratio	0.13	0.31	0.31	0.04	0.22	0.22	0.13	0.23	0.23	0.21	0.31	0.31
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	575	488	79	782	350	231	421	358	375	572	486
v/s Ratio Prot	c0.11	c0.14		0.03	0.10		0.10	c0.15		c0.19	0.14	
v/s Ratio Perm			0.03			0.05			0.00			0.03
v/c Ratio	0.87	0.47	0.10	0.63	0.47	0.23	0.74	0.66	0.01	0.90	0.46	0.10
Uniform Delay, d1	32.5	21.4	18.9	35.9	25.9	24.5	32.0	26.9	23.0	29.3	21.4	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.9	0.6	0.1	15.4	0.5	0.3	11.5	3.7	0.0	22.9	0.6	0.1
Delay (s)	59.5	22.0	19.0	51.3	26.4	24.8	43.5	30.6	23.0	52.2	22.0	19.0
Level of Service	E	C	B	D	C	C	D	C	C	D	C	B
Approach Delay (s)		33.2			27.2			35.1			34.8	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	187	467	155	47	343	340	156	260	14	315	244	142
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	508	168	51	373	370	170	283	15	342	265	154
RTOR Reduction (vph)	0	0	113	0	0	290	0	0	12	0	0	106
Lane Group Flow (vph)	203	508	55	51	373	80	170	283	3	342	265	48
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.9	24.3	24.3	3.0	15.4	15.4	10.1	15.9	15.9	17.5	23.3	23.3
Effective Green, g (s)	11.9	26.3	26.3	3.0	17.4	17.4	10.1	17.9	17.9	17.5	25.3	25.3
Actuated g/C Ratio	0.15	0.33	0.33	0.04	0.22	0.22	0.13	0.22	0.22	0.22	0.31	0.31
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	607	516	66	763	341	222	413	351	384	584	496
v/s Ratio Prot	c0.11	c0.27		0.03	0.11		0.10	c0.15		c0.19	0.14	
v/s Ratio Perm			0.03			0.05			0.00			0.03
v/c Ratio	0.78	0.84	0.11	0.77	0.49	0.23	0.77	0.69	0.01	0.89	0.45	0.10
Uniform Delay, d1	33.1	25.2	19.0	38.5	27.8	26.1	34.2	28.8	24.5	30.7	22.2	19.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.6	9.8	0.1	42.0	0.5	0.4	14.5	4.7	0.0	21.8	0.6	0.1
Delay (s)	46.7	35.0	19.1	80.5	28.2	26.5	48.7	33.5	24.5	52.5	22.7	19.7
Level of Service	D	C	B	F	C	C	D	C	C	D	C	B
Approach Delay (s)		34.6			30.8			38.7			35.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	310	702	264	75	539	512	276	439	22	467	421	241
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	330	747	281	80	573	545	297	472	24	502	453	259
RTOR Reduction (vph)	0	0	124	0	0	356	0	0	17	0	0	179
Lane Group Flow (vph)	330	747	157	80	573	189	297	472	7	502	453	80
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	23.0	41.0	41.0	4.0	22.0	22.0	21.0	28.0	28.0	29.0	36.0	36.0
Effective Green, g (s)	23.0	42.0	42.0	4.0	23.0	23.0	21.0	29.0	29.0	29.0	37.0	37.0
Actuated g/C Ratio	0.19	0.35	0.35	0.03	0.19	0.19	0.18	0.24	0.24	0.24	0.31	0.31
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	339	652	554	59	678	303	310	450	383	428	574	488
v/s Ratio Prot	0.19	c0.40		c0.05	0.16		0.17	c0.25		c0.28	0.24	
v/s Ratio Perm			0.10			0.12			0.00			0.05
v/c Ratio	0.97	1.15	0.28	1.36	0.85	0.62	0.96	1.05	0.02	1.17	0.79	0.16
Uniform Delay, d1	48.2	39.0	28.1	58.0	46.8	44.5	49.1	45.5	34.7	45.5	37.9	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	41.5	82.8	0.3	238.3	9.5	4.0	39.5	55.8	0.0	100.0	7.1	0.2
Delay (s)	89.7	121.8	28.4	296.3	56.3	48.5	88.5	101.3	34.7	145.5	45.1	30.4
Level of Service	F	F	C	F	E	D	F	F	C	F	D	C
Approach Delay (s)		94.6			68.8			94.5			83.5	
Approach LOS		F			E			F			F	

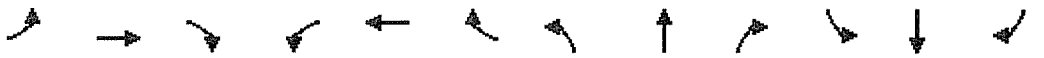
Intersection Summary			
HCM Average Control Delay	84.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	3433	3539	1583
Volume (vph)	310	702	264	75	539	512	276	439	22	467	421	241
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	330	747	281	80	573	545	297	472	24	502	453	259
RTOR Reduction (vph)	0	0	184	0	0	333	0	0	19	0	0	209
Lane Group Flow (vph)	330	747	97	80	573	212	297	472	5	502	453	50
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.7	28.1	28.1	6.6	17.0	17.0	16.0	16.3	16.3	15.0	15.3	15.3
Effective Green, g (s)	17.7	29.1	29.1	6.6	18.0	18.0	16.0	17.3	17.3	15.0	16.3	16.3
Actuated g/C Ratio	0.21	0.35	0.35	0.08	0.21	0.21	0.19	0.21	0.21	0.18	0.19	0.19
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	373	1226	548	139	758	339	337	729	326	613	687	307
v/s Ratio Prot	c0.19	0.21		0.05	c0.16		c0.17	c0.13		0.15	0.13	
v/s Ratio Perm			0.06			0.13			0.00			0.03
v/c Ratio	0.88	0.61	0.18	0.58	0.76	0.62	0.88	0.65	0.02	0.82	0.66	0.16
Uniform Delay, d1	32.2	22.7	19.1	37.3	30.9	29.9	33.1	30.6	26.6	33.2	31.3	28.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.2	0.9	0.2	5.7	4.3	3.6	22.5	2.0	0.0	8.4	2.3	0.3
Delay (s)	53.4	23.6	19.3	43.0	35.3	33.5	55.6	32.5	26.6	41.6	33.6	28.4
Level of Service	D	C	B	D	D	C	E	C	C	D	C	C
Approach Delay (s)		29.9			35.0			41.0			35.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	3433	3539	1583
Volume (vph)	310	712	268	76	541	513	276	444	22	473	422	241
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	330	757	285	81	576	546	297	477	24	509	454	259
RTOR Reduction (vph)	0	0	187	0	0	346	0	0	19	0	0	208
Lane Group Flow (vph)	330	757	98	81	576	200	297	477	5	509	454	51
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.8	28.2	28.2	6.6	17.0	17.0	16.1	16.7	16.7	15.1	15.7	15.7
Effective Green, g (s)	17.8	29.2	29.2	6.6	18.0	18.0	16.1	17.7	17.7	15.1	16.7	16.7
Actuated g/C Ratio	0.21	0.35	0.35	0.08	0.21	0.21	0.19	0.21	0.21	0.18	0.20	0.20
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	372	1221	546	138	753	337	337	740	331	613	699	312
v/s Ratio Prot	c0.19	0.21		0.05	c0.16		c0.17	0.13		c0.15	0.13	
v/s Ratio Perm			0.06			0.13			0.00			0.03
v/c Ratio	0.89	0.62	0.18	0.59	0.76	0.59	0.88	0.64	0.02	0.83	0.65	0.16
Uniform Delay, d1	32.4	23.1	19.3	37.7	31.3	30.0	33.3	30.6	26.5	33.5	31.3	28.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.6	0.9	0.2	6.2	4.6	2.8	22.5	1.9	0.0	9.3	2.1	0.2
Delay (s)	54.0	24.0	19.5	43.9	36.0	32.8	55.9	32.5	26.6	42.8	33.3	28.4
Level of Service	D	C	B	D	D	C	E	C	C	D	C	C
Approach Delay (s)		30.3			35.1			41.0			36.3	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	35.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	84.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & South H St - PM Peak
Count Date: 5/14/2008

Exist Peak Hour Volumes

AWS		
>	WBL	19
1	WBT	156
1	WBR	114
>	EBL	51
1	EBT	192
1	EBR	60
1	NBL	68
1	NBT	91
<	NBR	27
1	SBL	147
1	SBT	120
<	SBR	89
	TOTAL	1134

Year 2035
Fut. Volumes w/o Proj

WBL	54
WBT	454
WBR	293
EBL	169
EBT	509
EBR	220
NBL	265
NBT	314
NBR	74
SBL	378
SBT	428
SBR	324
TOTAL	3482

Year 2035 Fut. Vol
+ Project Traffic

WBL	54
WBT	455
WBR	295
EBL	169
EBT	510
EBR	225
NBL	266
NBT	318
NBR	74
SBL	378
SBT	434
SBR	324
TOTAL	3502

Year 2020
Fut. Volumes w/o Proj

WBL	35
WBT	289
WBR	194
EBL	104
EBT	334
EBR	132
NBL	156
NBT	191
NBR	48
SBL	250
SBT	258
SBR	194
TOTAL	2184

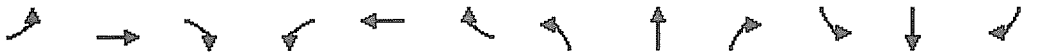
Year 2020 Fut. Vol
+ Project Traffic

WBL	35
WBT	290
WBR	196
EBL	104
EBT	335
EBR	137
NBL	157
NBT	195
NBR	48
SBL	250
SBT	264
SBR	194
TOTAL	2204

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	1	1	0
WBR	2	2	0
EBL	0	0	0
EBT	1	1	0
EBR	5	5	0
NBL	1	1	0
NBT	4	4	0
NBR	0	0	0
SBL	0	0	0
SBT	6	5	1
SBR	0	0	0
TOTAL	20	19	1

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & South H St - PM Peak						
	Count Date:	5/14/2008						
2008	ADT							
WB Approach (To)	4.12							
WB Approach (Away)	4.07							
EB Approach (To)	3.54							
EB Approach (Away)	4.16							
NB Approach (To)	2.52							
NB Approach (Away)	2.29							
SB Approach (To)	4.01							
SB Approach (Away)	3.64							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	8.8		WBL	2.96	WBT	3.05	WBR	2.61
WB Approach (Away)	8.0		3.93%	54	4.02%	454	3.54%	293
EB Approach (To)	12.6		EBL	3.32	EBT	2.76	EBR	3.67
EB Approach (Away)	16.5		4.51%	169	3.65%	509	4.91%	220
NB Approach (To)	9.7		NBL	3.90	NBT	3.47	NBR	2.91
NB Approach (Away)	8.7		5.14%	265	4.66%	314	3.81%	74
SB Approach (To)	13.4		SBL	2.66	SBT	3.57	SBR	3.66
SB Approach (Away)	11.3		3.54%	378	4.79%	428	4.88%	324
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	7.7		WBL	2.89	WBT	2.70	WBR	2.56
WB Approach (Away)	7.6		3.74%	51	3.54%	401	3.39%	282
EB Approach (To)	12.5		EBL	3.40	EBT	2.70	EBR	3.72
EB Approach (Away)	14.7		4.60%	173	3.54%	494	4.95%	223
NB Approach (To)	9.9		NBL	3.72	NBT	3.59	NBR	2.89
NB Approach (Away)	9.0		4.96%	253	4.80%	325	3.74%	73
SB Approach (To)	13.0		SBL	2.56	SBT	3.58	SBR	3.39
SB Approach (Away)	11.9		3.38%	363	4.80%	428	4.60%	301



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	51	192	60	19	156	114	68	91	27	147	120	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	209	65	21	170	124	74	99	29	160	130	97

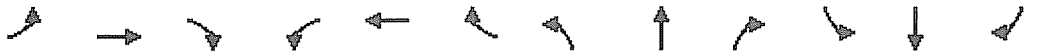
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	264	65	190	124	74	128	160	227
Volume Left (vph)	55	0	21	0	74	0	160	0
Volume Right (vph)	0	65	0	124	0	29	0	97
Hadj (s)	0.14	-0.67	0.09	-0.67	0.53	-0.13	0.53	-0.26
Departure Headway (s)	6.9	6.1	6.9	6.1	7.5	6.9	7.2	6.4
Degree Utilization, x	0.50	0.11	0.36	0.21	0.15	0.24	0.32	0.41
Capacity (veh/h)	501	558	497	553	447	488	473	532
Control Delay (s)	15.4	8.6	12.5	9.5	10.7	10.9	12.4	12.6
Approach Delay (s)	14.1		11.3		10.8		12.5	
Approach LOS	B		B		B		B	

Intersection Summary			
Delay	12.4		
HCM Level of Service	B		
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	104	334	132	35	289	194	156	191	48	250	258	194
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	363	143	38	314	211	170	208	52	272	280	211

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	476	143	352	211	170	260	272	491
Volume Left (vph)	113	0	38	0	170	0	272	0
Volume Right (vph)	0	143	0	211	0	52	0	211
Hadj (s)	0.15	-0.67	0.09	-0.67	0.53	-0.11	0.53	-0.27
Departure Headway (s)	9.3	8.5	9.4	8.6	10.0	9.4	9.5	8.7
Degree Utilization, x	1.23	0.34	0.92	0.51	0.47	0.68	0.72	1.19
Capacity (veh/h)	392	412	352	410	345	372	369	417
Control Delay (s)	152.0	14.7	57.3	19.0	20.5	29.1	32.0	134.7
Approach Delay (s)	120.2		42.9		25.7		98.1	
Approach LOS	F		E		D		F	

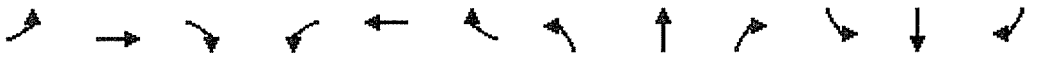
Intersection Summary				
Delay	77.7			
HCM Level of Service	F			
Intersection Capacity Utilization	87.9%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	104	334	132	35	289	194	156	191	48	250	258	194
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	363	143	38	314	211	170	208	52	272	280	211

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	113	363	143	38	314	211	170	208	52	272	280	211
Volume Left (vph)	113	0	0	38	0	0	170	0	0	272	0	0
Volume Right (vph)	0	0	143	0	0	211	0	0	52	0	0	211
Hadj (s)	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	8.8	8.3	3.2	9.0	8.5	3.2	9.1	8.6	3.2	8.8	8.3	3.2
Degree Utilization, x	0.28	0.84	0.13	0.10	0.74	0.19	0.43	0.49	0.05	0.66	0.64	0.19
Capacity (veh/h)	397	426	1121	383	409	1121	377	397	1121	399	421	1121
Control Delay (s)	13.9	40.2	5.5	11.8	31.2	5.7	17.4	18.4	5.2	26.0	23.8	5.7
Approach Delay (s)	27.4			20.3			16.4			19.6		
Approach LOS	D			C			C			C		

Intersection Summary			
Delay	21.2		
HCM Level of Service	C		
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	104	335	137	35	290	196	157	195	48	250	264	194
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	364	149	38	315	213	171	212	52	272	287	211

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	113	364	149	38	315	213	171	212	52	272	287	211
Volume Left (vph)	113	0	0	38	0	0	171	0	0	272	0	0
Volume Right (vph)	0	0	149	0	0	213	0	0	52	0	0	211
Hadj (s)	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	8.8	8.3	3.2	9.1	8.6	3.2	9.1	8.6	3.2	8.8	8.3	3.2
Degree Utilization, x	0.28	0.84	0.13	0.10	0.75	0.19	0.43	0.51	0.05	0.66	0.66	0.19
Capacity (veh/h)	396	424	1121	381	408	1121	376	396	1121	398	420	1121
Control Delay (s)	14.0	41.2	5.5	11.8	31.9	5.7	17.6	18.8	5.2	26.3	24.8	5.7
Approach Delay (s)	27.8			20.7			16.7			20.1		
Approach LOS	D			C			C			C		

Intersection Summary			
Delay	21.6		
HCM Level of Service	C		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	509	220	54	454	293	265	314	74	378	428	324
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	184	553	239	59	493	318	288	341	80	411	465	352

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	184	553	239	59	493	318	288	341	80	411	465	352
Volume Left (vph)	184	0	0	59	0	0	288	0	0	411	0	0
Volume Right (vph)	0	0	239	0	0	318	0	0	80	0	0	352
Hadj (s)	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	10.4	10.0	3.2	10.9	10.4	3.2	10.4	9.9	3.2	10.0	9.5	3.2
Degree Utilization, x	0.53	1.53	0.21	0.18	1.42	0.28	0.83	0.94	0.07	1.14	1.23	0.31
Capacity (veh/h)	334	373	1122	310	354	1112	342	358	1121	372	383	1113
Control Delay (s)	23.5	275.9	5.9	15.0	233.5	6.3	47.4	64.2	5.2	123.1	153.8	6.5
Approach Delay (s)	162.2			135.6			50.7			101.3		
Approach LOS	F			F			F			F		

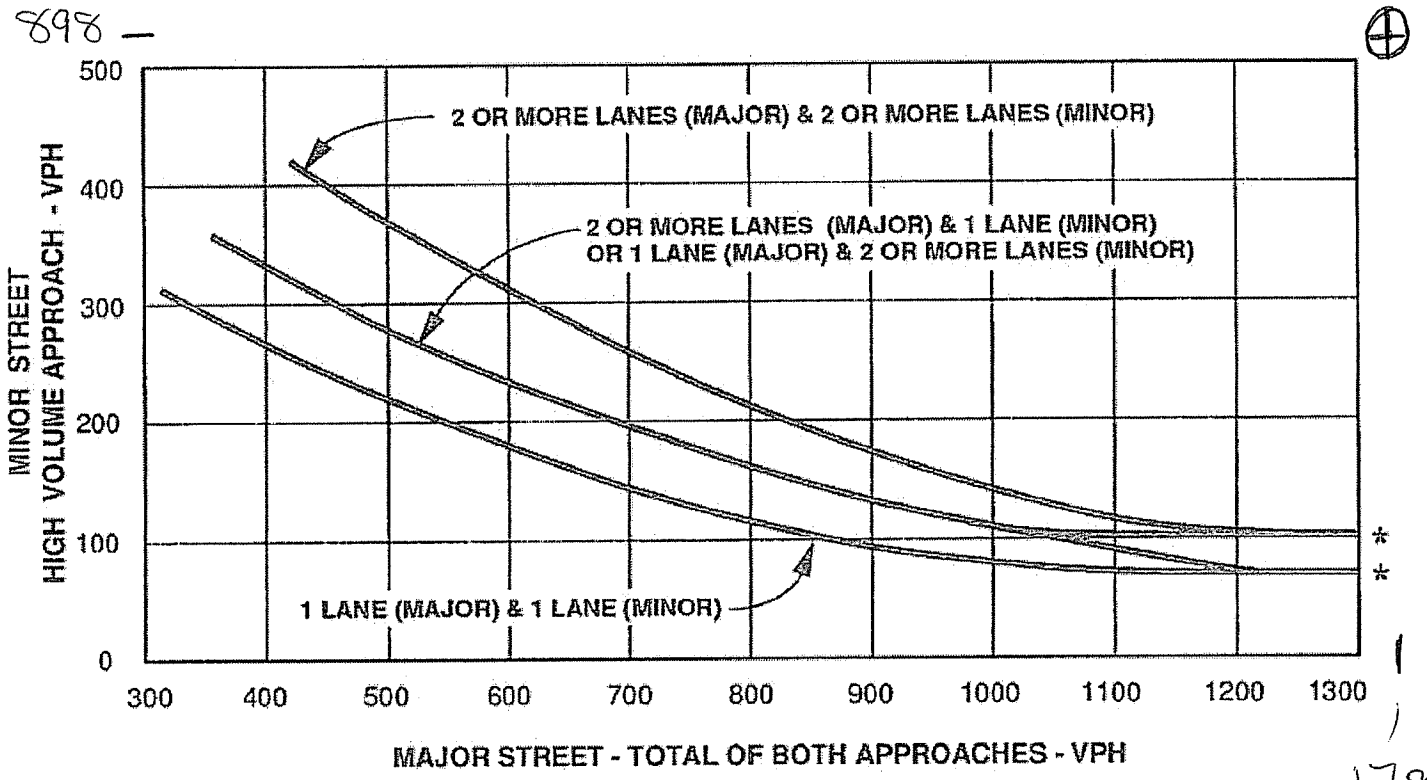
Intersection Summary			
Delay	115.4		
HCM Level of Service	F		
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

Hosking Ave & South H St

2035 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More....23100....	2 or More...12600.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More....23100.....	2 or More.....12600.....
1.....	2 or More.....

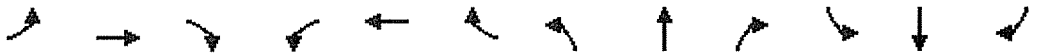
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

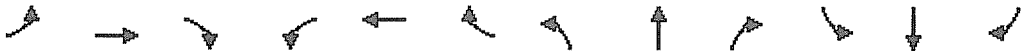
No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	169	509	220	54	454	293	265	314	74	378	428	324
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	553	239	59	493	318	288	341	80	411	465	352
RTOR Reduction (vph)	0	0	166	0	0	243	0	0	64	0	0	206
Lane Group Flow (vph)	184	553	73	59	493	75	288	341	16	411	465	146
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	21.7	21.7	3.4	16.1	16.1	15.3	13.0	13.0	19.1	16.8	16.8
Effective Green, g (s)	9.0	23.7	23.7	3.4	18.1	18.1	15.3	15.0	15.0	19.1	18.8	18.8
Actuated g/C Ratio	0.12	0.31	0.31	0.04	0.23	0.23	0.20	0.19	0.19	0.25	0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	206	1086	486	78	830	371	351	688	308	438	862	385
v/s Ratio Prot	c0.10	0.16		0.03	c0.14		0.16	0.10		c0.23	c0.13	
v/s Ratio Perm			0.05			0.05			0.01			0.09
v/c Ratio	0.89	0.51	0.15	0.76	0.59	0.20	0.82	0.50	0.05	0.94	0.54	0.38
Uniform Delay, d1	33.6	22.0	19.4	36.5	26.3	23.7	29.6	27.7	25.3	28.5	25.4	24.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.9	0.4	0.1	33.5	1.1	0.3	14.2	0.6	0.1	27.8	0.7	0.6
Delay (s)	68.5	22.4	19.6	70.0	27.4	24.0	43.8	28.3	25.4	56.2	26.1	25.0
Level of Service	E	C	B	E	C	C	D	C	C	E	C	C
Approach Delay (s)		30.4			29.1			34.3			35.9	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	32.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	169	510	225	54	455	295	266	318	74	378	434	324
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	554	245	59	495	321	289	346	80	411	472	352
RTOR Reduction (vph)	0	0	170	0	0	246	0	0	64	0	0	205
Lane Group Flow (vph)	184	554	75	59	495	75	289	346	16	411	472	147
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.0	21.7	21.7	3.4	16.1	16.1	15.3	13.1	13.1	19.1	16.9	16.9
Effective Green, g (s)	9.0	23.7	23.7	3.4	18.1	18.1	15.3	15.1	15.1	19.1	18.9	18.9
Actuated g/C Ratio	0.12	0.31	0.31	0.04	0.23	0.23	0.20	0.20	0.20	0.25	0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	206	1085	485	78	829	371	350	691	309	437	865	387
v/s Ratio Prot	c0.10	0.16		0.03	c0.14		0.16	0.10		c0.23	c0.13	
v/s Ratio Perm			0.05			0.05			0.01			0.09
v/c Ratio	0.89	0.51	0.15	0.76	0.60	0.20	0.83	0.50	0.05	0.94	0.55	0.38
Uniform Delay, d1	33.7	22.0	19.5	36.5	26.4	23.8	29.7	27.7	25.3	28.5	25.5	24.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.9	0.4	0.1	33.5	1.2	0.3	14.6	0.6	0.1	28.5	0.7	0.6
Delay (s)	68.6	22.4	19.7	70.0	27.5	24.1	44.3	28.3	25.3	57.1	26.2	25.0
Level of Service	E	C	B	E	C	C	D	C	C	E	C	C
Approach Delay (s)		30.4			29.1			34.5			36.1	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	77.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & South Union Ave - AM Peak
Count Date: 5/21/2008

Exist Peak Hour Volumes

AWS		
>	WBL	26
1	WBT	58
1	WBR	16
>	EBL	197
1	EBT	44
<	EBR	64
1	NBL	41
2	NBT	240
<	NBR	21
1	SBL	20
2	SBT	232
<	SBR	220
	TOTAL	1179

Year 2035
Fut. Volumes w/o Proj

WBL	77
WBT	107
WBR	40
EBL	308
EBT	77
EBR	120
NBL	81
NBT	633
NBR	62
SBL	51
SBT	635
SBR	374
TOTAL	2565

Year 2035 Fut. Vol
+ Project Traffic

WBL	86
WBT	107
WBR	40
EBL	308
EBT	77
EBR	163
NBL	90
NBT	643
NBR	65
SBL	51
SBT	723
SBR	374
TOTAL	2727

Year 2020
Fut. Volumes w/o Proj

WBL	49
WBT	80
WBR	27
EBL	247
EBT	59
EBR	89
NBL	59
NBT	416
NBR	39
SBL	34
SBT	412
SBR	289
TOTAL	1798

Year 2020 Fut. Vol
+ Project Traffic

WBL	58
WBT	80
WBR	27
EBL	247
EBT	59
EBR	132
NBL	68
NBT	426
NBR	42
SBL	34
SBT	500
SBR	289
TOTAL	1960

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	9	7	2
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	43	35	8
NBL	9	7	2
NBT	10	9	1
NBR	3	2	1
SBL	0	0	0
SBT	88	81	7
SBR	0	0	0
TOTAL	162	141	21

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Hosking Ave & South Union Ave - AM Peak					
	Count Date:	5/21/2008					
2008	ADT						
WB Approach (To)	0.95						
WB Approach (Away)	0.9						
EB Approach (To)	2.98						
EB Approach (Away)	3.26						
NB Approach (To)	3.05						
NB Approach (Away)	3.19						
SB Approach (To)	4.75						
SB Approach (Away)	4.5						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	2.6		WBL	2.98	WBT	2.00	WBR 2.50
WB Approach (Away)	2.5		4.09%	77	2.29%	107	3.41% 40
EB Approach (To)	3.3		EBL	1.66	EBT	1.93	EBR 2.13
EB Approach (Away)	4.0		1.66%	308	2.08%	77	2.34% 120
NB Approach (To)	9.5		NBL	2.17	NBT	2.67	NBR 2.95
NB Approach (Away)	10.1		2.52%	81	3.64%	633	4.06% 62
SB Approach (To)	11.2		SBL	2.56	SBT	2.77	SBR 1.79
SB Approach (Away)	10.0		3.52%	51	3.78%	635	1.98% 374
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	2.5		WBL	3.32	WBT	1.87	WBR 2.77
WB Approach (Away)	2.4		4.44%	84	2.01%	99	3.82% 44
EB Approach (To)	3.3		EBL	1.99	EBT	1.88	EBR 2.55
EB Approach (Away)	3.6		2.17%	353	2.01%	75	2.80% 135
NB Approach (To)	12.2		NBL	2.55	NBT	3.44	NBR 3.32
NB Approach (Away)	12.7		2.80%	87	4.61%	815	4.44% 68
SB Approach (To)	13.7		SBL	2.77	SBT	3.44	SBR 2.00
SB Approach (Away)	13.0		3.83%	55	4.61%	788	2.18% 395

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.
Channelized right turn lanes are not counted.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	197	44	64	26	58	16	41	240	21	20	232	220
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	214	48	70	28	63	17	45	261	23	22	252	239

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	332	91	17	45	284	22	491
Volume Left (vph)	214	28	0	45	0	22	0
Volume Right (vph)	70	0	17	0	23	0	239
Hadj (s)	0.04	0.19	-0.67	0.53	-0.02	0.53	-0.31
Departure Headway (s)	7.3	8.3	7.4	7.7	7.2	7.4	6.5
Degree Utilization, x	0.67	0.21	0.04	0.10	0.57	0.04	0.89
Capacity (veh/h)	467	400	440	444	470	469	541
Control Delay (s)	24.0	12.3	9.5	10.4	17.9	9.5	41.0
Approach Delay (s)	24.0	11.8		16.9		39.6	
Approach LOS	C	B		C		E	

Intersection Summary				
Delay	27.4			
HCM Level of Service	D			
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	247	59	89	49	80	27	59	416	39	34	412	289
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	268	64	97	53	87	29	64	452	42	37	448	314

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	429	140	29	64	495	37	762
Volume Left (vph)	268	53	0	64	0	37	0
Volume Right (vph)	97	0	29	0	42	0	314
Hadj (s)	0.02	0.22	-0.67	0.53	-0.03	0.53	-0.25
Departure Headway (s)	8.5	9.8	8.9	8.9	8.4	8.9	8.2
Degree Utilization, x	1.01	0.38	0.07	0.16	1.15	0.09	1.73
Capacity (veh/h)	429	364	398	398	434	397	447
Control Delay (s)	77.1	17.5	11.4	12.4	117.9	11.6	354.8
Approach Delay (s)	77.1	16.4		105.8		338.9	
Approach LOS	F	C		F		F	

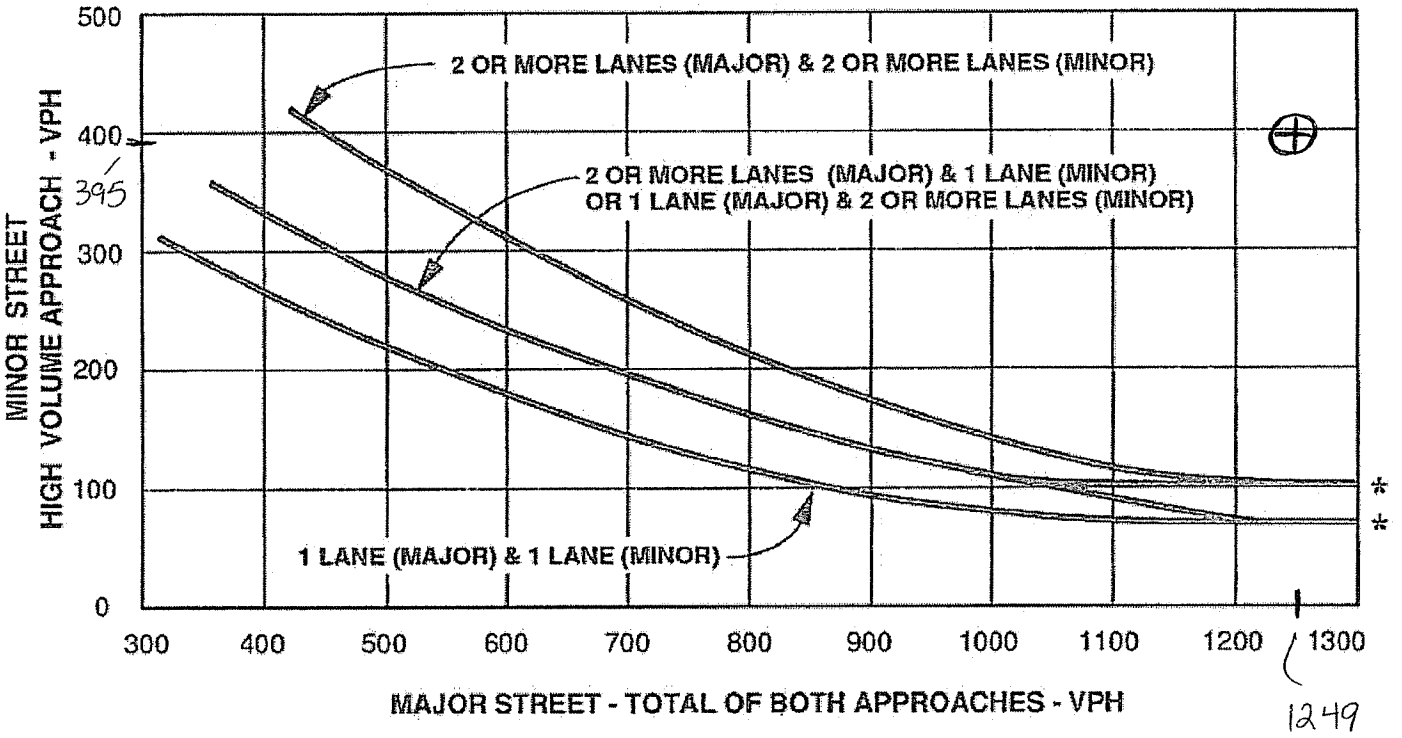
Intersection Summary			
Delay	186.9		
HCM Level of Service	F		
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

Hosking Ave & South Union Ave

2020 without Project - AM Peak

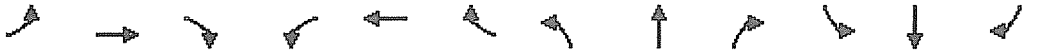
Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



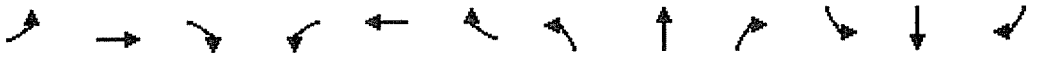
*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

SATISFIED YES ☒ NO ☐



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1751			1828	1583	1770	3494		1770	3320	
Flt Permitted		0.73			0.82	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1316			1523	1583	1770	3494		1770	3320	
Volume (vph)	247	59	89	49	80	27	59	416	39	34	412	289
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	64	97	53	87	29	64	452	42	37	448	314
RTOR Reduction (vph)	0	20	0	0	0	18	0	12	0	0	216	0
Lane Group Flow (vph)	0	409	0	0	140	11	64	482	0	37	546	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		17.3			17.3	17.3	2.0	15.0		1.3	14.3	
Effective Green, g (s)		17.3			17.3	17.3	2.0	15.0		1.3	14.3	
Actuated g/C Ratio		0.38			0.38	0.38	0.04	0.33		0.03	0.31	
Clearance Time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		499			578	601	78	1149		50	1041	
v/s Ratio Prot							c0.04	0.14		0.02	c0.16	
v/s Ratio Perm		c0.31			0.09	0.01						
v/c Ratio		0.82			0.24	0.02	0.82	0.42		0.74	0.52	
Uniform Delay, d1		12.7			9.7	8.8	21.6	11.9		22.0	12.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.2			0.2	0.0	47.4	0.2		44.3	0.5	
Delay (s)		22.9			9.9	8.9	69.0	12.2		66.3	13.3	
Level of Service		C			A	A	E	B		E	B	
Approach Delay (s)		22.9			9.7			18.7			15.8	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



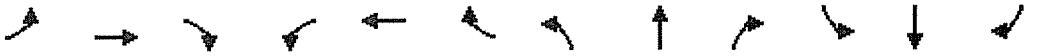
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1738			1824	1583	1770	3491		1770	3345	
Flt Permitted		0.74			0.77	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1328			1438	1583	1770	3491		1770	3345	
Volume (vph)	247	59	132	58	80	27	68	426	42	34	500	289
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	64	143	63	87	29	74	463	46	37	543	314
RTOR Reduction (vph)	0	28	0	0	0	18	0	13	0	0	148	0
Lane Group Flow (vph)	0	447	0	0	150	11	74	496	0	37	709	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		18.2			18.2	18.2	2.1	15.6		1.4	14.9	
Effective Green, g (s)		19.2			19.2	19.2	2.1	17.6		1.4	16.9	
Actuated g/C Ratio		0.38			0.38	0.38	0.04	0.35		0.03	0.34	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		508			550	605	74	1224		49	1126	
v/s Ratio Prot							c0.04	0.14		0.02	c0.21	
v/s Ratio Perm		c0.34			0.10	0.01						
v/c Ratio		0.88			0.27	0.02	1.00	0.41		0.76	0.63	
Uniform Delay, d1		14.4			10.7	9.6	24.0	12.3		24.2	14.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		15.8			0.3	0.0	104.6	0.2		48.1	1.1	
Delay (s)		30.2			11.0	9.7	128.7	12.6		72.3	15.1	
Level of Service		C			B	A	F	B		E	B	
Approach Delay (s)		30.2			10.7			27.3			17.5	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1824	1583	1770	3492		1770	3342	
Flt Permitted		0.69			0.73	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1243			1367	1583	1770	3492		1770	3342	
Volume (vph)	308	77	120	77	107	40	81	633	62	51	635	374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	84	130	84	116	43	88	688	67	55	690	407
RTOR Reduction (vph)	0	17	0	0	0	24	0	11	0	0	130	0
Lane Group Flow (vph)	0	532	0	0	200	19	88	744	0	55	967	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		27.2			27.2	27.2	3.1	19.6		2.3	18.8	
Effective Green, g (s)		28.2			28.2	28.2	3.1	21.6		2.3	20.8	
Actuated g/C Ratio		0.44			0.44	0.44	0.05	0.34		0.04	0.32	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		547			601	696	86	1177		64	1084	
v/s Ratio Prot							c0.05	0.21		0.03	c0.29	
v/s Ratio Perm		c0.43			0.15	0.01						
v/c Ratio		0.97			0.33	0.03	1.02	0.63		0.86	0.89	
Uniform Delay, d1		17.6			11.8	10.2	30.5	17.9		30.7	20.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		31.2			0.3	0.0	103.5	1.1		64.6	9.5	
Delay (s)		48.8			12.1	10.2	134.0	19.0		95.4	30.1	
Level of Service		D			B	B	F	B		F	C	
Approach Delay (s)		48.8			11.8			31.0			33.2	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	64.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected		0.97			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1739			1822	1583	1770	3490		1770	3358	
Flt Permitted		0.68			0.70	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1220			1296	1583	1770	3490		1770	3358	
Volume (vph)	308	77	163	86	107	40	90	643	65	51	723	374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	84	177	93	116	43	98	699	71	55	786	407
RTOR Reduction (vph)	0	20	0	0	0	24	0	10	0	0	88	0
Lane Group Flow (vph)	0	576	0	0	209	19	98	760	0	55	1105	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		33.0			33.0	33.0	4.0	24.6		3.2	23.8	
Effective Green, g (s)		34.0			34.0	34.0	4.0	26.6		3.2	25.8	
Actuated g/C Ratio		0.45			0.45	0.45	0.05	0.35		0.04	0.34	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		547			581	710	93	1225		75	1143	
v/s Ratio Prot							c0.06	0.22		0.03	c0.33	
v/s Ratio Perm		c0.47			0.16	0.01						
v/c Ratio		1.05			0.36	0.03	1.05	0.62		0.73	0.97	
Uniform Delay, d1		20.9			13.7	11.7	35.9	20.4		35.9	24.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		53.0			0.4	0.0	108.7	1.0		30.6	19.0	
Delay (s)		73.9			14.1	11.7	144.6	21.4		66.5	43.5	
Level of Service		E			B	B	F	C		E	D	
Approach Delay (s)		73.9			13.7			35.3			44.6	
Approach LOS		E			B			D			D	

Intersection Summary			
HCM Average Control Delay	45.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	75.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1673		1770	1863	1583	1770	3490		1770	3358	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1673		1770	1863	1583	1770	3490		1770	3358	
Volume (vph)	308	77	163	86	107	40	90	643	65	51	723	374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	84	177	93	116	43	98	699	71	55	786	407
RTOR Reduction (vph)	0	89	0	0	0	38	0	8	0	0	69	0
Lane Group Flow (vph)	335	172	0	93	116	5	98	762	0	55	1124	0
Turn Type	Prot			Prot		Perm	Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	17.5	19.0		6.9	8.4	8.4	5.3	31.9		3.8	30.4	
Effective Green, g (s)	17.5	20.0		6.9	9.4	9.4	5.3	33.9		3.8	32.4	
Actuated g/C Ratio	0.22	0.25		0.09	0.12	0.12	0.07	0.42		0.05	0.40	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	415		152	217	185	116	1468		83	1350	
v/s Ratio Prot	c0.19	0.10		0.05	c0.06		c0.06	0.22		0.03	c0.33	
v/s Ratio Perm						0.00						
v/c Ratio	0.87	0.41		0.61	0.53	0.03	0.84	0.52		0.66	0.83	
Uniform Delay, d1	30.5	25.4		35.6	33.5	31.5	37.2	17.3		37.8	21.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	19.1	0.7		7.1	2.5	0.1	40.0	0.3		18.1	4.5	
Delay (s)	49.5	26.1		42.7	36.1	31.6	77.2	17.6		55.9	26.2	
Level of Service	D	C		D	D	C	E	B		E	C	
Approach Delay (s)		39.2			37.7			24.4			27.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & South Union Ave - PM Peak
Count Date: 5/21/2008

Exist Peak Hour Volumes

AWS		
>	WBL	18
1	WBT	28
1	WBR	14
>	EBL	54
1	EBT	25
<	EBR	35
1	NBL	48
2	NBT	239
<	NBR	14
1	SBL	19
2	SBT	275
<	SBR	104
	TOTAL	873

Year 2035
Fut. Volumes w/o Proj

WBL	53
WBT	75
WBR	40
EBL	113
EBT	64
EBR	76
NBL	109
NBT	576
NBR	41
SBL	56
SBT	686
SBR	236
TOTAL	2124

Year 2035 Fut. Vol
+ Project Traffic

WBL	63
WBT	75
WBR	40
EBL	113
EBT	64
EBR	94
NBL	122
NBT	641
NBR	48
SBL	56
SBT	734
SBR	236
TOTAL	2285

Year 2020
Fut. Volumes w/o Proj

WBL	34
WBT	49
WBR	26
EBL	80
EBT	42
EBR	53
NBL	75
NBT	389
NBR	26
SBL	35
SBT	459
SBR	163
TOTAL	1432

Year 2020 Fut. Vol
+ Project Traffic

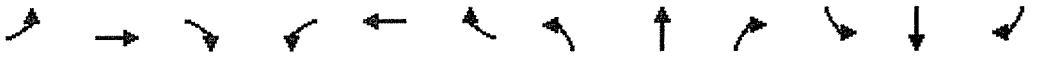
WBL	44
WBT	49
WBR	26
EBL	80
EBT	42
EBR	71
NBL	88
NBT	454
NBR	33
SBL	35
SBT	507
SBR	163
TOTAL	1593

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	10	8	2
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	18	10	8
NBL	13	10	3
NBT	65	61	4
NBR	7	5	2
SBL	0	0	0
SBT	48	41	7
SBR	0	0	0
TOTAL	161	135	26

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & South Union Ave - PM Peak						
	Count Date:	5/21/2008						
2008	ADT							
WB Approach (To)	0.76							
WB Approach (Away)	0.72							
EB Approach (To)	1.75							
EB Approach (Away)	1.92							
NB Approach (To)	3.84							
NB Approach (Away)	4.02							
SB Approach (To)	4.53							
SB Approach (Away)	4.28							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	2.6		WBL	2.99	WBT	2.77	WBR	2.90
WB Approach (Away)	2.5		4.08%	53	3.71%	75	3.94%	40
EB Approach (To)	3.3		EBL	2.10	EBT	2.66	EBR	2.19
EB Approach (Away)	4.0		2.75%	113	3.50%	64	2.89%	76
NB Approach (To)	9.5		NBL	2.28	NBT	2.41	NBR	2.97
NB Approach (Away)	10.1		3.07%	109	3.29%	576	4.04%	41
SB Approach (To)	11.2		SBL	2.96	SBT	2.49	SBR	2.27
SB Approach (Away)	10.0		4.03%	56	3.43%	686	3.06%	236
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	2.5		WBL	3.23	WBT	2.59	WBR	3.17
WB Approach (Away)	2.4		4.42%	58	3.42%	70	4.34%	44
EB Approach (To)	3.3		EBL	2.46	EBT	2.59	EBR	2.52
EB Approach (Away)	3.6		3.26%	129	3.43%	62	3.34%	85
NB Approach (To)	12.2		NBL	2.52	NBT	3.10	NBR	3.24
NB Approach (Away)	12.7		3.34%	117	4.26%	741	4.43%	45
SB Approach (To)	13.7		SBL	3.17	SBT	3.10	SBR	2.45
SB Approach (Away)	13.0		4.34%	60	4.26%	852	3.26%	248

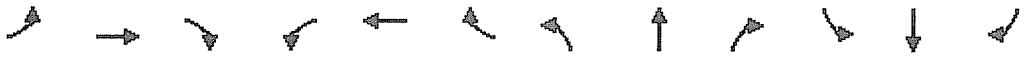
Intersection has too many lanes per leg.
HCM All-Way analysis is limited to two lanes per leg.
Channelized right turn lanes are not counted.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	54	25	35	18	28	14	48	239	14	19	275	104
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	27	38	20	30	15	52	260	15	21	299	113

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	124	50	15	52	275	21	412
Volume Left (vph)	59	20	0	52	0	21	0
Volume Right (vph)	38	0	15	0	15	0	113
Hadj (s)	-0.06	0.23	-0.67	0.53	0.00	0.53	-0.16
Departure Headway (s)	6.4	6.9	6.0	6.1	5.6	6.1	5.4
Degree Utilization, x	0.22	0.10	0.03	0.09	0.43	0.03	0.61
Capacity (veh/h)	509	462	523	562	621	571	657
Control Delay (s)	11.2	9.4	7.9	8.5	11.5	8.1	15.3
Approach Delay (s)	11.2	9.1		11.1		14.9	
Approach LOS	B	A		B		B	

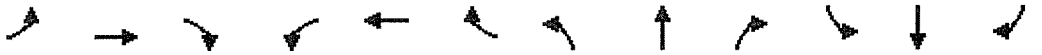
Intersection Summary				
Delay	12.7			
HCM Level of Service	B			
Intersection Capacity Utilization	47.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	80	42	53	34	49	26	75	389	26	35	459	163
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	46	58	37	53	28	82	423	28	38	499	177

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	190	90	28	82	451	38	676
Volume Left (vph)	87	37	0	82	0	38	0
Volume Right (vph)	58	0	28	0	28	0	177
Hadj (s)	-0.06	0.24	-0.67	0.53	-0.01	0.53	-0.15
Departure Headway (s)	7.7	8.4	7.5	7.2	6.6	7.2	6.5
Degree Utilization, x	0.41	0.21	0.06	0.16	0.83	0.08	1.22
Capacity (veh/h)	438	402	447	491	533	487	560
Control Delay (s)	15.9	12.4	9.7	10.4	33.4	9.6	134.1
Approach Delay (s)	15.9	11.8		29.9		127.5	
Approach LOS	C	B		D		F	

Intersection Summary				
Delay	71.6			
HCM Level of Service	F			
Intersection Capacity Utilization	64.8%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	80	42	53	34	49	26	75	389	26	35	459	163
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	46	58	37	53	28	82	423	28	38	499	177
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1093	1278	338	1006	1352	226	676			451		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1093	1278	338	1006	1352	226	676			451		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	14	69	91	70	59	96	91			97		
cM capacity (veh/h)	101	145	658	123	131	778	911			1106		

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	190	90	28	82	282	169	38	333	343
Volume Left	87	37	0	82	0	0	38	0	0
Volume Right	58	0	28	0	0	28	0	0	177
cSH	151	128	778	911	1700	1700	1106	1700	1700
Volume to Capacity	1.26	0.71	0.04	0.09	0.17	0.10	0.03	0.20	0.20
Queue Length 95th (ft)	281	98	3	7	0	0	3	0	0
Control Delay (s)	217.2	82.8	9.8	9.3	0.0	0.0	8.4	0.0	0.0
Lane LOS	F	F	A	A			A		
Approach Delay (s)	217.2	65.4		1.4			0.4		
Approach LOS	F	F							

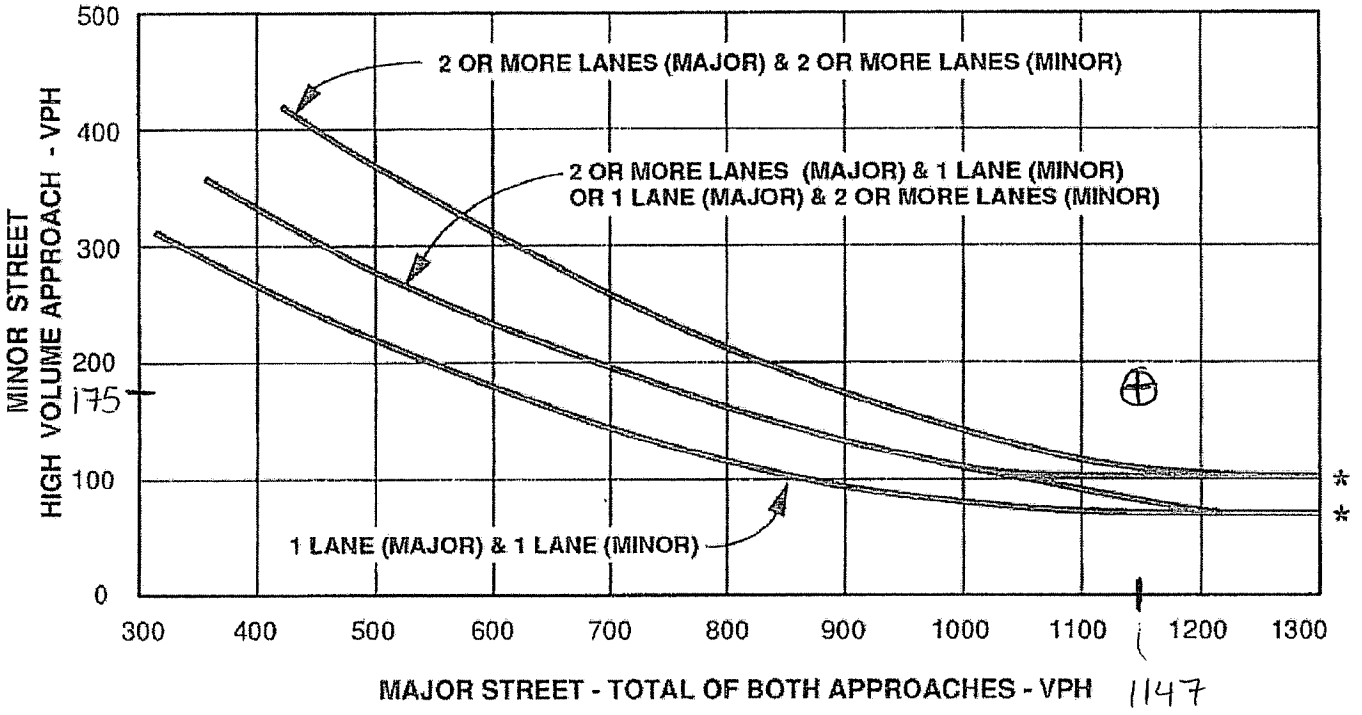
Intersection Summary				
Average Delay	32.2	HCM Level of Service	D
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Hosking Ave + South Union Ave

2020 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More..11470..	2 or More..1750..
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied __X__ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More..11470..	2 or More..1750..
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

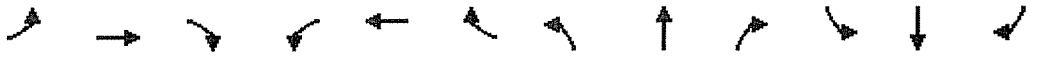
No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1747			1825	1583	1770	3506		1770	3400	
Flt Permitted		0.81			0.84	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1448			1558	1583	1770	3506		1770	3400	
Volume (vph)	80	42	53	34	49	26	75	389	26	35	459	163
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	46	58	37	53	28	82	423	28	38	499	177
RTOR Reduction (vph)	0	20	0	0	0	22	0	4	0	0	31	0
Lane Group Flow (vph)	0	171	0	0	90	6	82	447	0	38	645	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		10.9			10.9	10.9	5.4	27.7		2.9	27.2	
Effective Green, g (s)		11.9			11.9	11.9	5.4	29.7		4.9	29.2	
Actuated g/C Ratio		0.20			0.20	0.20	0.09	0.51		0.08	0.50	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		295			317	322	163	1780		148	1697	
v/s Ratio Prot							c0.05	0.13		0.02	c0.19	
v/s Ratio Perm		c0.12			0.06	0.00						
v/c Ratio		0.58			0.28	0.02	0.50	0.25		0.26	0.38	
Uniform Delay, d1		21.0			19.7	18.6	25.3	8.1		25.1	9.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.8			0.5	0.0	2.4	0.1		0.9	0.1	
Delay (s)		23.8			20.2	18.6	27.7	8.2		26.0	9.2	
Level of Service		C			C	B	C	A		C	A	
Approach Delay (s)		23.8			19.8			11.2			10.1	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1735			1820	1583	1770	3503		1770	3410	
Flt Permitted		0.82			0.77	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1451			1438	1583	1770	3503		1770	3410	
Volume (vph)	80	42	71	44	49	26	88	454	33	35	507	163
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	46	77	48	53	28	96	493	36	38	551	177
RTOR Reduction (vph)	0	27	0	0	0	22	0	5	0	0	27	0
Lane Group Flow (vph)	0	183	0	0	101	6	96	524	0	38	701	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		11.2			11.2	11.2	5.6	28.7		2.8	27.9	
Effective Green, g (s)		12.2			12.2	12.2	5.6	30.7		4.8	29.9	
Actuated g/C Ratio		0.20			0.20	0.20	0.09	0.51		0.08	0.50	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		297			294	323	166	1801		142	1708	
v/s Ratio Prot							c0.05	0.15		0.02	c0.21	
v/s Ratio Perm		c0.13			0.07	0.00						
v/c Ratio		0.62			0.34	0.02	0.58	0.29		0.27	0.41	
Uniform Delay, d1		21.6			20.3	19.0	25.9	8.3		25.8	9.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.8			0.7	0.0	4.8	0.1		1.0	0.2	
Delay (s)		25.4			21.0	19.0	30.7	8.4		26.8	9.5	
Level of Service		C			C	B	C	A		C	A	
Approach Delay (s)		25.4			20.6			11.8			10.4	
Approach LOS		C			C			B			B	

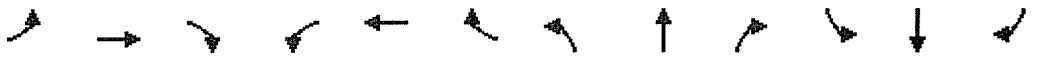
Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1825	1583	1770	3504		1770	3403	
Flt Permitted		0.77			0.78	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1384			1446	1583	1770	3504		1770	3403	
Volume (vph)	113	64	76	53	75	40	109	576	41	56	686	236
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	70	83	58	82	43	118	626	45	61	746	257
RTOR Reduction (vph)	0	19	0	0	0	32	0	5	0	0	32	0
Lane Group Flow (vph)	0	257	0	0	140	11	118	666	0	61	971	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		16.6			16.6	16.6	8.2	30.8		4.8	29.4	
Effective Green, g (s)		17.6			17.6	17.6	8.2	32.8		6.8	31.4	
Actuated g/C Ratio		0.25			0.25	0.25	0.12	0.47		0.10	0.45	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		352			368	403	210	1661		174	1544	
v/s Ratio Prot							c0.07	0.19		0.03	c0.29	
v/s Ratio Perm		c0.19			0.10	0.01						
v/c Ratio		0.73			0.38	0.03	0.56	0.40		0.35	0.63	
Uniform Delay, d1		23.6			21.3	19.4	28.8	11.8		29.1	14.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.6			0.7	0.0	3.4	0.2		1.2	0.8	
Delay (s)		31.2			22.0	19.4	32.2	12.0		30.4	15.3	
Level of Service		C			C	B	C	B		C	B	
Approach Delay (s)		31.2			21.4			15.0			16.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	69.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1740			1821	1583	1770	3502		1770	3410	
Flt Permitted		0.76			0.73	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1349			1358	1583	1770	3502		1770	3410	
Volume (vph)	113	64	94	63	75	40	122	641	48	56	734	236
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	70	102	68	82	43	133	697	52	61	798	257
RTOR Reduction (vph)	0	23	0	0	0	32	0	5	0	0	30	0
Lane Group Flow (vph)	0	272	0	0	150	11	133	744	0	61	1025	0
Turn Type	Perm			Perm		Perm	Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		17.5			17.5	17.5	8.8	32.5		4.9	30.6	
Effective Green, g (s)		18.5			18.5	18.5	8.8	34.5		6.9	32.6	
Actuated g/C Ratio		0.26			0.26	0.26	0.12	0.48		0.10	0.45	
Clearance Time (s)		5.0			5.0	5.0	4.0	6.0		6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		347			349	407	217	1680		170	1546	
v/s Ratio Prot							c0.08	0.21		0.03	c0.30	
v/s Ratio Perm		c0.20			0.11	0.01						
v/c Ratio		0.78			0.43	0.03	0.61	0.44		0.36	0.66	
Uniform Delay, d1		24.8			22.3	20.0	29.9	12.4		30.4	15.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.0			0.9	0.0	5.1	0.2		1.3	1.1	
Delay (s)		35.9			23.1	20.0	35.0	12.5		31.7	16.4	
Level of Service		D			C	B	C	B		C	B	
Approach Delay (s)		35.9			22.4			15.9			17.3	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & Cottonwood Rd - AM Peak
Count Date: 5/21/2008

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
>	EBL	58
0	EBT	0
<	EBR	20
>	NBL	17
1	NBT	71
0	NBR	0
0	SBL	0
1	SBT	78
<	SBR	69
	TOTAL	313

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	59
EBT	0
EBR	20
NBL	15
NBT	59
NBR	0
SBL	0
SBT	83
SBR	79
TOTAL	315

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	60
EBT	0
EBR	21
NBL	16
NBT	66
NBR	0
SBL	0
SBT	126
SBR	85
TOTAL	374

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	58
EBT	0
EBR	20
NBL	16
NBT	65
NBR	0
SBL	0
SBT	80
SBR	73
TOTAL	314

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	59
EBT	0
EBR	21
NBL	17
NBT	72
NBR	0
SBL	0
SBT	123
SBR	79
TOTAL	373

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	1	1	0
EBT	0	0	0
EBR	1	1	0
NBL	1	0	1
NBT	7	5	2
NBR	0	0	0
SBL	0	0	0
SBT	43	37	6
SBR	6	6	0
TOTAL	59	50	9

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Hosking Ave & Cottonwood Rd - AM Peak						
	Count Date:	5/21/2008						
2008	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	1.03							
EB Approach (Away)	1.02							
NB Approach (To)	1.38							
NB Approach (Away)	0.95							
SB Approach (To)	1.50							
SB Approach (Away)	1.95							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.38	WBT	1.45	WBR	1.37
WB Approach (Away)	*1.8*		1.02%	0	1.27%	0	1.00%	0
EB Approach (To)	1.1		EBL	1.01	EBT	1.44	EBR	1.02
EB Approach (Away)	1.1		0.04%	59	1.23%	0	0.06%	20
NB Approach (To)	1.0		NBL	0.91	NBT	0.83	NBR	1.26
NB Approach (Away)	0.9		-0.43%	15	-0.70%	59	0.49%	0
SB Approach (To)	1.8		SBL	1.49	SBT	1.07	SBR	1.14
SB Approach (Away)	1.8		1.41%	0	0.24%	83	0.49%	79
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.68	WBT	1.43	WBR	1.67
WB Approach (Away)	*1.8*		1.93%	0	1.20%	0	1.89%	0
EB Approach (To)	1.1		EBL	1.30	EBT	1.43	EBR	1.31
EB Approach (Away)	1.1		0.90%	74	1.20%	0	0.94%	26
NB Approach (To)	2.2		NBL	1.31	NBT	1.55	NBR	1.68
NB Approach (Away)	1.5		0.94%	22	1.63%	110	1.93%	0
SB Approach (To)	2.3		SBL	1.67	SBT	1.56	SBR	1.30
SB Approach (Away)	3.0		1.90%	0	1.64%	121	0.91%	88

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	58	20	17	71	78	69
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	22	18	77	85	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	236	122	160			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	236	122	160			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	98	99			
cM capacity (veh/h)	742	929	1419			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	96	160
Volume Left	63	18	0
Volume Right	22	0	75
cSH	782	1419	1700
Volume to Capacity	0.11	0.01	0.09
Queue Length 95th (ft)	9	1	0
Control Delay (s)	10.2	1.5	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	1.5	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.0	HCM Level of Service	A
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	58	20	16	65	80	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	22	17	71	87	79
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	232	127	166			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232	127	166			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	98	99			
cM capacity (veh/h)	747	924	1412			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	88	166
Volume Left	63	17	0
Volume Right	22	0	79
cSH	785	1412	1700
Volume to Capacity	0.11	0.01	0.10
Queue Length 95th (ft)	9	1	0
Control Delay (s)	10.1	1.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	1.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.9	HCM Level of Service	A
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	59	21	17	72	123	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	23	18	78	134	86
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	292	177	220			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	292	177	220			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	97	99			
cM capacity (veh/h)	689	866	1350			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	87	97	220
Volume Left	64	18	0
Volume Right	23	0	86
cSH	728	1350	1700
Volume to Capacity	0.12	0.01	0.13
Queue Length 95th (ft)	10	1	0
Control Delay (s)	10.6	1.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	1.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.7	HCM Level of Service	A
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	59	20	15	59	83	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	22	16	64	90	86
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	230	133	176			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	230	133	176			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	98	99			
cM capacity (veh/h)	749	916	1400			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	86	80	176
Volume Left	64	16	0
Volume Right	22	0	86
cSH	786	1400	1700
Volume to Capacity	0.11	0.01	0.10
Queue Length 95th (ft)	9	1	0
Control Delay (s)	10.1	1.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	1.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.9	HCM Level of Service	A
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	60	21	16	66	126	85
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	23	17	72	137	92
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	290	183	229			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	183	229			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	97	99			
cM capacity (veh/h)	692	859	1339			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	89	229
Volume Left	65	17	0
Volume Right	23	0	92
cSH	729	1339	1700
Volume to Capacity	0.12	0.01	0.13
Queue Length 95th (ft)	10	1	0
Control Delay (s)	10.6	1.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	1.6	0.0
Approach LOS	B		

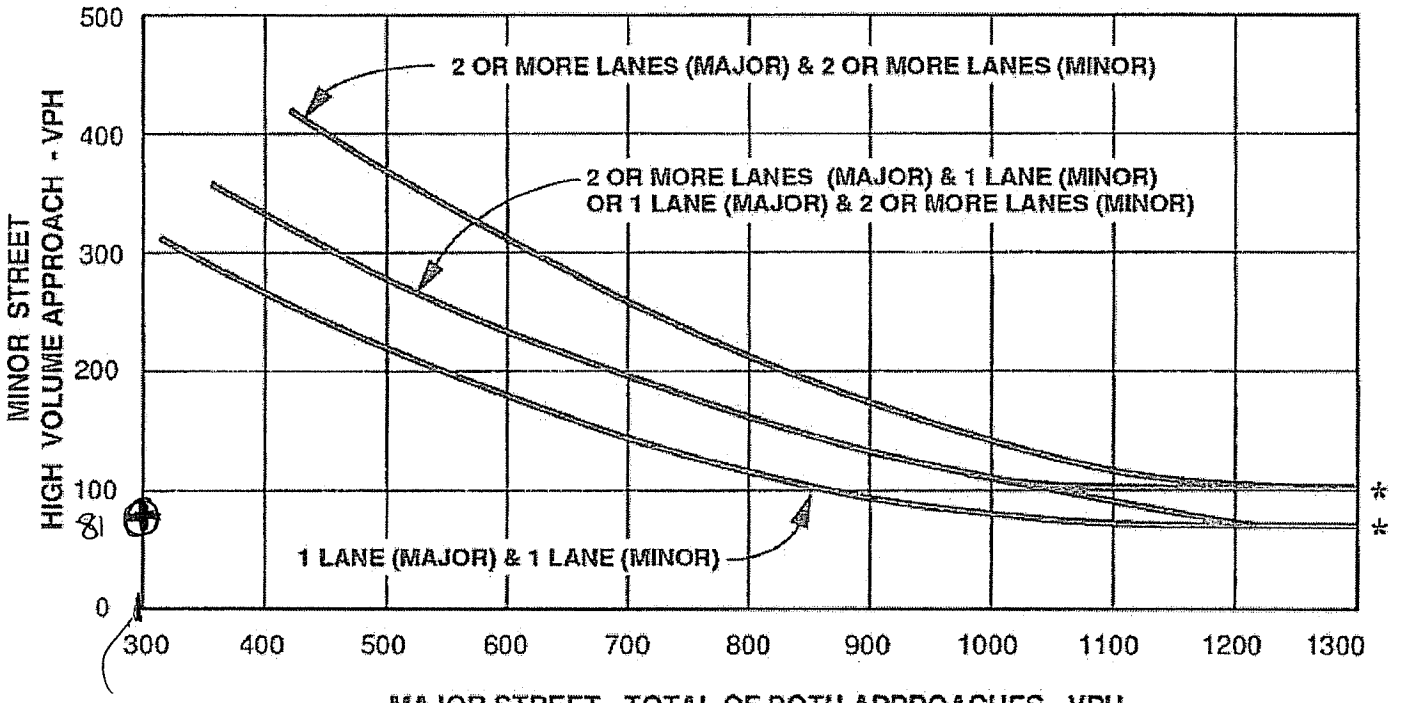
Intersection Summary			
Average Delay	2.6	HCM Level of Service	A
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Hosking Ave & Cottonwood Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



293

*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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Hosking Ave & Cottonwood Rd - PM Peak
Count Date: 5/21/2008

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
>	EBL	26
0	EBT	0
<	EBR	30
>	NBL	11
1	NBT	137
0	NBR	0
0	SBL	0
1	SBT	118
<	SBR	41
	TOTAL	363

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	38
EBT	0
EBR	37
NBL	12
NBT	104
NBR	0
SBL	0
SBT	115
SBR	67
TOTAL	374

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	40
EBT	0
EBR	38
NBL	13
NBT	126
NBR	0
SBL	0
SBT	135
SBR	73
TOTAL	426

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	31
EBT	0
EBR	33
NBL	11
NBT	122
NBR	0
SBL	0
SBT	117
SBR	52
TOTAL	368

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	33
EBT	0
EBR	34
NBL	12
NBT	144
NBR	0
SBL	0
SBT	137
SBR	58
TOTAL	420

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	2	2	0
EBT	0	0	0
EBR	1	1	0
NBL	1	0	1
NBT	22	19	3
NBR	0	0	0
SBL	0	0	0
SBT	20	19	1
SBR	6	6	0
TOTAL	52	47	5

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Hosking Ave & Cottonwood Rd - PM Peak					
	Count Date:	5/21/2008					
2008	ADT						
WB Approach (To)	*1*						
WB Approach (Away)	*1*						
EB Approach (To)	0.54						
EB Approach (Away)	0.54						
NB Approach (To)	1.75						
NB Approach (Away)	1.21						
SB Approach (To)	1.4						
SB Approach (Away)	1.82						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	*1.8*		WBL	1.28	WBT	1.94	WBR 1.41
WB Approach (Away)	*1.8*		0.57%	0	2.46%	0	1.12% 0
EB Approach (To)	1.1		EBL	1.54	EBT	1.93	EBR 1.40
EB Approach (Away)	1.1		1.37%	38	2.44%	0	0.83% 37
NB Approach (To)	1.0		NBL	1.32	NBT	0.79	NBR 1.18
NB Approach (Away)	0.9		0.33%	12	-1.00%	104	0.06% 0
SB Approach (To)	1.8		SBL	1.53	SBT	1.01	SBR 1.67
SB Approach (Away)	1.8		1.54%	0	-0.08%	115	1.81% 67
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	*1.8*		WBL	1.52	WBT	1.90	WBR 1.72
WB Approach (Away)	*1.8*		1.48%	0	2.39%	0	2.02% 0
EB Approach (To)	1.1		EBL	1.83	EBT	1.91	EBR 1.62
EB Approach (Away)	1.1		2.23%	47	2.40%	0	1.69% 47
NB Approach (To)	2.2		NBL	1.62	NBT	1.44	NBR 1.52
NB Approach (Away)	1.5		1.68%	17	1.32%	195	1.49% 0
SB Approach (To)	2.3		SBL	1.73	SBT	1.44	SBR 1.82
SB Approach (Away)	3.0		2.03%	0	1.32%	168	2.22% 74

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	26	30	11	137	118	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	33	12	149	128	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	323	151	173			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	323	151	173			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	99			
cM capacity (veh/h)	665	896	1404			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	61	161	173
Volume Left	28	12	0
Volume Right	33	0	45
cSH	771	1404	1700
Volume to Capacity	0.08	0.01	0.10
Queue Length 95th (ft)	6	1	0
Control Delay (s)	10.1	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.8	HCM Level of Service	A
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	31	33	11	122	117	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	36	12	133	127	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	312	155	184			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	312	155	184			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	96	99			
cM capacity (veh/h)	675	890	1391			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	70	145	184
Volume Left	34	12	0
Volume Right	36	0	57
cSH	771	1391	1700
Volume to Capacity	0.09	0.01	0.11
Queue Length 95th (ft)	7	1	0
Control Delay (s)	10.1	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.1	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.0	HCM Level of Service	A
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	33	34	12	144	137	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	37	13	157	149	63
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	363	180	212			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	363	180	212			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	96	99			
cM capacity (veh/h)	630	862	1358			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	73	170	212
Volume Left	36	13	0
Volume Right	37	0	63
cSH	730	1358	1700
Volume to Capacity	0.10	0.01	0.12
Queue Length 95th (ft)	8	1	0
Control Delay (s)	10.5	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.9	HCM Level of Service	A
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	38	37	12	104	115	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	40	13	113	125	73
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	301	161	198			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	301	161	198			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	95	99			
cM capacity (veh/h)	684	884	1375			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	82	126	198
Volume Left	41	13	0
Volume Right	40	0	73
cSH	770	1375	1700
Volume to Capacity	0.11	0.01	0.12
Queue Length 95th (ft)	9	1	0
Control Delay (s)	10.2	0.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.2	0.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.3	HCM Level of Service	A
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	40	38	13	126	135	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	41	14	137	147	79
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	352	186	226			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	352	186	226			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	95	99			
cM capacity (veh/h)	639	856	1342			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	85	151	226
Volume Left	43	14	0
Volume Right	41	0	79
cSH	729	1342	1700
Volume to Capacity	0.12	0.01	0.13
Queue Length 95th (ft)	10	1	0
Control Delay (s)	10.6	0.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	0.8	0.0
Approach LOS	B		

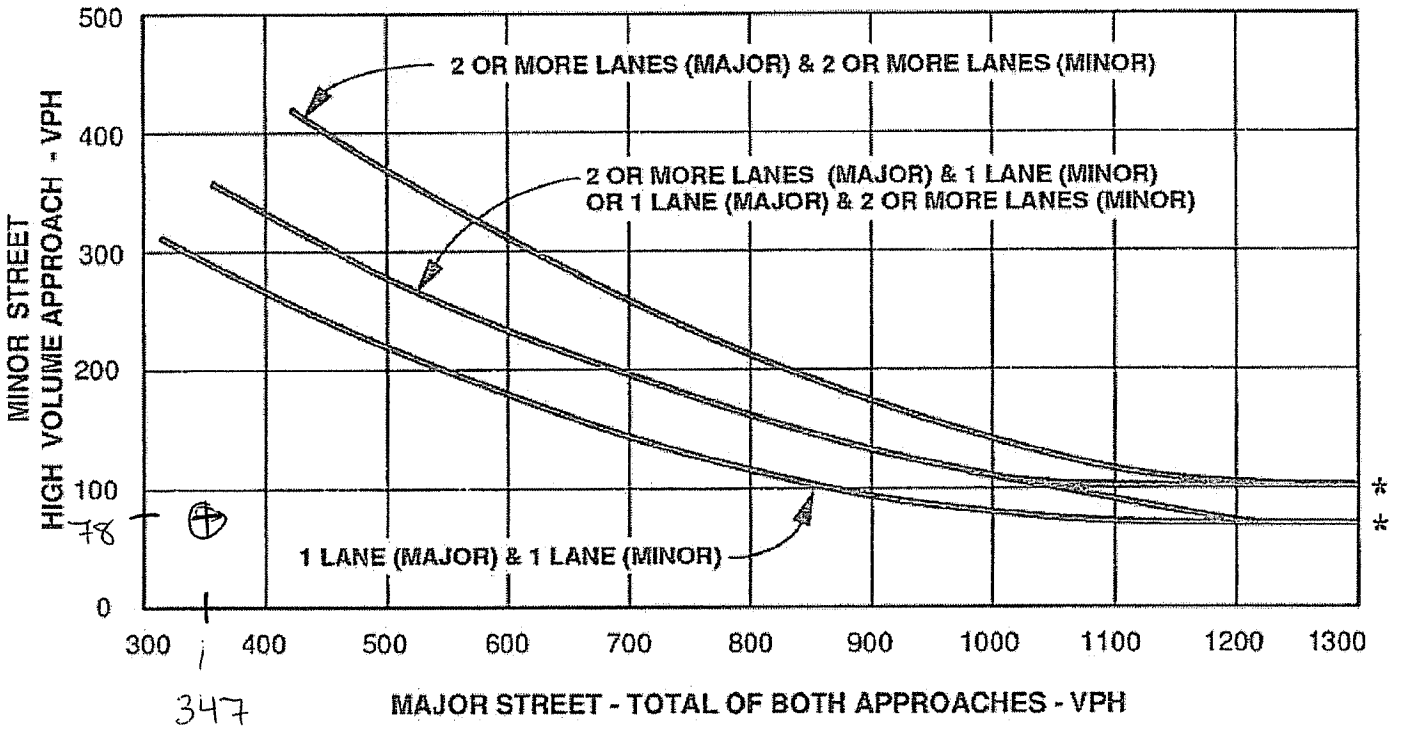
Intersection Summary			
Average Delay	2.2	HCM Level of Service	A
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		

Hosking Ave & Cottonwood Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1 3470	1 780
2 or More	1
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1 3470	1 780
2 or More	1
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied X

No one condition satisfied, but following conditions fulfilled 80% or more..... 54% (A) 66% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & Wible Rd - AM Peak
Count Date: 9/18/2007

Exist Peak Hour Volumes

S		
1	WBL	8
1	WBT	353
1	WBR	9
1	EBL	19
1	EBT	364
1	EBR	12
>	NBL	24
1	NBT	29
1	NBR	17
>	SBL	68
1	SBT	46
1	SBR	74
	TOTAL	1023

Year 2035
Fut. Volumes w/o Proj

WBL	15
WBT	898
WBR	16
EBL	49
EBT	1389
EBR	31
NBL	49
NBT	43
NBR	37
SBL	146
SBT	66
SBR	149
TOTAL	2888

Year 2035 Fut. Vol
+ Project Traffic

WBL	15
WBT	912
WBR	17
EBL	49
EBT	1441
EBR	31
NBL	49
NBT	43
NBR	37
SBL	148
SBT	66
SBR	149
TOTAL	2957

Year 2020
Fut. Volumes w/o Proj

WBL	11
WBT	604
WBR	12
EBL	33
EBT	836
EBR	21
NBL	36
NBT	35
NBR	26
SBL	104
SBT	55
SBR	108
TOTAL	1881

Year 2020 Fut. Vol
+ Project Traffic

WBL	11
WBT	618
WBR	13
EBL	33
EBT	888
EBR	21
NBL	36
NBT	35
NBR	26
SBL	106
SBT	55
SBR	108
TOTAL	1950

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	14	11	3
WBR	1	1	0
EBL	0	0	0
EBT	52	44	8
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	2	1	1
SBT	0	0	0
SBR	0	0	0
TOTAL	69	57	12

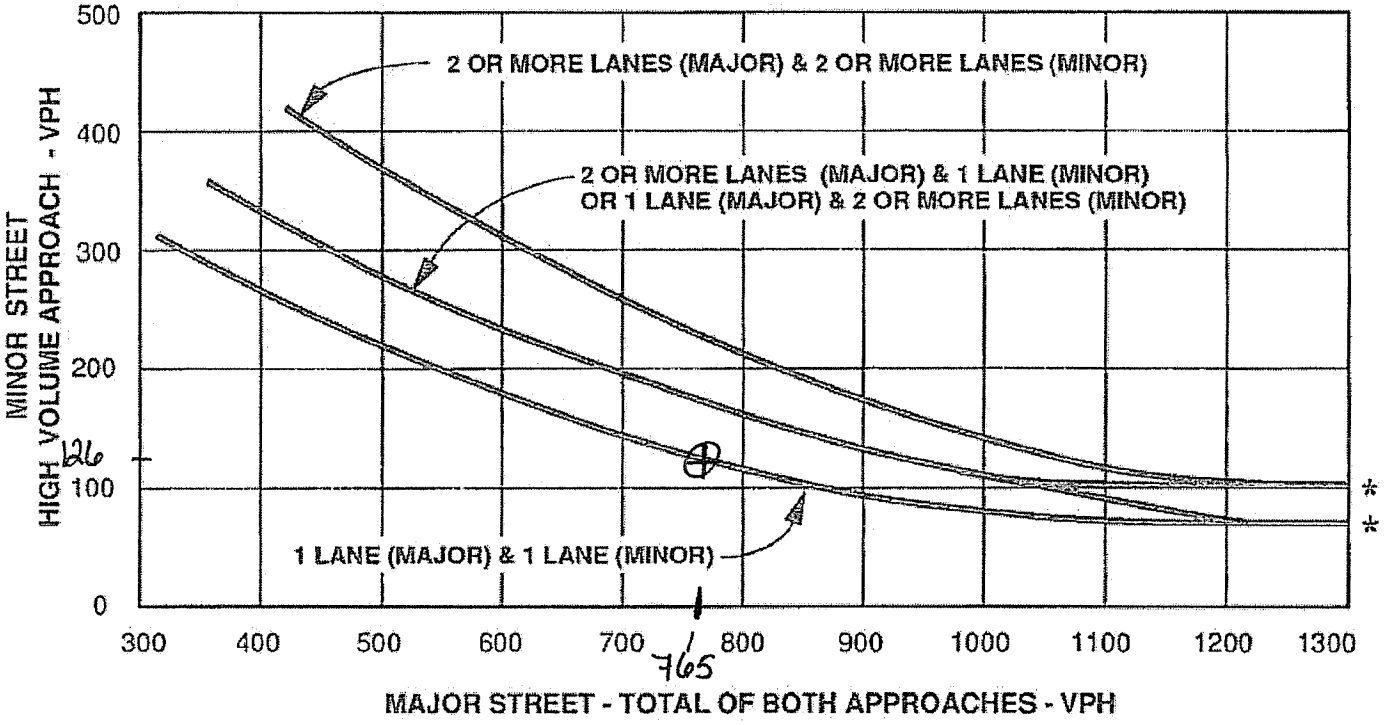
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ SR 119 & Wible Rd - AM Peak						
	Count Date:	9/18/2007						
2006	ADT							
WB Approach (To)	3.08							
WB Approach (Away)	2.43							
EB Approach (To)	1.67							
EB Approach (Away)	2.55							
NB Approach (To)	0.90							
NB Approach (Away)	0.62							
SB Approach (To)	1.04							
SB Approach (Away)	1.09							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	7.3		WBL	1.92	WBT	2.66	WBR	1.93
WB Approach (Away)	8.2		2.17%	15	3.41%	898	2.20%	16
EB Approach (To)	8.1		EBL	3.17	EBT	4.11	EBR	3.15
EB Approach (Away)	7.5		3.48%	49	4.94%	1389	3.45%	31
NB Approach (To)	1.4		NBL	2.23	NBT	1.50	NBR	2.44
NB Approach (Away)	0.9		2.62%	49	1.40%	43	2.85%	37
SB Approach (To)	1.5		SBL	2.41	SBT	1.46	SBR	2.20
SB Approach (Away)	1.6		2.78%	146	1.30%	66	2.55%	149
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	8.4		WBL	2.10	WBT	3.01	WBR	2.08
WB Approach (Away)	9.6		2.44%	16	3.86%	1011	2.39%	17
EB Approach (To)	9.3		EBL	3.49	EBT	4.73	EBR	3.51
EB Approach (Away)	8.4		3.68%	52	5.45%	1592	3.72%	33
NB Approach (To)	1.3		NBL	2.39	NBT	1.46	NBR	2.70
NB Approach (Away)	0.9		2.77%	51	1.31%	42	3.08%	39
SB Approach (To)	1.6		SBL	2.71	SBT	1.49	SBR	2.40
SB Approach (Away)	1.6		3.11%	160	1.38%	67	2.81%	160

Taft Hwy / SR 119 & Wible Rd

Existing - AM Peak

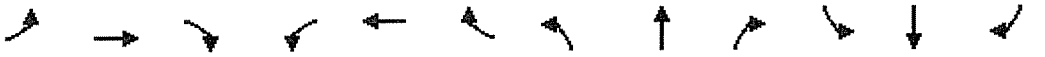
Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒



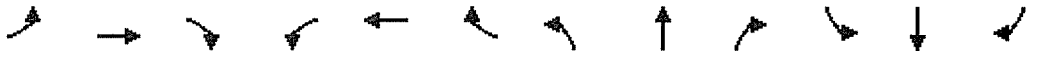
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1822	1583		1809	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.84	1.00		0.79	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1556	1583		1463	1583
Volume (vph)	19	364	12	8	353	9	24	29	17	68	46	74
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	396	13	9	384	10	26	32	18	74	50	80
RTOR Reduction (vph)	0	0	8	0	0	6	0	0	13	0	0	59
Lane Group Flow (vph)	21	396	5	9	384	4	0	58	5	0	124	21
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	0.5	11.8	11.8	0.5	11.8	11.8		8.3	8.3		8.3	8.3
Effective Green, g (s)	0.5	13.8	13.8	0.5	13.8	13.8		9.3	9.3		9.3	9.3
Actuated g/C Ratio	0.01	0.39	0.39	0.01	0.39	0.39		0.26	0.26		0.26	0.26
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	25	722	614	25	722	614		406	414		382	414
v/s Ratio Prot	c0.01	c0.21		0.01	0.21							
v/s Ratio Perm			0.00			0.00		0.04	0.00		c0.08	0.01
v/c Ratio	0.84	0.55	0.01	0.36	0.53	0.01		0.14	0.01		0.32	0.05
Uniform Delay, d1	17.5	8.5	6.7	17.4	8.4	6.7		10.1	9.7		10.6	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	110.8	0.9	0.0	8.7	0.8	0.0		0.2	0.0		0.5	0.1
Delay (s)	128.3	9.3	6.7	26.0	9.2	6.7		10.3	9.8		11.1	9.9
Level of Service	F	A	A	C	A	A		B	A		B	A
Approach Delay (s)		15.1			9.5			10.1			10.6	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	35.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1817	1583		1804	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79	1.00		0.76	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1475	1583		1409	1583
Volume (vph)	33	836	21	11	604	12	36	35	26	104	55	108
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	909	23	12	657	13	39	38	28	113	60	117
RTOR Reduction (vph)	0	0	10	0	0	6	0	0	22	0	0	92
Lane Group Flow (vph)	36	909	13	12	657	7	0	77	6	0	173	25
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	1.6	31.3	31.3	0.6	30.3	30.3		11.4	11.4		11.4	11.4
Effective Green, g (s)	1.6	33.3	33.3	0.6	32.3	32.3		12.4	12.4		12.4	12.4
Actuated g/C Ratio	0.03	0.57	0.57	0.01	0.55	0.55		0.21	0.21		0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	49	1064	904	18	1032	877		314	337		300	337
v/s Ratio Prot	c0.02	c0.49		0.01	0.35							
v/s Ratio Perm			0.01			0.00		0.05	0.00		c0.12	0.02
v/c Ratio	0.73	0.85	0.01	0.67	0.64	0.01		0.25	0.02		0.58	0.07
Uniform Delay, d1	28.1	10.5	5.4	28.8	9.0	5.8		19.1	18.1		20.6	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	43.4	6.8	0.0	66.1	1.3	0.0		0.4	0.0		2.7	0.1
Delay (s)	71.6	17.3	5.4	94.8	10.3	5.8		19.5	18.2		23.3	18.5
Level of Service	E	B	A	F	B	A		B	B		C	B
Approach Delay (s)		19.0			11.7			19.1			21.3	
Approach LOS		B			B			B			C	

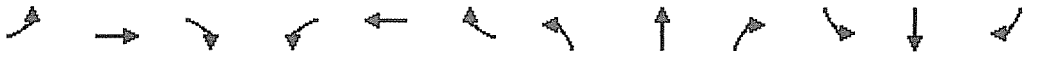
Intersection Summary			
HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1817	1583		1803	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.79	1.00		0.76	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1473	1583		1407	1583
Volume (vph)	33	888	21	11	618	13	36	35	26	106	55	108
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	965	23	12	672	14	39	38	28	115	60	117
RTOR Reduction (vph)	0	0	9	0	0	6	0	0	22	0	0	93
Lane Group Flow (vph)	36	965	14	12	672	8	0	77	6	0	175	24
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	1.6	34.3	34.3	0.6	33.3	33.3		11.8	11.8		11.8	11.8
Effective Green, g (s)	1.6	36.3	36.3	0.6	35.3	35.3		12.8	12.8		12.8	12.8
Actuated g/C Ratio	0.03	0.59	0.59	0.01	0.57	0.57		0.21	0.21		0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	46	1096	931	17	1066	906		306	328		292	328
v/s Ratio Prot	c0.02	c0.52		0.01	0.36							
v/s Ratio Perm			0.01			0.01		0.05	0.00		c0.12	0.02
v/c Ratio	0.78	0.88	0.01	0.71	0.63	0.01		0.25	0.02		0.60	0.07
Uniform Delay, d1	29.9	10.8	5.3	30.5	8.8	5.7		20.4	19.4		22.1	19.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	57.8	8.4	0.0	84.0	1.2	0.0		0.4	0.0		3.3	0.1
Delay (s)	87.6	19.3	5.3	114.4	10.1	5.7		20.9	19.5		25.4	19.8
Level of Service	F	B	A	F	B	A		C	B		C	B
Approach Delay (s)		21.4			11.8			20.5			23.2	
Approach LOS		C			B			C			C	

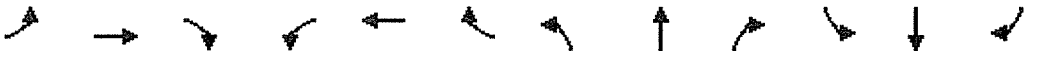
Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1815	1583		1801	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.44	1.00		0.65	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		819	1583		1209	1583
Volume (vph)	49	1389	31	15	898	16	49	43	37	146	66	149
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	1510	34	16	976	17	53	47	40	159	72	162
RTOR Reduction (vph)	0	0	6	0	0	4	0	0	33	0	0	132
Lane Group Flow (vph)	53	1510	28	16	976	13	0	100	7	0	231	30
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	7.5	105.1	105.1	1.5	99.1	99.1		26.0	26.0		26.0	26.0
Effective Green, g (s)	7.5	107.1	107.1	1.5	101.1	101.1		27.0	27.0		27.0	27.0
Actuated g/C Ratio	0.05	0.73	0.73	0.01	0.68	0.68		0.18	0.18		0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	90	1352	1149	18	1276	1084		150	290		221	290
v/s Ratio Prot	c0.03	c0.81		0.01	0.52							
v/s Ratio Perm			0.02			0.01		0.12	0.00		c0.19	0.02
v/c Ratio	0.59	1.12	0.02	0.89	0.76	0.01		0.67	0.03		1.05	0.10
Uniform Delay, d1	68.5	20.2	5.7	73.0	15.4	7.4		56.1	49.5		60.3	50.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	9.5	63.2	0.0	156.5	2.8	0.0		10.7	0.0		72.9	0.2
Delay (s)	78.0	83.4	5.7	229.5	18.2	7.4		66.8	49.5		133.2	50.4
Level of Service	E	F	A	F	B	A		E	D		F	D
Approach Delay (s)		81.6			21.3			61.9			99.1	
Approach LOS		F			C			E			F	

Intersection Summary			
HCM Average Control Delay	63.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	147.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1815	1583		1801	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.74	1.00		0.73	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1379	1583		1365	1583
Volume (vph)	49	1389	31	15	898	16	49	43	37	146	66	149
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	1510	34	16	976	17	53	47	40	159	72	162
RTOR Reduction (vph)	0	0	16	0	0	9	0	0	30	0	0	122
Lane Group Flow (vph)	53	1510	18	16	976	8	0	100	10	0	231	40
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	3.2	27.0	27.0	0.7	24.5	24.5		12.5	12.5		12.5	12.5
Effective Green, g (s)	3.2	29.0	29.0	0.7	26.5	26.5		13.5	13.5		13.5	13.5
Actuated g/C Ratio	0.06	0.53	0.53	0.01	0.48	0.48		0.24	0.24		0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	103	1859	832	22	1699	760		337	387		334	387
v/s Ratio Prot	c0.03	c0.43		0.01	0.28							
v/s Ratio Perm			0.01			0.01		0.07	0.01		c0.17	0.03
v/c Ratio	0.51	0.81	0.02	0.73	0.57	0.01		0.30	0.03		0.69	0.10
Uniform Delay, d1	25.2	10.8	6.3	27.2	10.3	7.5		17.0	15.8		19.0	16.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	4.3	2.8	0.0	76.4	0.5	0.0		0.5	0.0		6.1	0.1
Delay (s)	29.5	13.7	6.3	103.5	10.8	7.5		17.5	15.9		25.0	16.3
Level of Service	C	B	A	F	B	A		B	B		C	B
Approach Delay (s)		14.0			12.2			17.0			21.4	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1815	1583		1801	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73	1.00		0.73	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1355	1583		1364	1583
Volume (vph)	49	1441	31	15	912	17	49	43	37	148	66	149
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	1566	34	16	991	18	53	47	40	161	72	162
RTOR Reduction (vph)	0	0	16	0	0	9	0	0	30	0	0	123
Lane Group Flow (vph)	53	1566	18	16	991	9	0	100	10	0	233	39
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	3.2	28.8	28.8	0.7	26.3	26.3		12.9	12.9		12.9	12.9
Effective Green, g (s)	3.2	30.8	30.8	0.7	28.3	28.3		13.9	13.9		13.9	13.9
Actuated g/C Ratio	0.06	0.54	0.54	0.01	0.49	0.49		0.24	0.24		0.24	0.24
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	99	1899	849	22	1745	780		328	383		330	383
v/s Ratio Prot	c0.03	c0.44		0.01	0.28							
v/s Ratio Perm			0.01			0.01		0.07	0.01		c0.17	0.02
v/c Ratio	0.54	0.82	0.02	0.73	0.57	0.01		0.30	0.03		0.71	0.10
Uniform Delay, d1	26.4	11.1	6.2	28.3	10.2	7.4		17.8	16.6		19.9	16.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	5.5	3.1	0.0	76.4	0.4	0.0		0.5	0.0		6.7	0.1
Delay (s)	31.8	14.1	6.2	104.6	10.7	7.4		18.3	16.6		26.6	17.0
Level of Service	C	B	A	F	B	A		B	B		C	B
Approach Delay (s)		14.5			12.1			17.8			22.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & Wible Rd - PM Peak
Count Date: 7/24/2007

Exist Peak Hour Volumes

S		
1	WBL	17
1	WBT	369
1	WBR	159
1	EBL	65
1	EBT	451
1	EBR	17
>	NBL	13
1	NBT	28
1	NBR	21
>	SBL	80
1	SBT	19
1	SBR	21
	TOTAL	1260

Year 2035
Fut. Volumes w/o Proj

WBL	31
WBT	943
WBR	292
EBL	169
EBT	1734
EBR	44
NBL	27
NBT	41
NBR	46
SBL	172
SBT	27
SBR	42
TOTAL	3569

Year 2035 Fut. Vol
+ Project Traffic

WBL	31
WBT	992
WBR	304
EBL	169
EBT	1759
EBR	46
NBL	27
NBT	41
NBR	46
SBL	183
SBT	29
SBR	42
TOTAL	3670

Year 2020
Fut. Volumes w/o Proj

WBL	23
WBT	635
WBR	221
EBL	113
EBT	1045
EBR	29
NBL	19
NBT	34
NBR	33
SBL	123
SBT	23
SBR	31
TOTAL	2329

Year 2020 Fut. Vol
+ Project Traffic

WBL	23
WBT	684
WBR	233
EBL	113
EBT	1070
EBR	31
NBL	19
NBT	34
NBR	33
SBL	134
SBT	25
SBR	31
TOTAL	2430

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	49	49	0
WBR	12	12	0
EBL	0	0	0
EBT	25	25	0
EBR	2	2	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	11	11	0
SBT	2	2	0
SBR	0	0	0
TOTAL	101	101	0

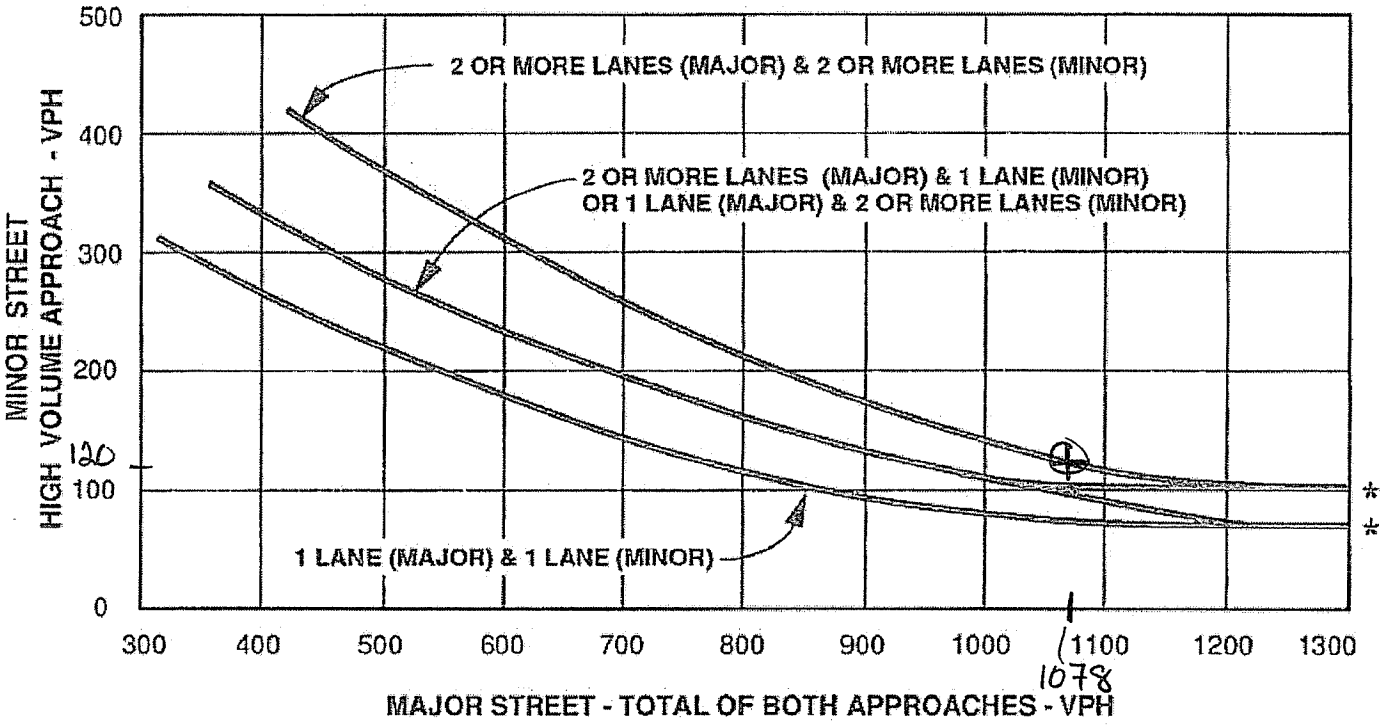
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ SR 119 & Wible Rd - PM Peak						
	Count Date:	7/24/2007						
2006	ADT							
WB Approach (To)	3.08							
WB Approach (Away)	2.43							
EB Approach (To)	1.67							
EB Approach (Away)	2.55							
NB Approach (To)	0.90							
NB Approach (Away)	0.62							
SB Approach (To)	1.04							
SB Approach (Away)	1.09							
2035	ADT w/o Proj		2006	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	7.3		WBL	1.92	WBT	2.66	WBR	1.93
WB Approach (Away)	8.2		2.17%	31	3.41%	943	2.20%	292
EB Approach (To)	8.1		EBL	3.17	EBT	4.11	EBR	3.15
EB Approach (Away)	7.5		3.48%	169	4.94%	1734	3.45%	44
NB Approach (To)	1.4		NBL	2.23	NBT	1.50	NBR	2.44
NB Approach (Away)	0.9		2.62%	27	1.40%	41	2.85%	46
SB Approach (To)	1.5		SBL	2.41	SBT	1.46	SBR	2.20
SB Approach (Away)	1.6		2.78%	172	1.30%	27	2.55%	42
2035	ADT with Proj		2006	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	8.4		WBL	2.10	WBT	3.01	WBR	2.08
WB Approach (Away)	9.6		2.44%	33	3.86%	1063	2.39%	308
EB Approach (To)	9.3		EBL	3.49	EBT	4.73	EBR	3.51
EB Approach (Away)	8.4		3.68%	178	5.45%	1989	3.72%	47
NB Approach (To)	1.3		NBL	2.39	NBT	1.46	NBR	2.70
NB Approach (Away)	0.9		2.77%	28	1.31%	40	3.08%	49
SB Approach (To)	1.6		SBL	2.71	SBT	1.49	SBR	2.40
SB Approach (Away)	1.6		3.11%	189	1.38%	28	2.81%	46

Taft Hwy / SR 119 & Wible Rd

Existing - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 10780	1 1200
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 10780	1 1200
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%

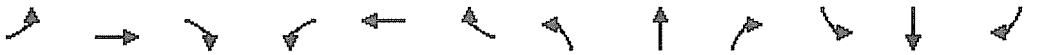
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1834	1583		1791	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.89	1.00		0.74	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1656	1583		1374	1583
Volume (vph)	65	451	17	17	369	159	13	28	21	80	19	21
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	490	18	18	401	173	14	30	23	87	21	23
RTOR Reduction (vph)	0	0	10	0	0	103	0	0	17	0	0	17
Lane Group Flow (vph)	71	490	8	18	401	70	0	44	6	0	108	6
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	2.5	17.1	17.1	0.6	15.2	15.2		8.8	8.8		8.8	8.8
Effective Green, g (s)	2.5	19.1	19.1	0.6	17.2	17.2		10.8	10.8		10.8	10.8
Actuated g/C Ratio	0.06	0.45	0.45	0.01	0.40	0.40		0.25	0.25		0.25	0.25
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	104	837	711	25	754	641		421	402		349	402
v/s Ratio Prot	c0.04	c0.26		0.01	0.22							
v/s Ratio Perm			0.01			0.04		0.03	0.00		c0.08	0.00
v/c Ratio	0.68	0.59	0.01	0.72	0.53	0.11		0.10	0.01		0.31	0.01
Uniform Delay, d1	19.6	8.7	6.5	20.9	9.6	7.9		12.1	11.9		12.8	11.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	16.9	1.1	0.0	68.2	0.7	0.1		0.1	0.0		0.5	0.0
Delay (s)	36.5	9.8	6.5	89.1	10.3	8.0		12.3	11.9		13.3	11.9
Level of Service	D	A	A	F	B	A		B	B		B	B
Approach Delay (s)		13.0			12.0			12.1			13.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1830	1583		1787	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86	1.00		0.72	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1598	1583		1340	1583
Volume (vph)	113	1045	29	23	635	221	19	34	33	123	23	31
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	1136	32	25	690	240	21	37	36	134	25	34
RTOR Reduction (vph)	0	0	11	0	0	103	0	0	29	0	0	28
Lane Group Flow (vph)	123	1136	21	25	690	137	0	58	7	0	159	6
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4			8	2		2	6		6
Actuated Green, G (s)	8.1	51.0	51.0	1.4	44.3	44.3		12.7	12.7		12.7	12.7
Effective Green, g (s)	8.1	53.0	53.0	1.4	46.3	46.3		14.7	14.7		14.7	14.7
Actuated g/C Ratio	0.10	0.65	0.65	0.02	0.57	0.57		0.18	0.18		0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	177	1217	1035	31	1064	904		290	287		243	287
v/s Ratio Prot	c0.07	c0.61		0.01	0.37							
v/s Ratio Perm			0.01			0.09		0.04	0.00		c0.12	0.00
v/c Ratio	0.69	0.93	0.02	0.81	0.65	0.15		0.20	0.02		0.65	0.02
Uniform Delay, d1	35.3	12.5	4.9	39.7	11.9	8.2		28.2	27.3		30.8	27.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	11.2	12.9	0.0	83.8	1.4	0.1		0.3	0.0		6.2	0.0
Delay (s)	46.5	25.4	4.9	123.5	13.2	8.3		28.5	27.3		37.0	27.3
Level of Service	D	C	A	F	B	A		C	C		D	C
Approach Delay (s)		26.9			14.9			28.1			35.3	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

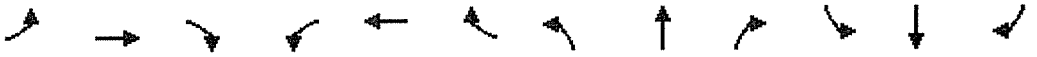
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1830	1583		1787	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86	1.00		0.72	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1595	1583		1339	1583
Volume (vph)	113	1070	31	23	684	233	19	34	33	134	25	31
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	1163	34	25	743	253	21	37	36	146	27	34
RTOR Reduction (vph)	0	0	12	0	0	103	0	0	29	0	0	28
Lane Group Flow (vph)	123	1163	22	25	743	150	0	58	7	0	173	6
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	7.0	54.0	54.0	1.5	48.5	48.5		13.7	13.7		13.7	13.7
Effective Green, g (s)	7.0	56.0	56.0	1.5	50.5	50.5		15.7	15.7		15.7	15.7
Actuated g/C Ratio	0.08	0.66	0.66	0.02	0.59	0.59		0.18	0.18		0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	145	1225	1040	31	1104	938		294	292		247	292
v/s Ratio Prot	c0.07	c0.62		0.01	0.40							
v/s Ratio Perm			0.01			0.09		0.04	0.00		c0.13	0.00
v/c Ratio	0.85	0.95	0.02	0.81	0.67	0.16		0.20	0.02		0.70	0.02
Uniform Delay, d1	38.6	13.3	5.1	41.7	11.8	7.8		29.4	28.5		32.5	28.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	34.4	15.0	0.0	83.8	1.6	0.1		0.3	0.0		8.6	0.0
Delay (s)	72.9	28.3	5.1	125.5	13.4	7.9		29.7	28.5		41.2	28.5
Level of Service	E	C	A	F	B	A		C	C		D	C
Approach Delay (s)		31.9			14.8			29.3			39.1	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	85.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



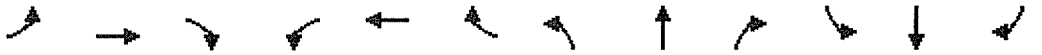
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1827	1583		1785	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.47	1.00		0.66	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		875	1583		1222	1583
Volume (vph)	169	1734	44	31	943	292	27	41	46	172	27	42
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	1885	48	34	1025	317	29	45	50	187	29	46
RTOR Reduction (vph)	0	0	7	0	0	80	0	0	43	0	0	39
Lane Group Flow (vph)	184	1885	41	34	1025	237	0	74	7	0	216	7
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	18.4	110.1	110.1	3.2	94.9	94.9		20.0	20.0		20.0	20.0
Effective Green, g (s)	18.4	112.1	112.1	3.2	96.9	96.9		22.0	22.0		22.0	22.0
Actuated g/C Ratio	0.12	0.75	0.75	0.02	0.65	0.65		0.15	0.15		0.15	0.15
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	218	1399	1189	38	1209	1027		129	233		180	233
v/s Ratio Prot	c0.10	c1.01		0.02	0.55							
v/s Ratio Perm			0.03			0.15		0.08	0.00		c0.18	0.00
v/c Ratio	0.84	1.35	0.03	0.89	0.85	0.23		0.57	0.03		1.20	0.03
Uniform Delay, d1	64.0	18.6	4.8	72.9	20.4	10.8		59.3	54.5		63.6	54.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	24.6	161.2	0.0	103.9	5.7	0.1		6.0	0.1		131.2	0.1
Delay (s)	88.7	179.8	4.8	176.8	26.1	10.9		65.3	54.6		194.8	54.6
Level of Service	F	F	A	F	C	B		E	D		F	D
Approach Delay (s)		167.9			26.4			61.0			170.2	
Approach LOS		F			C			E			F	

Intersection Summary			
HCM Average Control Delay	114.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	149.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	122.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1827	1583		1785	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.82	1.00		0.70	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1526	1583		1309	1583
Volume (vph)	169	1734	44	31	943	292	27	41	46	172	27	42
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	1885	48	34	1025	317	29	45	50	187	29	46
RTOR Reduction (vph)	0	0	20	0	0	165	0	0	39	0	0	36
Lane Group Flow (vph)	184	1885	28	34	1025	152	0	74	11	0	216	10
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	9.8	40.4	40.4	2.1	32.7	32.7		13.9	13.9		13.9	13.9
Effective Green, g (s)	9.8	42.4	42.4	2.1	34.7	34.7		15.9	15.9		15.9	15.9
Actuated g/C Ratio	0.14	0.59	0.59	0.03	0.48	0.48		0.22	0.22		0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	240	2073	927	51	1696	759		335	348		287	348
v/s Ratio Prot	c0.10	c0.53		0.02	0.29							
v/s Ratio Perm			0.02			0.10		0.05	0.01		c0.16	0.01
v/c Ratio	0.77	0.91	0.03	0.67	0.60	0.20		0.22	0.03		0.75	0.03
Uniform Delay, d1	30.2	13.3	6.3	34.8	13.8	10.9		23.2	22.2		26.4	22.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	13.6	6.3	0.0	28.3	0.6	0.1		0.3	0.0		10.6	0.0
Delay (s)	43.8	19.6	6.3	63.1	14.4	11.0		23.5	22.2		37.0	22.2
Level of Service	D	B	A	E	B	B		C	C		D	C
Approach Delay (s)		21.4			14.8			23.0			34.4	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1827	1583		1786	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.81	1.00		0.70	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583		1510	1583		1311	1583
Volume (vph)	169	1759	46	31	992	304	27	41	46	183	29	42
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	1912	50	34	1078	330	29	45	50	199	32	46
RTOR Reduction (vph)	0	0	21	0	0	170	0	0	39	0	0	36
Lane Group Flow (vph)	184	1912	29	34	1078	160	0	74	11	0	231	10
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	9.9	41.1	41.1	2.2	33.4	33.4		14.9	14.9		14.9	14.9
Effective Green, g (s)	9.9	43.1	43.1	2.2	35.4	35.4		15.9	15.9		15.9	15.9
Actuated g/C Ratio	0.14	0.59	0.59	0.03	0.48	0.48		0.22	0.22		0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	239	2084	932	53	1711	766		328	344		285	344
v/s Ratio Prot	c0.10	c0.54		0.02	0.30							
v/s Ratio Perm			0.02			0.10		0.05	0.01		c0.18	0.01
v/c Ratio	0.77	0.92	0.03	0.64	0.63	0.21		0.23	0.03		0.81	0.03
Uniform Delay, d1	30.6	13.5	6.3	35.1	14.0	10.9		23.6	22.6		27.2	22.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	13.9	6.9	0.0	23.5	0.8	0.1		0.4	0.0		15.9	0.0
Delay (s)	44.4	20.4	6.3	58.7	14.8	11.0		23.9	22.6		43.1	22.6
Level of Service	D	C	A	E	B	B		C	C		D	C
Approach Delay (s)		22.1			15.0			23.4			39.7	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & SR 99 Southbound Off Ramp/Compagnoni St - AM Peak
Count Date: 8/14/2007

Exist Peak Hour Volumes

S		
1	WBL	30
1	WBT	157
0	WBR	0
0	EBL	0
1	EBT	488
1	EBR	22
1	NBL	24
0	NBT	0
1	NBR	121
1	SBL	175
1	SBT	51
1	SBR	221
	TOTAL	1289

Year 2035
Fut. Volumes w/o Proj

WBL	52
WBT	291
WBR	0
EBL	0
EBT	976
EBR	32
NBL	46
NBT	0
NBR	298
SBL	402
SBT	86
SBR	397
TOTAL	2581

Year 2035 Fut. Vol
+ Project Traffic

WBL	52
WBT	310
WBR	0
EBL	0
EBT	1035
EBR	32
NBL	46
NBT	0
NBR	298
SBL	402
SBT	86
SBR	397
TOTAL	2659

Year 2020
Fut. Volumes w/o Proj

WBL	40
WBT	219
WBR	0
EBL	0
EBT	714
EBR	27
NBL	34
NBT	0
NBR	203
SBL	280
SBT	67
SBR	302
TOTAL	1886

Year 2020 Fut. Vol
+ Project Traffic

WBL	40
WBT	238
WBR	0
EBL	0
EBT	773
EBR	27
NBL	34
NBT	0
NBR	203
SBL	280
SBT	67
SBR	302
TOTAL	1964

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	19	13	6
WBR	0	0	0
EBL	0	0	0
EBT	59	46	13
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	78	59	19

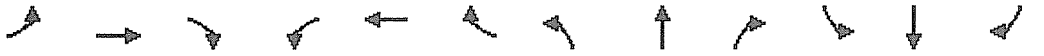
	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Taft Hwy/ SR 119 & SR 99 Southbound Off Ramp/Compagnoni St - AM Peak					
	Count Date:	8/14/2007					
2007	ADT						
WB Approach (To)	5.74						
WB Approach (Away)	6.39						
EB Approach (To)	6.06						
EB Approach (Away)	5.34						
NB Approach (To)	1.47						
NB Approach (Away)	1.63						
SB Approach (To)	5.06						
SB Approach (Away)	*1*						
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	12.5		WBL	1.78	WBT	1.88	WBR 1.59
WB Approach (Away)	16.5		2.01%	52	2.24%	291	1.42% 0
EB Approach (To)	9.4		EBL	1.27	EBT	2.06	EBR 1.47
EB Approach (Away)	8.4		0.79%	0	2.52%	976	1.38% 32
NB Approach (To)	3.5		NBL	1.96	NBT	1.68	NBR 2.47
NB Approach (Away)	2.3		2.38%	46	1.56%	0	3.29% 298
SB Approach (To)	10.3		SBL	2.31	SBT	1.72	SBR 1.81
SB Approach (Away)	*1*		3.03%	402	1.89%	86	2.12% 397
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	14.0		WBL	2.40	WBT	2.11	WBR 1.72
WB Approach (Away)	15.6		3.18%	72	2.66%	327	1.63% 0
EB Approach (To)	10.8		EBL	1.39	EBT	2.11	EBR 2.06
EB Approach (Away)	9.5		1.04%	0	2.66%	1016	2.60% 45
NB Approach (To)	3.5		NBL	2.06	NBT	1.68	NBR 2.40
NB Approach (Away)	3.8		2.59%	49	1.56%	0	3.18% 290
SB Approach (To)	9.7		SBL	2.18	SBT	2.13	SBR 1.84
SB Approach (Away)	*1*		2.80%	378	2.73%	108	2.21% 407

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	488	22	30	157	0	24	0	121	175	51	221
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	530	24	33	171	0	26	0	132	190	55	240
RTOR Reduction (vph)	0	0	16	0	0	0	0	0	109	0	0	166
Lane Group Flow (vph)	0	530	8	33	171	0	26	0	23	190	55	74
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		19.0	19.0	1.3	26.3		1.6		9.6	9.6	17.6	17.6
Effective Green, g (s)		21.0	21.0	3.3	28.3		1.6		10.6	9.6	18.6	18.6
Actuated g/C Ratio		0.35	0.35	0.05	0.47		0.03		0.18	0.16	0.31	0.31
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		647	549	97	871		47		277	281	573	487
v/s Ratio Prot		c0.28		c0.02	0.09		0.01			c0.11	0.03	
v/s Ratio Perm			0.01						0.01			c0.05
v/c Ratio		0.82	0.02	0.34	0.20		0.55		0.08	0.68	0.10	0.15
Uniform Delay, d1		18.0	13.0	27.6	9.4		29.1		20.9	24.0	15.0	15.2
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		8.0	0.0	2.1	0.1		13.3		0.1	6.3	0.1	0.1
Delay (s)		26.0	13.0	29.6	9.5		42.4		21.0	30.3	15.0	15.4
Level of Service		C	B	C	A		D		C	C	B	B
Approach Delay (s)		25.4			12.8			24.5			21.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

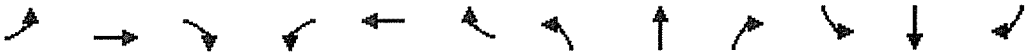
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	714	27	40	219	0	34	0	203	280	67	302
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	776	29	43	238	0	37	0	221	304	73	328
RTOR Reduction (vph)	0	0	14	0	0	0	0	0	145	0	0	233
Lane Group Flow (vph)	0	776	15	43	238	0	37	0	76	304	73	95
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		39.4	39.4	2.2	47.6		3.3		11.3	17.6	25.6	25.6
Effective Green, g (s)		41.4	41.4	4.2	49.6		3.3		12.3	17.6	26.6	26.6
Actuated g/C Ratio		0.45	0.45	0.05	0.54		0.04		0.13	0.19	0.29	0.29
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		843	716	81	1010		64		213	340	542	460
v/s Ratio Prot		c0.42		c0.02	0.13		0.02			c0.17	0.04	
v/s Ratio Perm			0.01						c0.05			0.06
v/c Ratio		0.92	0.02	0.53	0.24		0.58		0.35	0.89	0.13	0.21
Uniform Delay, d1		23.5	13.8	42.7	11.0		43.4		36.0	36.0	24.0	24.5
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		15.1	0.0	6.5	0.1		12.0		1.0	24.4	0.1	0.2
Delay (s)		38.7	13.9	49.2	11.1		55.4		37.0	60.4	24.1	24.7
Level of Service		D	B	D	B		E		D	E	C	C
Approach Delay (s)		37.8			17.0			39.7			40.0	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



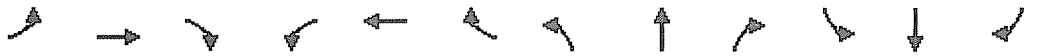
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	714	27	40	219	0	34	0	203	280	67	302
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	776	29	43	238	0	37	0	221	304	73	328
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	183	0	0	205
Lane Group Flow (vph)	0	776	9	43	238	0	37	0	38	304	73	123
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		19.3	19.3	2.4	27.7		2.1		11.2	16.3	25.4	25.4
Effective Green, g (s)		21.3	21.3	4.4	29.7		2.1		12.2	16.3	26.4	26.4
Actuated g/C Ratio		0.30	0.30	0.06	0.42		0.03		0.17	0.23	0.38	0.38
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1074	480	111	788		53		275	411	701	595
v/s Ratio Prot		c0.22		0.02	c0.13		0.02			c0.17	0.04	
v/s Ratio Perm			0.01						0.02			c0.08
v/c Ratio		0.72	0.02	0.39	0.30		0.70		0.14	0.74	0.10	0.21
Uniform Delay, d1		21.8	17.1	31.6	13.4		33.7		24.6	25.0	14.2	14.8
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		2.4	0.0	2.2	0.2		33.1		0.2	6.8	0.1	0.2
Delay (s)		24.2	17.1	33.8	13.6		66.8		24.8	31.8	14.3	15.0
Level of Service		C	B	C	B		E		C	C	B	B
Approach Delay (s)		24.0			16.7			30.8			22.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



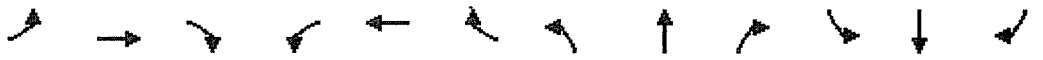
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	773	27	40	238	0	34	0	203	280	67	302
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	840	29	43	259	0	37	0	221	304	73	328
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	181	0	0	207
Lane Group Flow (vph)	0	840	9	43	259	0	37	0	40	304	73	121
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		20.9	20.9	2.4	29.3		2.1		11.3	16.5	25.7	25.7
Effective Green, g (s)		22.9	22.9	4.4	31.3		2.1		12.3	16.5	26.7	26.7
Actuated g/C Ratio		0.32	0.32	0.06	0.43		0.03		0.17	0.23	0.37	0.37
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1124	503	108	809		52		270	405	690	586
v/s Ratio Prot		c0.24		0.02	c0.14		0.02			c0.17	0.04	
v/s Ratio Perm			0.01						0.03			c0.08
v/c Ratio		0.75	0.02	0.40	0.32		0.71		0.15	0.75	0.11	0.21
Uniform Delay, d1		22.0	16.9	32.6	13.4		34.7		25.4	25.9	14.9	15.5
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		2.8	0.0	2.4	0.2		36.8		0.3	7.6	0.1	0.2
Delay (s)		24.8	16.9	35.0	13.6		71.5		25.7	33.5	14.9	15.7
Level of Service		C	B	C	B		E		C	C	B	B
Approach Delay (s)		24.5			16.7			32.3			23.3	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



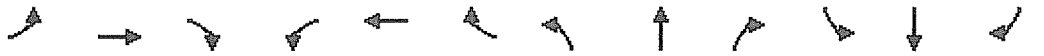
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	976	32	52	291	0	46	0	298	402	86	397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1061	35	57	316	0	50	0	324	437	93	432
RTOR Reduction (vph)	0	0	23	0	0	0	0	0	112	0	0	260
Lane Group Flow (vph)	0	1061	12	57	316	0	50	0	212	437	93	172
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		30.7	30.7	2.9	39.6		5.1		15.8	26.1	36.8	36.8
Effective Green, g (s)		32.7	32.7	4.9	41.6		5.1		16.8	26.1	37.8	37.8
Actuated g/C Ratio		0.34	0.34	0.05	0.43		0.05		0.17	0.27	0.39	0.39
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1199	536	90	803		94		276	479	730	620
v/s Ratio Prot		c0.30		c0.03	0.17		0.03			c0.25	0.05	
v/s Ratio Perm			0.01						c0.13			0.11
v/c Ratio		0.88	0.02	0.63	0.39		0.53		0.77	0.91	0.13	0.28
Uniform Delay, d1		30.1	21.2	44.9	18.8		44.5		38.0	34.1	18.8	20.0
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		8.1	0.0	13.7	0.3		5.7		12.0	21.6	0.1	0.2
Delay (s)		38.2	21.3	58.6	19.1		50.2		50.0	55.7	18.9	20.3
Level of Service		D	C	E	B		D		D	E	B	C
Approach Delay (s)		37.7			25.2			50.0			36.2	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	0.97	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Volume (vph)	0	976	32	52	291	0	46	0	298	402	86	397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1061	35	57	316	0	50	0	324	437	93	432
RTOR Reduction (vph)	0	0	22	0	0	0	0	0	108	0	0	280
Lane Group Flow (vph)	0	1061	13	57	316	0	50	0	216	437	93	152
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		29.1	29.1	2.9	38.0		3.7		16.3	15.7	28.3	28.3
Effective Green, g (s)		31.1	31.1	4.9	40.0		3.7		17.3	15.7	29.3	29.3
Actuated g/C Ratio		0.37	0.37	0.06	0.47		0.04		0.20	0.18	0.34	0.34
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1295	579	102	877		77		322	634	642	546
v/s Ratio Prot		c0.30		c0.03	0.17		0.03			c0.13	0.05	
v/s Ratio Perm			0.01						c0.14			0.10
v/c Ratio		0.82	0.02	0.56	0.36		0.65		0.67	0.69	0.14	0.28
Uniform Delay, d1		24.4	17.2	39.0	14.3		40.0		31.2	32.4	19.2	20.2
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		4.2	0.0	6.5	0.3		17.3		5.2	3.1	0.1	0.3
Delay (s)		28.6	17.2	45.5	14.6		57.3		36.4	35.5	19.3	20.5
Level of Service		C	B	D	B		E		D	D	B	C
Approach Delay (s)		28.2			19.3			39.2			27.2	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	0.97	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Volume (vph)	0	1035	32	52	310	0	46	0	298	402	86	397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1125	35	57	337	0	50	0	324	437	93	432
RTOR Reduction (vph)	0	0	21	0	0	0	0	0	107	0	0	268
Lane Group Flow (vph)	0	1125	14	57	337	0	50	0	217	437	93	164
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		2		1	6		3			7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)		30.6	30.6	2.9	39.5		3.7		16.3	15.9	28.5	28.5
Effective Green, g (s)		32.6	32.6	4.9	41.5		3.7		17.3	15.9	29.5	29.5
Actuated g/C Ratio		0.38	0.38	0.06	0.48		0.04		0.20	0.18	0.34	0.34
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1331	595	100	892		76		316	630	634	539
v/s Ratio Prot		c0.32		c0.03	0.18		0.03			c0.13	0.05	
v/s Ratio Perm			0.01						c0.14			0.10
v/c Ratio		0.85	0.02	0.57	0.38		0.66		0.69	0.69	0.15	0.30
Uniform Delay, d1		24.7	17.0	39.9	14.4		40.9		32.2	33.1	19.9	21.0
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		5.1	0.0	7.3	0.3		18.7		6.1	3.3	0.1	0.3
Delay (s)		29.9	17.0	47.1	14.7		59.6		38.2	36.4	20.0	21.4
Level of Service		C	B	D	B		E		D	D	B	C
Approach Delay (s)		29.5			19.4			41.1			28.1	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & SR 99 Southbound Off Ramp/Compagnoni St - PM Peak
Count Date: 6/28/2007

Exist Peak Hour Volumes

S		
1	WBL	65
1	WBT	273
0	WBR	0
0	EBL	0
1	EBT	608
1	EBR	41
1	NBL	44
0	NBT	0
1	NBR	148
1	SBL	353
1	SBT	58
1	SBR	304
	TOTAL	1894

Year 2035
Fut. Volumes w/o Proj

WBL	97
WBT	439
WBR	0
EBL	0
EBT	1054
EBR	53
NBL	75
NBT	0
NBR	311
SBL	656
SBT	81
SBR	457
TOTAL	3224

Year 2035 Fut. Vol
+ Project Traffic

WBL	97
WBT	503
WBR	0
EBL	0
EBT	1093
EBR	53
NBL	75
NBT	0
NBR	315
SBL	695
SBT	81
SBR	457
TOTAL	3370

Year 2020
Fut. Volumes w/o Proj

WBL	80
WBT	350
WBR	0
EBL	0
EBT	815
EBR	47
NBL	58
NBT	0
NBR	224
SBL	494
SBT	69
SBR	375
TOTAL	2512

Year 2020 Fut. Vol
+ Project Traffic

WBL	80
WBT	414
WBR	0
EBL	0
EBT	854
EBR	47
NBL	58
NBT	0
NBR	228
SBL	533
SBT	69
SBR	375
TOTAL	2658

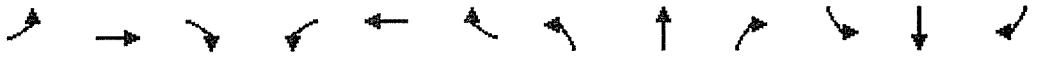
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	64	64	0
WBR	0	0	0
EBL	0	0	0
EBT	39	39	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	4	4	0
SBL	39	39	0
SBT	0	0	0
SBR	0	0	0
TOTAL	146	146	0

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ SR 119 & SR 99 Southbound Off Ramp/Compagnoni St - PM Peak						
	Count Date:	6/28/2007						
2007	ADT							
WB Approach (To)	6.85							
WB Approach (Away)	7.62							
EB Approach (To)	6.76							
EB Approach (Away)	5.94							
NB Approach (To)	1.69							
NB Approach (Away)	1.87							
SB Approach (To)	6.48							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	12.5		WBL	1.52	WBT	1.62	WBR	1.41
WB Approach (Away)	16.5		1.43%	97	1.71%	439	1.09%	0
EB Approach (To)	9.4		EBL	1.19	EBT	1.78	EBR	1.30
EB Approach (Away)	8.4		0.59%	0	1.98%	1054	0.93%	53
NB Approach (To)	3.5		NBL	1.73	NBT	1.52	NBR	2.10
NB Approach (Away)	2.3		1.92%	75	1.29%	0	2.69%	311
SB Approach (To)	10.3		SBL	1.88	SBT	1.40	SBR	1.51
SB Approach (Away)	*1*		2.24%	656	1.18%	81	1.47%	457
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	14.0		WBL	2.05	WBT	1.82	WBR	1.52
WB Approach (Away)	15.6		2.59%	133	2.13%	493	1.29%	0
EB Approach (To)	10.8		EBL	1.30	EBT	1.82	EBR	1.82
EB Approach (Away)	9.5		0.84%	0	2.13%	1098	2.13%	74
NB Approach (To)	3.5		NBL	1.82	NBT	1.52	NBR	2.05
NB Approach (Away)	3.8		2.13%	79	1.29%	0	2.59%	303
SB Approach (To)	9.7		SBL	1.77	SBT	1.77	SBR	1.54
SB Approach (Away)	*1*		2.01%	617	2.02%	101	1.56%	469

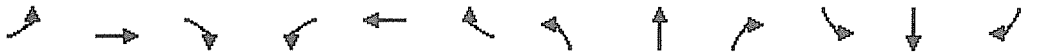
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	608	41	65	273	0	44	0	148	353	58	304
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	661	45	71	297	0	48	0	161	384	63	330
RTOR Reduction (vph)	0	0	28	0	0	0	0	0	142	0	0	227
Lane Group Flow (vph)	0	661	17	71	297	0	48	0	19	384	63	103
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		29.1	29.1	3.1	38.2		3.5		8.8	19.1	24.4	24.4
Effective Green, g (s)		31.1	31.1	5.1	40.2		3.5		9.8	19.1	25.4	25.4
Actuated g/C Ratio		0.38	0.38	0.06	0.50		0.04		0.12	0.24	0.31	0.31
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		714	607	111	923		76		191	417	583	496
v/s Ratio Prot		c0.35		c0.04	0.16		0.03			c0.22	0.03	
v/s Ratio Perm			0.01						0.01			c0.07
v/c Ratio		0.93	0.03	0.64	0.32		0.63		0.10	0.92	0.11	0.21
Uniform Delay, d1		23.9	15.6	37.1	12.3		38.2		31.7	30.3	19.8	20.5
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		17.9	0.0	11.5	0.2		15.9		0.2	25.5	0.1	0.2
Delay (s)		41.8	15.6	48.6	12.5		54.0		32.0	55.8	19.9	20.7
Level of Service		D	B	D	B		D		C	E	B	C
Approach Delay (s)		40.1			19.4			37.0			38.0	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	35.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		1863	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	815	47	80	350	0	58	0	224	494	69	375
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	886	51	87	380	0	63	0	243	537	75	408
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	102	0	0	255
Lane Group Flow (vph)	0	886	32	87	380	0	63	0	141	537	75	153
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		45.1	45.1	4.0	55.1		7.4		14.4	33.0	40.0	40.0
Effective Green, g (s)		47.1	47.1	6.0	57.1		7.4		15.4	33.0	41.0	41.0
Actuated g/C Ratio		0.40	0.40	0.05	0.49		0.06		0.13	0.28	0.35	0.35
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		747	635	90	905		111		207	497	650	552
v/s Ratio Prot		c0.48		c0.05	0.20		0.04			c0.30	0.04	
v/s Ratio Perm			0.02						c0.09			0.10
v/c Ratio		1.19	0.05	0.97	0.42		0.57		0.68	1.08	0.12	0.28
Uniform Delay, d1		35.2	21.5	55.7	19.5		53.5		48.7	42.2	25.9	27.6
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		97.0	0.0	83.1	0.3		6.5		8.9	63.8	0.1	0.3
Delay (s)		132.2	21.6	138.7	19.8		60.0		57.7	106.1	26.0	27.8
Level of Service		F	C	F	B		E		E	F	C	C
Approach Delay (s)		126.2			42.0			58.1			68.9	
Approach LOS		F			D			E			E	

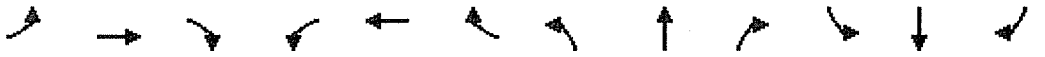
Intersection Summary			
HCM Average Control Delay	82.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	117.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	815	47	80	350	0	58	0	224	494	69	375
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	886	51	87	380	0	63	0	243	537	75	408
RTOR Reduction (vph)	0	0	37	0	0	0	0	0	126	0	0	191
Lane Group Flow (vph)	0	886	14	87	380	0	63	0	117	537	75	217
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		21.1	21.1	3.0	30.1		5.9		11.7	27.1	32.9	32.9
Effective Green, g (s)		23.1	23.1	5.0	32.1		5.9		12.7	27.1	33.9	33.9
Actuated g/C Ratio		0.28	0.28	0.06	0.38		0.07		0.15	0.32	0.40	0.40
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		974	436	105	713		124		240	572	753	640
v/s Ratio Prot		c0.25		c0.05	0.20		0.04			c0.30	0.04	
v/s Ratio Perm			0.01						c0.07			0.14
v/c Ratio		0.91	0.03	0.83	0.53		0.51		0.49	0.94	0.10	0.34
Uniform Delay, d1		29.4	22.2	39.0	20.1		37.6		32.6	27.6	15.5	17.3
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		12.1	0.0	39.1	0.8		3.3		1.6	23.2	0.1	0.3
Delay (s)		41.4	22.3	78.2	20.9		40.9		34.2	50.8	15.6	17.6
Level of Service		D	C	E	C		D		C	D	B	B
Approach Delay (s)		40.4			31.5			35.6			34.9	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	83.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	854	47	80	414	0	58	0	228	533	69	375
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	928	51	87	450	0	63	0	248	579	75	408
RTOR Reduction (vph)	0	0	36	0	0	0	0	0	136	0	0	160
Lane Group Flow (vph)	0	928	15	87	450	0	63	0	112	579	75	248
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		26.9	26.9	4.4	37.3		6.3		12.6	34.6	40.9	40.9
Effective Green, g (s)		28.9	28.9	6.4	39.3		6.3		13.6	34.6	41.9	41.9
Actuated g/C Ratio		0.29	0.29	0.06	0.39		0.06		0.14	0.35	0.42	0.42
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1028	460	114	736		112		216	615	785	667
v/s Ratio Prot		c0.26		c0.05	0.24		0.04			c0.33	0.04	
v/s Ratio Perm			0.01						c0.07			0.16
v/c Ratio		0.90	0.03	0.76	0.61		0.56		0.52	0.94	0.10	0.37
Uniform Delay, d1		33.9	25.3	45.8	24.0		45.3		39.9	31.5	17.4	19.8
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		10.9	0.0	25.6	1.5		6.3		2.1	22.8	0.1	0.4
Delay (s)		44.9	25.3	71.4	25.5		51.6		42.0	54.3	17.4	20.1
Level of Service		D	C	E	C		D		D	D	B	C
Approach Delay (s)		43.9			33.0			43.9			38.6	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	39.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	1770	1863	1583
Volume (vph)	0	1054	53	97	439	0	75	0	311	656	81	457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1146	58	105	477	0	82	0	338	713	88	497
RTOR Reduction (vph)	0	0	25	0	0	0	0	0	107	0	0	138
Lane Group Flow (vph)	0	1146	33	105	477	0	82	0	231	713	88	359
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		45.0	45.0	7.0	58.0		11.2		19.0	58.0	65.8	65.8
Effective Green, g (s)		47.0	47.0	9.0	60.0		11.2		20.0	58.0	66.8	66.8
Actuated g/C Ratio		0.31	0.31	0.06	0.40		0.07		0.13	0.39	0.45	0.45
Clearance Time (s)		6.0	6.0	6.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1109	496	106	745		132		211	684	830	705
v/s Ratio Prot		c0.32		c0.06	0.26		0.05			c0.40	0.05	
v/s Ratio Perm			0.02						c0.15			0.23
v/c Ratio		1.03	0.07	0.99	0.64		0.62		1.10	1.04	0.11	0.51
Uniform Delay, d1		51.5	36.1	70.5	36.3		67.3		65.0	46.0	24.2	29.9
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		36.0	0.1	84.2	1.9		8.8		90.2	45.9	0.1	0.6
Delay (s)		87.5	36.2	154.7	38.2		76.1		155.2	91.9	24.3	30.4
Level of Service		F	D	F	D		E		F	F	C	C
Approach Delay (s)		85.0			59.2			139.7			63.8	
Approach LOS		F			E			F			E	

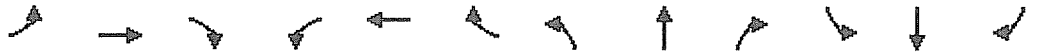
Intersection Summary			
HCM Average Control Delay	79.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑		↰		↱	↰↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	0.97	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Volume (vph)	0	1054	53	97	439	0	75	0	311	656	81	457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1146	58	105	477	0	82	0	338	713	88	497
RTOR Reduction (vph)	0	0	38	0	0	0	0	0	106	0	0	187
Lane Group Flow (vph)	0	1146	20	105	477	0	82	0	232	713	88	310
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		28.1	28.1	6.0	38.1		10.6		16.2	19.0	24.6	24.6
Effective Green, g (s)		30.1	30.1	6.0	40.1		10.6		17.2	19.0	25.6	25.6
Actuated g/C Ratio		0.34	0.34	0.07	0.45		0.12		0.19	0.22	0.29	0.29
Clearance Time (s)		6.0	6.0	4.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1206	540	120	846		212		308	739	540	459
v/s Ratio Prot		c0.32		c0.06	0.26		0.05			c0.21	0.05	
v/s Ratio Perm			0.01						c0.15			c0.20
v/c Ratio		0.95	0.04	0.88	0.56		0.39		0.75	0.96	0.16	0.68
Uniform Delay, d1		28.4	19.4	40.8	17.7		35.9		33.5	34.3	23.4	27.7
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		15.5	0.0	45.8	0.9		1.2		9.9	24.5	0.1	3.9
Delay (s)		43.9	19.5	86.6	18.5		37.0		43.5	58.8	23.5	31.6
Level of Service		D	B	F	B		D		D	E	C	C
Approach Delay (s)		42.7			30.8			42.2			46.0	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0		4.0		4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	1.00		1.00		1.00	0.97	1.00	1.00
Frt		1.00	0.85	1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Flt Permitted		1.00	1.00	0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		3539	1583	1770	1863		1770		1583	3433	1863	1583
Volume (vph)	0	1093	53	97	503	0	75	0	315	695	81	457
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1188	58	105	547	0	82	0	342	755	88	497
RTOR Reduction (vph)	0	0	38	0	0	0	0	0	104	0	0	159
Lane Group Flow (vph)	0	1188	20	105	547	0	82	0	238	755	88	338
Turn Type			Perm	Prot			Prot		custom	Prot		Perm
Protected Phases		4		3	8		5			1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)		29.0	29.0	6.0	39.0		9.7		15.7	20.0	26.0	26.0
Effective Green, g (s)		31.0	31.0	6.0	41.0		9.7		16.7	20.0	27.0	27.0
Actuated g/C Ratio		0.35	0.35	0.07	0.46		0.11		0.19	0.22	0.30	0.30
Clearance Time (s)		6.0	6.0	4.0	6.0		4.0		5.0	4.0	5.0	5.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		1223	547	118	852		191		295	765	561	476
v/s Ratio Prot		c0.34		c0.06	0.29		0.05			c0.22	0.05	
v/s Ratio Perm			0.01						c0.15			c0.21
v/c Ratio		0.97	0.04	0.89	0.64		0.43		0.81	0.99	0.16	0.71
Uniform Delay, d1		28.9	19.5	41.5	18.7		37.4		35.0	34.7	23.0	27.9
Progression Factor		1.00	1.00	1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		19.1	0.0	49.7	1.7		1.6		14.8	29.0	0.1	5.0
Delay (s)		48.0	19.5	91.2	20.4		39.0		49.7	63.7	23.1	32.8
Level of Service		D	B	F	C		D		D	E	C	C
Approach Delay (s)		46.7			31.8			47.6			49.6	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & South H St - AM Peak
Count Date: 8/29/2007

Exist Peak Hour Volumes

S		
1	WBL	0
1	WBT	358
1	WBR	24
1	EBL	124
1	EBT	330
1	EBR	26
1	NBL	71
1	NBT	17
1	NBR	8
1	SBL	38
1	SBT	9
1	SBR	224
	TOTAL	1229

Year 2035
Fut. Volumes w/o Proj

WBL	13
WBT	1335
WBR	87
EBL	401
EBT	1240
EBR	150
NBL	346
NBT	80
NBR	44
SBL	133
SBT	48
SBR	693
TOTAL	4569

Year 2035 Fut. Vol
+ Project Traffic

WBL	13
WBT	1347
WBR	90
EBL	401
EBT	1290
EBR	159
NBL	354
NBT	83
NBR	44
SBL	140
SBT	53
SBR	693
TOTAL	4666

Year 2020
Fut. Volumes w/o Proj

WBL	8
WBT	809
WBR	53
EBL	252
EBT	750
EBR	83
NBL	198
NBT	46
NBR	25
SBL	82
SBT	27
SBR	440
TOTAL	2772

Year 2020 Fut. Vol
+ Project Traffic

WBL	8
WBT	821
WBR	56
EBL	252
EBT	800
EBR	92
NBL	206
NBT	49
NBR	25
SBL	89
SBT	32
SBR	440
TOTAL	2869

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	12	9	3
WBR	3	2	1
EBL	0	0	0
EBT	50	40	10
EBR	9	6	3
NBL	8	6	2
NBT	3	2	1
NBR	0	0	0
SBL	7	4	3
SBT	5	4	1
SBR	0	0	0
TOTAL	97	73	24

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ SR 119 & South H St - AM Peak						
	Count Date:	8/29/2007						
2007	ADT							
WB Approach (To)	3.80							
WB Approach (Away)	3.78							
EB Approach (To)	4.51							
EB Approach (Away)	6.82							
NB Approach (To)	1.13							
NB Approach (Away)	0.18							
SB Approach (To)	2.06							
SB Approach (Away)	2.30							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	16.3		WBL	6.94	WBT	3.77	WBR	3.67
WB Approach (Away)	15.5		6.91%	13	4.84%	1335	4.72%	87
EB Approach (To)	15.5		EBL	3.24	EBT	3.77	EBR	6.51
EB Approach (Away)	22.0		4.30%	401	4.87%	1240	6.49%	150
NB Approach (To)	8.3		NBL	5.27	NBT	5.17	NBR	5.70
NB Approach (Away)	1.7		5.85%	346	5.73%	80	6.30%	44
SB Approach (To)	6.1		SBL	3.53	SBT	6.27	SBR	3.10
SB Approach (Away)	7.0		4.59%	133	6.21%	48	4.14%	693
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	15.8		WBL	6.46	WBT	3.73	WBR	3.70
WB Approach (Away)	15.7		6.68%	13	4.81%	1327	4.78%	88
EB Approach (To)	14.9		EBL	3.27	EBT	3.73	EBR	6.03
EB Approach (Away)	22.5		4.34%	405	4.82%	1224	6.24%	140
NB Approach (To)	9.9		NBL	6.01	NBT	5.98	NBR	6.44
NB Approach (Away)	1.6		6.23%	382	6.19%	91	6.67%	48
SB Approach (To)	6.7		SBL	3.70	SBT	6.00	SBR	3.26
SB Approach (Away)	7.4		4.78%	139	6.20%	48	4.34%	731

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583		1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	124	330	26	0	358	24	71	17	8	38	9	224
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	359	28	0	389	26	77	18	9	41	10	243
RTOR Reduction (vph)	0	0	14	0	0	18	0	0	7	0	0	192
Lane Group Flow (vph)	135	359	14	0	389	8	77	18	2	41	10	51
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	4.2	21.5	21.5		13.3	13.3	2.1	8.7	8.7	1.3	7.9	7.9
Effective Green, g (s)	4.2	23.5	23.5		15.3	15.3	2.1	10.7	10.7	1.3	9.9	9.9
Actuated g/C Ratio	0.09	0.49	0.49		0.32	0.32	0.04	0.23	0.23	0.03	0.21	0.21
Clearance Time (s)	4.0	6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	157	922	783		600	510	78	420	357	48	388	330
v/s Ratio Prot	c0.08	0.19			c0.21		c0.04	0.01		0.02	0.01	
v/s Ratio Perm			0.01			0.01			0.00			c0.03
v/c Ratio	0.86	0.39	0.02		0.65	0.02	0.99	0.04	0.01	0.85	0.03	0.15
Uniform Delay, d1	21.4	7.5	6.1		13.8	11.0	22.7	14.4	14.3	23.0	15.0	15.4
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.5	0.3	0.0		2.4	0.0	96.8	0.0	0.0	76.9	0.0	0.2
Delay (s)	55.9	7.8	6.1		16.2	11.0	119.5	14.4	14.3	99.9	15.0	15.6
Level of Service	E	A	A		B	B	F	B	B	F	B	B
Approach Delay (s)		20.1			15.9			92.2			27.3	
Approach LOS		C			B			F			C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	252	750	83	8	809	53	198	46	25	82	27	440
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	274	815	90	9	879	58	215	50	27	89	29	478
RTOR Reduction (vph)	0	0	28	0	0	17	0	0	22	0	0	238
Lane Group Flow (vph)	274	815	62	9	879	41	215	50	5	89	29	240
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	23.0	92.8	92.8	1.6	71.4	71.4	18.0	25.8	25.8	12.2	20.0	20.0
Effective Green, g (s)	23.0	94.8	94.8	1.6	73.4	73.4	18.0	27.8	27.8	12.2	22.0	22.0
Actuated g/C Ratio	0.15	0.62	0.62	0.01	0.48	0.48	0.12	0.18	0.18	0.08	0.14	0.14
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	267	1159	985	19	897	762	209	340	289	142	269	229
v/s Ratio Prot	c0.15	0.44		0.01	c0.47		c0.12	0.03		0.05	0.02	
v/s Ratio Perm			0.04			0.03			0.00			c0.15
v/c Ratio	1.03	0.70	0.06	0.47	0.98	0.05	1.03	0.15	0.02	0.63	0.11	1.05
Uniform Delay, d1	64.7	19.3	11.3	75.0	38.8	21.0	67.2	52.3	51.1	67.9	56.7	65.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	62.0	2.0	0.0	17.5	24.9	0.0	69.9	0.2	0.0	8.4	0.2	72.8
Delay (s)	126.7	21.3	11.4	92.5	63.6	21.0	137.1	52.5	51.1	76.2	56.8	138.0
Level of Service	F	C	B	F	E	C	F	D	D	E	E	F
Approach Delay (s)		45.0			61.3			114.7			124.8	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM Average Control Delay	72.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	152.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	252	750	83	8	809	53	198	46	25	82	27	440
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	274	815	90	9	879	58	215	50	27	89	29	478
RTOR Reduction (vph)	0	0	46	0	0	40	0	0	21	0	0	281
Lane Group Flow (vph)	274	815	44	9	879	18	215	50	6	89	29	197
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.5	40.5	40.5	0.7	25.7	25.7	12.3	19.0	19.0	7.1	13.8	13.8
Effective Green, g (s)	15.5	42.5	42.5	0.7	27.7	27.7	12.3	21.0	21.0	7.1	15.8	15.8
Actuated g/C Ratio	0.18	0.49	0.49	0.01	0.32	0.32	0.14	0.24	0.24	0.08	0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	1723	771	14	1123	502	249	448	381	144	337	286
v/s Ratio Prot	c0.15	0.23		0.01	c0.25		c0.12	0.03		0.05	0.02	
v/s Ratio Perm			0.03			0.01			0.00			c0.12
v/c Ratio	0.87	0.47	0.06	0.64	0.78	0.04	0.86	0.11	0.02	0.62	0.09	0.69
Uniform Delay, d1	34.9	14.9	11.8	43.2	27.1	20.6	36.7	25.9	25.3	38.8	29.7	33.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.4	0.2	0.0	71.2	3.6	0.0	25.2	0.1	0.0	7.7	0.1	6.8
Delay (s)	57.3	15.1	11.9	114.4	30.7	20.6	61.8	26.0	25.3	46.5	29.9	40.2
Level of Service	E	B	B	F	C	C	E	C	C	D	C	D
Approach Delay (s)		24.7			30.9			52.3			40.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	252	800	92	8	821	56	206	49	25	89	32	440
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	274	870	100	9	892	61	224	53	27	97	35	478
RTOR Reduction (vph)	0	0	51	0	0	42	0	0	21	0	0	279
Lane Group Flow (vph)	274	870	49	9	892	19	224	53	6	97	35	199
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.6	40.7	40.7	0.7	25.8	25.8	12.5	19.1	19.1	7.2	13.8	13.8
Effective Green, g (s)	15.6	42.7	42.7	0.7	27.8	27.8	12.5	21.1	21.1	7.2	15.8	15.8
Actuated g/C Ratio	0.18	0.49	0.49	0.01	0.32	0.32	0.14	0.24	0.24	0.08	0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	315	1723	771	14	1122	502	252	448	381	145	336	285
v/s Ratio Prot	c0.15	0.25		0.01	c0.25		c0.13	0.03		0.05	0.02	
v/s Ratio Perm			0.03			0.01			0.00			c0.13
v/c Ratio	0.87	0.50	0.06	0.64	0.80	0.04	0.89	0.12	0.02	0.67	0.10	0.70
Uniform Delay, d1	35.1	15.3	11.9	43.4	27.3	20.7	36.9	26.0	25.4	39.1	30.0	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.6	0.2	0.0	71.2	4.0	0.0	29.2	0.1	0.0	11.1	0.1	7.3
Delay (s)	56.7	15.5	11.9	114.6	31.3	20.7	66.1	26.1	25.4	50.2	30.2	41.0
Level of Service	E	B	B	F	C	C	E	C	C	D	C	D
Approach Delay (s)		24.3			31.4			55.5			41.9	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

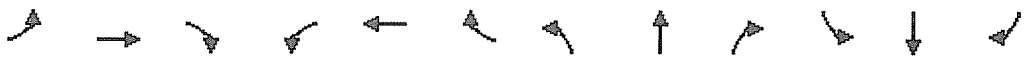
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	401	1240	150	13	1335	87	346	80	44	133	48	693
Peak-hour factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	422	1305	158	14	1420	93	376	87	48	143	52	745
RTOR Reduction (vph)	0	0	58	0	0	32	0	0	35	0	0	225
Lane Group Flow (vph)	422	1305	100	14	1420	61	376	87	13	143	52	520
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	27.0	75.4	75.4	2.0	50.4	50.4	24.0	38.6	38.6	16.4	31.0	31.0
Effective Green, g (s)	27.0	77.4	77.4	2.0	52.4	52.4	24.0	40.6	40.6	16.4	33.0	33.0
Actuated g/C Ratio	0.18	0.51	0.51	0.01	0.34	0.34	0.16	0.27	0.27	0.11	0.22	0.22
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	314	1797	804	23	1217	544	279	496	422	190	403	343
v/s Ratio Prot	c0.24	0.37		0.01	c0.40		c0.21	0.05		0.08	0.03	
v/s Ratio Perm			0.06			0.04			0.01			c0.33
v/c Ratio	1.34	0.73	0.12	0.61	1.17	0.11	1.35	0.18	0.03	0.75	0.13	1.52
Uniform Delay, d1	62.7	29.2	19.7	74.8	50.0	34.1	64.2	43.0	41.3	66.0	48.1	59.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	174.6	1.5	0.1	38.0	84.3	0.1	178.4	0.2	0.0	15.4	0.1	246.9
Delay (s)	237.3	30.7	19.8	112.9	134.3	34.2	242.6	43.2	41.4	81.5	48.3	306.6
Level of Service	F	C	B	F	F	C	F	D	D	F	D	F
Approach Delay (s)		76.1			128.0			189.7			258.1	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	139.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	152.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	2787
Volume (vph)	401	1240	150	13	1335	87	346	80	44	133	48	693
Peak-hour factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	422	1305	158	14	1420	93	376	87	48	143	52	745
RTOR Reduction (vph)	0	0	84	0	0	61	0	0	37	0	0	282
Lane Group Flow (vph)	422	1305	74	14	1420	32	376	87	11	143	52	463
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	11.0	36.4	36.4	0.8	26.2	26.2	10.0	16.0	16.0	8.7	14.7	14.7
Effective Green, g (s)	11.0	38.4	38.4	0.8	28.2	28.2	10.0	18.0	18.0	8.7	16.7	16.7
Actuated g/C Ratio	0.13	0.47	0.47	0.01	0.34	0.34	0.12	0.22	0.22	0.11	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	461	2384	742	17	1751	545	419	409	348	188	380	568
v/s Ratio Prot	c0.12	0.26		0.01	c0.28		c0.11	0.05		0.08	0.03	
v/s Ratio Perm			0.05			0.02			0.01			c0.17
v/c Ratio	0.92	0.55	0.10	0.82	0.81	0.06	0.90	0.21	0.03	0.76	0.14	0.82
Uniform Delay, d1	35.0	15.5	12.1	40.5	24.4	18.0	35.4	26.2	25.1	35.6	26.7	31.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.7	0.3	0.1	132.1	3.0	0.0	21.2	0.3	0.0	16.5	0.2	8.8
Delay (s)	57.7	15.8	12.2	172.6	27.4	18.0	56.7	26.4	25.1	52.1	26.9	39.9
Level of Service	E	B	B	F	C	B	E	C	C	D	C	D
Approach Delay (s)		24.9			28.2			48.5			41.1	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	2787
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	2787
Volume (vph)	401	1290	159	13	1347	90	354	83	44	140	53	693
Peak-hour factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	422	1358	167	14	1433	96	385	90	48	151	57	745
RTOR Reduction (vph)	0	0	89	0	0	63	0	0	37	0	0	281
Lane Group Flow (vph)	422	1358	78	14	1433	33	385	90	11	151	57	464
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	11.0	36.5	36.5	0.8	26.3	26.3	10.0	16.0	16.0	8.8	14.8	14.8
Effective Green, g (s)	11.0	38.5	38.5	0.8	28.3	28.3	10.0	18.0	18.0	8.8	16.8	16.8
Actuated g/C Ratio	0.13	0.47	0.47	0.01	0.34	0.34	0.12	0.22	0.22	0.11	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	460	2385	742	17	1753	546	418	408	347	190	381	570
v/s Ratio Prot	c0.12	0.27		0.01	c0.28		c0.11	0.05		0.09	0.03	
v/s Ratio Perm			0.05			0.02			0.01			c0.17
v/c Ratio	0.92	0.57	0.11	0.82	0.82	0.06	0.92	0.22	0.03	0.79	0.15	0.81
Uniform Delay, d1	35.1	15.8	12.2	40.6	24.5	18.0	35.7	26.3	25.2	35.8	26.8	31.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.0	0.3	0.1	132.1	3.1	0.0	25.5	0.3	0.0	20.1	0.2	8.7
Delay (s)	58.1	16.1	12.2	172.7	27.6	18.1	61.2	26.6	25.2	55.8	27.0	39.9
Level of Service	E	B	B	F	C	B	E	C	C	E	C	D
Approach Delay (s)		24.9			28.3			51.9			41.6	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ SR 119 & South H St - PM Peak
Count Date: 8/15/2007

Exist Peak Hour Volumes

S		
1	WBL	0
1	WBT	344
1	WBR	35
1	EBL	137
1	EBT	425
1	EBR	37
1	NBL	104
1	NBT	41
1	NBR	13
1	SBL	45
1	SBT	8
1	SBR	90
	TOTAL	1279

Year 2035
Fut. Volumes w/o Proj

WBL	22
WBT	1201
WBR	131
EBL	488
EBT	1494
EBR	170
NBL	406
NBT	172
NBR	54
SBL	163
SBT	38
SBR	308
TOTAL	4646

Year 2035 Fut. Vol
+ Project Traffic

WBL	22
WBT	1250
WBR	139
EBL	488
EBT	1555
EBR	170
NBL	423
NBT	173
NBR	54
SBL	180
SBT	39
SBR	308
TOTAL	4800

Year 2020
Fut. Volumes w/o Proj

WBL	10
WBT	740
WBR	79
EBL	299
EBT	919
EBR	99
NBL	243
NBT	101
NBR	32
SBL	99
SBT	22
SBR	191
TOTAL	2834

Year 2020 Fut. Vol
+ Project Traffic

WBL	10
WBT	789
WBR	87
EBL	299
EBT	980
EBR	99
NBL	260
NBT	102
NBR	32
SBL	116
SBT	23
SBR	191
TOTAL	2988

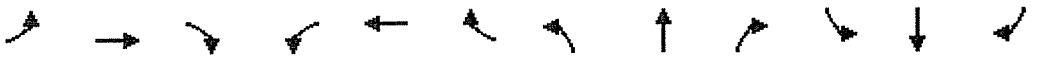
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	49	49	0
WBR	8	8	0
EBL	0	0	0
EBT	61	61	0
EBR	0	0	0
NBL	17	17	0
NBT	1	1	0
NBR	0	0	0
SBL	17	11	6
SBT	1	0	1
SBR	0	0	0
TOTAL	154	147	7

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ SR 119 & South H St - PM Peak						
	Count Date:	8/15/2007						
2007	ADT							
WB Approach (To)	4.32							
WB Approach (Away)	4.30							
EB Approach (To)	4.53							
EB Approach (Away)	6.84							
NB Approach (To)	1.75							
NB Approach (Away)	0.28							
SB Approach (To)	1.68							
SB Approach (Away)	1.88							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	16.3		WBL	4.97	WBT	3.50	WBR	3.75
WB Approach (Away)	15.5		5.81%	22	4.58%	1201	4.85%	131
EB Approach (To)	15.5		EBL	3.57	EBT	3.52	EBR	4.79
EB Approach (Away)	22.0		4.66%	488	4.61%	1494	5.62%	170
NB Approach (To)	8.3		NBL	3.97	NBT	4.21	NBR	4.16
NB Approach (Away)	1.7		5.00%	406	5.27%	172	5.21%	54
SB Approach (To)	6.1		SBL	3.62	SBT	4.90	SBR	3.43
SB Approach (Away)	7.0		4.72%	163	5.73%	38	4.51%	308
2035	ADT with Proj		2007	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	15.8		WBL	4.65	WBT	3.47	WBR	3.81
WB Approach (Away)	15.7		5.58%	21	4.56%	1194	4.91%	133
EB Approach (To)	14.9		EBL	3.62	EBT	3.47	EBR	4.46
EB Approach (Away)	22.5		4.71%	494	4.56%	1474	5.38%	159
NB Approach (To)	9.9		NBL	4.46	NBT	4.79	NBR	4.65
NB Approach (Away)	1.6		5.37%	448	5.72%	194	5.58%	59
SB Approach (To)	6.7		SBL	3.81	SBT	4.80	SBR	3.62
SB Approach (Away)	7.4		4.91%	171	5.73%	38	4.71%	325

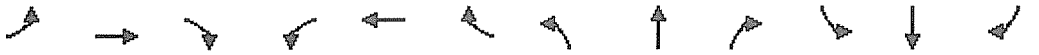
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583		1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583		1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	137	425	37	0	344	35	104	41	13	45	8	90
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	149	462	40	0	374	38	113	45	14	49	9	98
RTOR Reduction (vph)	0	0	20	0	0	26	0	0	11	0	0	79
Lane Group Flow (vph)	149	462	20	0	374	12	113	45	3	49	9	19
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	5.0	23.3	23.3		14.3	14.3	3.6	9.2	9.2	2.1	7.7	7.7
Effective Green, g (s)	5.0	25.3	25.3		16.3	16.3	3.6	11.2	11.2	2.1	9.7	9.7
Actuated g/C Ratio	0.10	0.50	0.50		0.32	0.32	0.07	0.22	0.22	0.04	0.19	0.19
Clearance Time (s)	4.0	6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	175	932	792		600	510	126	412	350	73	357	303
v/s Ratio Prot	c0.08	0.25			c0.20		c0.06	c0.02		0.03	0.00	
v/s Ratio Perm			0.01			0.01			0.00			0.01
v/c Ratio	0.85	0.50	0.03		0.62	0.02	0.90	0.11	0.01	0.67	0.03	0.06
Uniform Delay, d1	22.4	8.4	6.4		14.5	11.7	23.3	15.7	15.4	23.9	16.6	16.7
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.7	0.4	0.0		2.0	0.0	49.5	0.1	0.0	21.6	0.0	0.1
Delay (s)	53.1	8.8	6.4		16.6	11.7	72.8	15.8	15.4	45.5	16.6	16.8
Level of Service	D	A	A		B	B	E	B	B	D	B	B
Approach Delay (s)		18.8			16.1			53.2			25.8	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	50.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



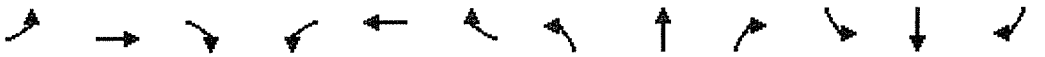
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	299	919	99	10	740	79	243	101	32	99	22	191
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	325	999	108	11	804	86	264	110	35	108	24	208
RTOR Reduction (vph)	0	0	26	0	0	29	0	0	30	0	0	191
Lane Group Flow (vph)	325	999	82	11	804	57	264	110	5	108	24	17
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	25.0	84.8	84.8	1.6	61.4	61.4	20.0	16.0	16.0	12.8	8.8	8.8
Effective Green, g (s)	25.0	86.8	86.8	1.6	63.4	63.4	20.0	18.0	18.0	12.8	10.8	10.8
Actuated g/C Ratio	0.18	0.64	0.64	0.01	0.47	0.47	0.15	0.13	0.13	0.09	0.08	0.08
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	327	1196	1016	21	874	742	262	248	211	168	149	126
v/s Ratio Prot	c0.18	0.54		0.01	c0.43		c0.15	c0.06		0.06	0.01	
v/s Ratio Perm			0.05			0.04			0.00			0.01
v/c Ratio	0.99	0.84	0.08	0.52	0.92	0.08	1.01	0.44	0.02	0.64	0.16	0.13
Uniform Delay, d1	55.0	18.7	9.1	66.4	33.5	19.8	57.6	54.0	50.9	59.0	58.0	57.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.9	5.2	0.0	21.6	14.5	0.0	57.6	1.3	0.0	8.1	0.5	0.5
Delay (s)	102.9	23.9	9.2	88.0	48.0	19.8	115.2	55.3	51.0	67.1	58.5	58.3
Level of Service	F	C	A	F	D	B	F	E	D	E	E	E
Approach Delay (s)		40.7			45.8			93.6			61.1	
Approach LOS		D			D			F			E	

Intersection Summary			
HCM Average Control Delay	51.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	135.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	229	919	99	10	740	79	243	101	32	99	22	191
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	249	999	108	11	804	86	264	110	35	108	24	208
RTOR Reduction (vph)	0	0	56	0	0	58	0	0	28	0	0	181
Lane Group Flow (vph)	249	999	52	11	804	28	264	110	7	108	24	27
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	14.0	37.4	37.4	0.7	24.1	24.1	14.7	15.3	15.3	8.0	8.6	8.6
Effective Green, g (s)	14.0	39.4	39.4	0.7	26.1	26.1	14.7	17.3	17.3	8.0	10.6	10.6
Actuated g/C Ratio	0.17	0.48	0.48	0.01	0.32	0.32	0.18	0.21	0.21	0.10	0.13	0.13
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	304	1713	766	15	1135	508	320	396	336	174	243	206
v/s Ratio Prot	c0.14	0.28		0.01	c0.23		c0.15	c0.06		0.06	0.01	
v/s Ratio Perm			0.03			0.02			0.00			0.02
v/c Ratio	0.82	0.58	0.07	0.73	0.71	0.05	0.82	0.28	0.02	0.62	0.10	0.13
Uniform Delay, d1	32.5	15.1	11.2	40.3	24.3	19.1	32.1	26.8	25.4	35.2	31.2	31.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.6	0.5	0.0	103.2	2.0	0.0	15.7	0.4	0.0	6.7	0.2	0.3
Delay (s)	48.1	15.6	11.2	143.5	26.4	19.2	47.8	27.2	25.4	42.0	31.4	31.6
Level of Service	D	B	B	F	C	B	D	C	C	D	C	C
Approach Delay (s)		21.2			27.1			40.4			34.9	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

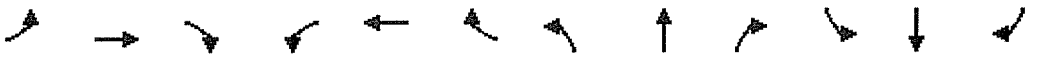


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	299	980	99	10	789	87	260	102	32	116	23	191
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	325	1065	108	11	858	95	283	111	35	126	25	208
RTOR Reduction (vph)	0	0	54	0	0	65	0	0	28	0	0	182
Lane Group Flow (vph)	325	1065	54	11	858	30	283	111	7	126	25	26
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	17.0	41.0	41.0	0.8	24.8	24.8	15.0	14.9	14.9	8.7	8.6	8.6
Effective Green, g (s)	17.0	43.0	43.0	0.8	26.8	26.8	15.0	16.9	16.9	8.7	10.6	10.6
Actuated g/C Ratio	0.20	0.50	0.50	0.01	0.31	0.31	0.18	0.20	0.20	0.10	0.12	0.12
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	352	1782	797	17	1111	497	311	369	313	180	231	196
v/s Ratio Prot	c0.18	0.30		0.01	c0.24		c0.16	c0.06		0.07	0.01	
v/s Ratio Perm			0.03			0.02			0.00			0.02
v/c Ratio	0.92	0.60	0.07	0.65	0.77	0.06	0.91	0.30	0.02	0.70	0.11	0.13
Uniform Delay, d1	33.6	15.1	10.9	42.2	26.5	20.5	34.5	29.2	27.6	37.1	33.2	33.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.1	0.5	0.0	62.0	3.4	0.1	28.7	0.5	0.0	11.6	0.2	0.3
Delay (s)	62.7	15.6	10.9	104.2	29.9	20.5	63.3	29.7	27.6	48.7	33.4	33.6
Level of Service	E	B	B	F	C	C	E	C	C	D	C	C
Approach Delay (s)		25.5			29.9			51.7			38.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	488	1494	170	22	1201	131	406	172	54	163	38	308
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	530	1624	185	24	1305	142	441	187	59	177	41	335
RTOR Reduction (vph)	0	0	52	0	0	53	0	0	49	0	0	307
Lane Group Flow (vph)	530	1624	133	24	1305	89	441	187	10	177	41	28
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	37.0	82.4	82.4	2.4	47.8	47.8	31.0	22.4	22.4	18.9	10.3	10.3
Effective Green, g (s)	37.0	84.4	84.4	2.4	49.8	49.8	31.0	24.4	24.4	18.9	12.3	12.3
Actuated g/C Ratio	0.25	0.58	0.58	0.02	0.34	0.34	0.21	0.17	0.17	0.13	0.08	0.08
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	448	2044	914	29	1206	540	376	311	264	229	157	133
v/s Ratio Prot	c0.30	0.46		0.01	c0.37		c0.25	c0.10		0.10	0.02	
v/s Ratio Perm			0.08			0.06			0.01			0.02
v/c Ratio	1.18	0.79	0.15	0.83	1.08	0.17	1.17	0.60	0.04	0.77	0.26	0.21
Uniform Delay, d1	54.6	24.1	14.2	71.6	48.1	33.6	57.5	56.3	51.0	61.5	62.6	62.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	103.1	2.2	0.1	95.2	51.1	0.1	102.5	3.3	0.1	14.9	0.9	0.8
Delay (s)	157.7	26.3	14.3	166.9	99.3	33.8	160.0	59.6	51.1	76.4	63.5	63.2
Level of Service	F	C	B	F	F	C	F	E	D	E	E	E
Approach Delay (s)		55.1			94.1			123.3			67.4	
Approach LOS		E			F			F			E	

Intersection Summary			
HCM Average Control Delay	77.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	146.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	1583
Volume (vph)	488	1494	170	22	1201	131	406	172	54	163	38	308
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	530	1624	185	24	1305	142	441	187	59	177	41	335
RTOR Reduction (vph)	0	0	94	0	0	95	0	0	48	0	0	229
Lane Group Flow (vph)	530	1624	91	24	1305	47	441	187	11	177	41	106
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.3	40.4	40.4	1.5	26.6	26.6	12.8	13.4	13.4	11.2	11.8	11.8
Effective Green, g (s)	15.3	42.4	42.4	1.5	28.6	28.6	12.8	15.4	15.4	11.2	13.8	13.8
Actuated g/C Ratio	0.18	0.49	0.49	0.02	0.33	0.33	0.15	0.18	0.18	0.13	0.16	0.16
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	607	2493	776	31	1681	523	508	332	282	229	297	253
v/s Ratio Prot	c0.15	0.32		0.01	c0.26		c0.13	c0.10		0.10	0.02	
v/s Ratio Perm			0.06			0.03			0.01			0.07
v/c Ratio	0.87	0.65	0.12	0.77	0.78	0.09	0.87	0.56	0.04	0.77	0.14	0.42
Uniform Delay, d1	34.7	16.5	11.9	42.3	26.1	20.0	36.0	32.5	29.4	36.4	31.2	32.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1	0.6	0.1	73.6	2.3	0.1	14.5	2.2	0.1	14.9	0.2	1.1
Delay (s)	47.8	17.1	12.0	116.0	28.4	20.0	50.6	34.7	29.5	51.3	31.5	33.8
Level of Service	D	B	B	F	C	C	D	C	C	D	C	C
Approach Delay (s)		23.7			29.0			44.4			39.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	1863	1583	1770	1863	1583
Volume (vph)	488	1555	170	22	1250	139	423	173	54	180	39	308
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	530	1690	185	24	1359	151	460	188	59	196	42	335
RTOR Reduction (vph)	0	0	94	0	0	101	0	0	49	0	0	229
Lane Group Flow (vph)	530	1690	91	24	1359	50	460	188	10	196	42	106
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.4	40.8	40.8	1.5	26.9	26.9	13.0	13.3	13.3	11.5	11.8	11.8
Effective Green, g (s)	15.4	42.8	42.8	1.5	28.9	28.9	13.0	15.3	15.3	11.5	13.8	13.8
Actuated g/C Ratio	0.18	0.49	0.49	0.02	0.33	0.33	0.15	0.18	0.18	0.13	0.16	0.16
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	607	2499	778	30	1687	525	512	327	278	234	295	251
v/s Ratio Prot	c0.15	0.33		0.01	c0.27		c0.13	c0.10		0.11	0.02	
v/s Ratio Perm			0.06			0.03			0.01			0.07
v/c Ratio	0.87	0.68	0.12	0.80	0.81	0.10	0.90	0.57	0.04	0.84	0.14	0.42
Uniform Delay, d1	34.9	16.9	12.0	42.7	26.5	20.1	36.4	32.9	29.8	36.9	31.6	33.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.1	0.7	0.1	84.3	2.9	0.1	18.3	2.4	0.1	22.2	0.2	1.2
Delay (s)	48.0	17.6	12.0	126.9	29.4	20.2	54.7	35.4	29.8	59.1	31.8	34.2
Level of Service	D	B	B	F	C	C	D	D	C	E	C	C
Approach Delay (s)		23.9			30.1			47.5			42.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ East Panama Rd/ SR 119 & South Union Ave - AM Peak
Count Date: 9/16/2008

Exist Peak Hour Volumes

S		
1	WBL	5
1	WBT	160
<	WBR	23
1	EBL	78
1	EBT	209
1	EBR	63
1	NBL	52
2	NBT	97
1	NBR	7
1	SBL	55
2	SBT	91
1	SBR	78
	TOTAL	918

Year 2035
Fut. Volumes w/o Proj

WBL	16
WBT	543
WBR	68
EBL	196
EBT	661
EBR	167
NBL	140
NBT	228
NBR	21
SBL	159
SBT	221
SBR	205
TOTAL	2626

Year 2035 Fut. Vol
+ Project Traffic

WBL	68
WBT	543
WBR	68
EBL	196
EBT	661
EBR	231
NBL	159
NBT	260
NBR	48
SBL	159
SBT	390
SBR	205
TOTAL	2989

Year 2020
Fut. Volumes w/o Proj

WBL	10
WBT	329
WBR	43
EBL	130
EBT	408
EBR	109
NBL	91
NBT	155
NBR	13
SBL	101
SBT	148
SBR	134
TOTAL	1670

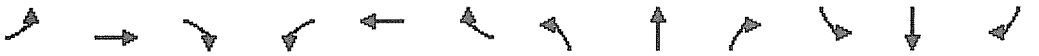
Year 2020 Fut. Vol
+ Project Traffic

WBL	62
WBT	329
WBR	43
EBL	130
EBT	408
EBR	173
NBL	110
NBT	187
NBR	40
SBL	101
SBT	317
SBR	134
TOTAL	2033

Project Generated Trips - Year 2035

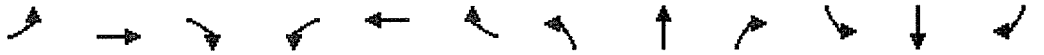
	Total	Indus.	Commer.
WBL	52	46	6
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	64	49	15
NBL	19	13	6
NBT	32	21	11
NBR	27	18	9
SBL	0	0	0
SBT	169	146	23
SBR	0	0	0
TOTAL	363	293	70

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ East Panama Rd/ SR 119 & South Union Ave - AM Peak						
	Count Date:	9/16/2008						
2008	ADT							
WB Approach (To)	2.80							
WB Approach (Away)	2.94							
EB Approach (To)	3.97							
EB Approach (Away)	4.03							
NB Approach (To)	1.99							
NB Approach (Away)	1.95							
SB Approach (To)	2.72							
SB Approach (Away)	2.55							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	10.9		WBL	3.20	WBT	3.42	WBR	3.07
WB Approach (Away)	10.5		4.35%	16	4.66%	543	4.14%	68
EB Approach (To)	11.1		EBL	2.53	EBT	3.19	EBR	2.66
EB Approach (Away)	12.0		3.50%	196	4.39%	661	3.71%	167
NB Approach (To)	4.9		NBL	2.71	NBT	2.35	NBR	3.01
NB Approach (Away)	4.9		3.77%	140	3.24%	228	4.13%	21
SB Approach (To)	6.3		SBL	2.95	SBT	2.43	SBR	2.65
SB Approach (Away)	5.8		4.04%	159	3.36%	221	3.67%	205
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	11.2		WBL	4.49	WBT	3.47	WBR	3.76
WB Approach (Away)	11.8		5.74%	22	4.71%	549	5.06%	86
EB Approach (To)	11.7		EBL	3.24	EBT	3.47	EBR	3.97
EB Approach (Away)	11.9		4.47%	252	4.71%	718	5.15%	242
NB Approach (To)	9.9		NBL	3.96	NBT	4.26	NBR	4.49
NB Approach (Away)	9.7		5.15%	200	5.50%	407	5.74%	31
SB Approach (To)	9.6		SBL	3.77	SBT	4.26	SBR	3.24
SB Approach (Away)	9.0		5.06%	207	5.50%	382	4.47%	252



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1828		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1828		1770	3539	1583	1770	3539	1583
Volume (vph)	78	209	63	5	160	23	52	97	7	55	91	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	227	68	5	174	25	57	105	8	60	99	85
RTOR Reduction (vph)	0	0	48	0	9	0	0	0	5	0	0	58
Lane Group Flow (vph)	85	227	20	5	190	0	57	105	3	60	99	27
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	2.1	11.9	11.9	0.6	10.4		2.1	13.1	13.1	2.1	13.1	13.1
Effective Green, g (s)	2.1	13.9	13.9	0.6	12.4		2.1	15.1	15.1	2.1	15.1	15.1
Actuated g/C Ratio	0.04	0.29	0.29	0.01	0.26		0.04	0.32	0.32	0.04	0.32	0.32
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	78	543	461	22	475		78	1120	501	78	1120	501
v/s Ratio Prot	c0.05	c0.12		0.00	0.10		0.03	c0.03		c0.03	0.03	
v/s Ratio Perm			0.01						0.00			0.02
v/c Ratio	1.09	0.42	0.04	0.23	0.40		0.73	0.09	0.01	0.77	0.09	0.05
Uniform Delay, d1	22.8	13.6	12.1	23.3	14.6		22.5	11.5	11.2	22.6	11.5	11.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	128.5	0.5	0.0	5.2	0.6		29.3	0.0	0.0	35.7	0.0	0.0
Delay (s)	151.3	14.2	12.2	28.5	15.1		51.9	11.5	11.2	58.3	11.5	11.4
Level of Service	F	B	B	C	B		D	B	B	E	B	B
Approach Delay (s)		44.5			15.5			25.0			23.0	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1830		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1830		1770	3539	1583	1770	3539	1583
Volume (vph)	130	408	109	10	329	43	91	155	13	101	148	134
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	443	118	11	358	47	99	168	14	110	161	146
RTOR Reduction (vph)	0	0	67	0	6	0	0	0	11	0	0	119
Lane Group Flow (vph)	141	443	51	11	399	0	99	168	3	110	161	27
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	6.3	23.9	23.9	1.2	18.8		5.5	8.7	8.7	5.6	8.8	8.8
Effective Green, g (s)	6.3	25.9	25.9	1.2	20.8		5.5	10.7	10.7	5.6	10.8	10.8
Actuated g/C Ratio	0.11	0.44	0.44	0.02	0.35		0.09	0.18	0.18	0.09	0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	188	812	690	36	641		164	637	285	167	643	288
v/s Ratio Prot	c0.08	0.24		0.01	c0.22		0.06	c0.05		c0.06	0.05	
v/s Ratio Perm			0.03						0.00			0.02
v/c Ratio	0.75	0.55	0.07	0.31	0.62		0.60	0.26	0.01	0.66	0.25	0.09
Uniform Delay, d1	25.8	12.4	9.8	28.7	16.0		25.9	21.0	20.0	26.0	20.8	20.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.4	0.8	0.0	4.8	1.9		6.1	0.2	0.0	9.0	0.2	0.1
Delay (s)	41.2	13.1	9.8	33.5	17.9		32.0	21.2	20.0	35.0	21.0	20.4
Level of Service	D	B	A	C	B		C	C	C	D	C	C
Approach Delay (s)		18.2			18.3			25.0			24.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1830		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1830		1770	3539	1583	1770	3539	1583
Volume (vph)	130	408	173	62	329	43	110	187	40	101	317	134
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	443	188	67	358	47	120	203	43	110	345	146
RTOR Reduction (vph)	0	0	121	0	6	0	0	0	33	0	0	113
Lane Group Flow (vph)	141	443	67	67	399	0	120	203	10	110	345	33
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	6.3	19.8	19.8	4.1	17.6		5.6	11.8	11.8	5.6	11.8	11.8
Effective Green, g (s)	6.3	21.8	21.8	4.1	19.6		5.6	13.8	13.8	5.6	13.8	13.8
Actuated g/C Ratio	0.10	0.36	0.36	0.07	0.32		0.09	0.23	0.23	0.09	0.23	0.23
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	182	663	563	118	585		162	797	356	162	797	356
v/s Ratio Prot	c0.08	c0.24		0.04	0.22		c0.07	0.06		0.06	c0.10	
v/s Ratio Perm			0.04						0.01			0.02
v/c Ratio	0.77	0.67	0.12	0.57	0.68		0.74	0.25	0.03	0.68	0.43	0.09
Uniform Delay, d1	26.8	16.7	13.3	27.7	18.1		27.1	19.5	18.5	27.0	20.4	18.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.4	2.6	0.1	6.1	3.3		16.6	0.2	0.0	10.8	0.4	0.1
Delay (s)	45.2	19.3	13.4	33.9	21.4		43.7	19.7	18.5	37.7	20.8	18.9
Level of Service	D	B	B	C	C		D	B	B	D	C	B
Approach Delay (s)		22.6			23.2			27.4			23.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1832		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1832		1770	3539	1583	1770	3539	1583
Volume (vph)	196	661	167	16	543	68	140	228	21	159	221	205
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	711	180	17	590	74	152	248	23	173	240	223
RTOR Reduction (vph)	0	0	84	0	4	0	0	0	20	0	0	188
Lane Group Flow (vph)	211	711	96	17	660	0	152	248	3	173	240	35
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	12.8	46.9	46.9	2.8	36.9		9.8	11.5	11.5	10.8	12.5	12.5
Effective Green, g (s)	12.8	48.9	48.9	2.8	38.9		9.8	13.5	13.5	10.8	14.5	14.5
Actuated g/C Ratio	0.14	0.53	0.53	0.03	0.42		0.11	0.15	0.15	0.12	0.16	0.16
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	246	990	841	54	775		189	519	232	208	558	249
v/s Ratio Prot	c0.12	0.38		0.01	c0.36		0.09	c0.07		c0.10	0.07	
v/s Ratio Perm			0.06						0.00			0.02
v/c Ratio	0.86	0.72	0.11	0.31	0.85		0.80	0.48	0.01	0.83	0.43	0.14
Uniform Delay, d1	38.7	16.3	10.7	43.7	23.9		40.2	36.0	33.6	39.7	35.0	33.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.3	2.5	0.1	3.3	8.9		21.4	0.7	0.0	23.7	0.5	0.3
Delay (s)	63.0	18.8	10.8	47.0	32.9		61.6	36.7	33.6	63.4	35.6	33.6
Level of Service	E	B	B	D	C		E	D	C	E	D	C
Approach Delay (s)		26.0			33.2			45.5			42.5	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	34.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	92.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1832		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1832		1770	3539	1583	1770	3539	1583
Volume (vph)	196	661	231	68	543	68	159	260	48	159	390	205
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	211	711	248	74	590	74	173	283	52	171	419	220
RTOR Reduction (vph)	0	0	138	0	5	0	0	0	42	0	0	176
Lane Group Flow (vph)	211	711	110	74	659	0	173	283	10	171	419	44
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	11.0	36.7	36.7	6.2	31.9		9.0	15.3	15.3	9.0	15.3	15.3
Effective Green, g (s)	11.0	38.7	38.7	6.2	33.9		9.0	17.3	17.3	9.0	17.3	17.3
Actuated g/C Ratio	0.13	0.44	0.44	0.07	0.39		0.10	0.20	0.20	0.10	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	223	827	703	126	712		183	702	314	183	702	314
v/s Ratio Prot	c0.12	0.38		0.04	c0.36		c0.10	0.08		0.10	c0.12	
v/s Ratio Perm			0.07						0.01			0.03
v/c Ratio	0.95	0.86	0.16	0.59	0.93		0.95	0.40	0.03	0.93	0.60	0.14
Uniform Delay, d1	37.8	21.8	14.5	39.3	25.4		38.9	30.5	28.2	38.8	31.8	28.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	44.9	8.9	0.1	6.8	17.9		50.4	0.4	0.0	47.6	1.4	0.2
Delay (s)	82.7	30.7	14.6	46.1	43.3		89.3	30.8	28.2	86.4	33.2	29.0
Level of Service	F	C	B	D	D		F	C	C	F	C	C
Approach Delay (s)		36.7			43.6			50.5			43.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	42.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	196	661	231	68	543	68	159	260	48	159	390	205
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	211	711	248	74	590	74	173	283	52	171	419	220
RTOR Reduction (vph)	0	0	144	0	0	47	0	0	42	0	0	176
Lane Group Flow (vph)	211	711	104	74	590	27	173	283	10	171	419	44
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	11.8	33.8	33.8	6.7	28.7	28.7	10.0	15.2	15.2	9.9	15.1	15.1
Effective Green, g (s)	11.8	35.8	35.8	6.7	30.7	30.7	10.0	17.2	17.2	9.9	17.1	17.1
Actuated g/C Ratio	0.14	0.42	0.42	0.08	0.36	0.36	0.12	0.20	0.20	0.12	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	244	1480	662	139	668	568	207	711	318	205	707	316
v/s Ratio Prot	c0.12	0.20		0.04	c0.32		c0.10	0.08		0.10	c0.12	
v/s Ratio Perm			0.07			0.02			0.01			0.03
v/c Ratio	0.86	0.48	0.16	0.53	0.88	0.05	0.84	0.40	0.03	0.83	0.59	0.14
Uniform Delay, d1	36.1	18.1	15.5	37.9	25.8	17.9	37.0	29.7	27.5	37.0	31.1	28.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.7	0.2	0.1	3.9	13.2	0.0	24.3	0.4	0.0	24.3	1.3	0.2
Delay (s)	61.8	18.4	15.6	41.8	38.9	17.9	61.2	30.1	27.6	61.3	32.4	28.4
Level of Service	E	B	B	D	D	B	E	C	C	E	C	C
Approach Delay (s)		25.6			37.1			40.4			37.4	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Taft Hwy/ East Panama Rd/ SR 119 & South Union Ave - PM Peak
Count Date: 9/16/2008

Exist Peak Hour Volumes

S		
1	WBL	6
1	WBT	176
<	WBR	52
1	EBL	96
1	EBT	248
1	EBR	53
1	NBL	72
2	NBT	164
1	NBR	15
1	SBL	83
2	SBT	120
1	SBR	58
	TOTAL	1143

Year 2035
Fut. Volumes w/o Proj

WBL	18
WBT	634
WBR	147
EBL	247
EBT	833
EBR	144
NBL	198
NBT	354
NBR	42
SBL	229
SBT	267
SBR	156
TOTAL	3270

Year 2035 Fut. Vol
+ Project Traffic

WBL	66
WBT	634
WBR	147
EBL	247
EBT	833
EBR	238
NBL	267
NBT	419
NBR	103
SBL	229
SBT	370
SBR	156
TOTAL	3710

Year 2020
Fut. Volumes w/o Proj

WBL	11
WBT	377
WBR	94
EBL	163
EBT	505
EBR	93
NBL	128
NBT	248
NBR	27
SBL	147
SBT	185
SBR	101
TOTAL	2079

Year 2020 Fut. Vol
+ Project Traffic

WBL	59
WBT	377
WBR	94
EBL	163
EBT	505
EBR	187
NBL	197
NBT	313
NBR	88
SBL	147
SBT	288
SBR	101
TOTAL	2519

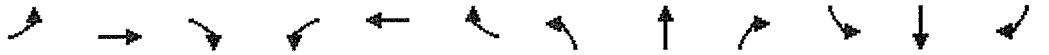
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	48	37	11
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	94	70	24
NBL	69	59	10
NBT	65	48	17
NBR	61	45	16
SBL	0	0	0
SBT	103	61	42
SBR	0	0	0
TOTAL	440	320	120

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Taft Hwy/ East Panama Rd/ SR 119 & South Union Ave - PM Peak						
	Count Date:	9/16/2008						
2008	ADT							
WB Approach (To)	2.83							
WB Approach (Away)	2.97							
EB Approach (To)	3.49							
EB Approach (Away)	3.54							
NB Approach (To)	2.17							
NB Approach (Away)	2.13							
SB Approach (To)	2.96							
SB Approach (Away)	2.77							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	10.9		WBL	3.07	WBT	3.61	WBR	2.96
WB Approach (Away)	10.5		4.16%	18	4.90%	634	3.96%	147
EB Approach (To)	11.1		EBL	2.63	EBT	3.36	EBR	2.75
EB Approach (Away)	12.0		3.60%	247	4.62%	833	3.79%	144
NB Approach (To)	4.9		NBL	2.81	NBT	2.16	NBR	2.89
NB Approach (Away)	4.9		3.85%	198	2.92%	354	3.94%	42
SB Approach (To)	6.3		SBL	2.84	SBT	2.23	SBR	2.76
SB Approach (Away)	5.8		3.86%	229	3.03%	267	3.76%	156
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	11.2		WBL	4.26	WBT	3.65	WBR	3.60
WB Approach (Away)	11.8		5.54%	25	4.94%	641	4.88%	186
EB Approach (To)	11.7		EBL	3.31	EBT	3.66	EBR	3.96
EB Approach (Away)	11.9		4.56%	317	4.94%	904	5.23%	208
NB Approach (To)	9.9		NBL	3.96	NBT	3.91	NBR	4.26
NB Approach (Away)	9.7		5.23%	282	5.17%	633	5.55%	64
SB Approach (To)	9.6		SBL	3.60	SBT	3.91	SBR	3.30
SB Approach (Away)	9.0		4.88%	298	5.16%	462	4.56%	192

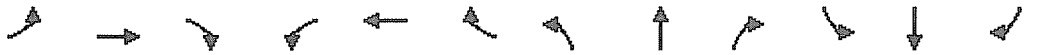
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1799		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1799		1770	3539	1583	1770	3539	1583
Volume (vph)	96	248	53	6	176	52	72	164	15	83	120	58
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	270	58	7	191	57	78	178	16	90	130	63
RTOR Reduction (vph)	0	0	38	0	19	0	0	0	12	0	0	46
Lane Group Flow (vph)	104	270	20	7	229	0	78	178	4	90	130	17
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	5.3	15.6	15.6	0.7	11.0		2.2	11.1	11.1	3.0	11.9	11.9
Effective Green, g (s)	5.3	17.6	17.6	0.7	13.0		2.2	13.1	13.1	3.0	13.9	13.9
Actuated g/C Ratio	0.11	0.35	0.35	0.01	0.26		0.04	0.26	0.26	0.06	0.28	0.28
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	186	651	553	25	464		77	920	411	105	976	437
v/s Ratio Prot	c0.06	c0.14		0.00	0.13		0.04	c0.05		c0.05	0.04	
v/s Ratio Perm			0.01						0.00			0.01
v/c Ratio	0.56	0.41	0.04	0.28	0.49		1.01	0.19	0.01	0.86	0.13	0.04
Uniform Delay, d1	21.4	12.5	10.8	24.6	15.9		24.1	14.5	13.8	23.5	13.7	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6	0.4	0.0	6.0	0.8		106.2	0.1	0.0	45.7	0.1	0.0
Delay (s)	25.1	12.9	10.8	30.6	16.7		130.3	14.6	13.8	69.2	13.8	13.4
Level of Service	C	B	B	C	B		F	B	B	E	B	B
Approach Delay (s)		15.6			17.1			47.8			31.3	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1807		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1807		1770	3539	1583	1770	3539	1583
Volume (vph)	163	505	93	11	377	94	128	248	27	147	185	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	549	101	12	410	102	139	270	29	160	201	110
RTOR Reduction (vph)	0	0	52	0	11	0	0	0	24	0	0	87
Lane Group Flow (vph)	177	549	49	12	501	0	139	270	5	160	201	23
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	9.6	34.2	34.2	0.7	25.3		6.9	11.7	11.7	8.7	13.5	13.5
Effective Green, g (s)	9.6	36.2	36.2	0.7	27.3		6.9	13.7	13.7	8.7	15.5	15.5
Actuated g/C Ratio	0.13	0.48	0.48	0.01	0.36		0.09	0.18	0.18	0.12	0.21	0.21
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	226	896	761	16	655		162	644	288	205	728	326
v/s Ratio Prot	c0.10	0.29		0.01	c0.28		0.08	c0.08		c0.09	0.06	
v/s Ratio Perm			0.03						0.00			0.01
v/c Ratio	0.78	0.61	0.06	0.75	0.77		0.86	0.42	0.02	0.78	0.28	0.07
Uniform Delay, d1	31.8	14.4	10.5	37.2	21.2		33.7	27.3	25.3	32.4	25.2	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.1	1.2	0.0	106.0	5.3		33.5	0.4	0.0	17.3	0.2	0.1
Delay (s)	47.9	15.6	10.5	143.2	26.5		67.2	27.7	25.3	49.7	25.4	24.2
Level of Service	D	B	B	F	C		E	C	C	D	C	C
Approach Delay (s)		21.9			29.2			40.1			33.4	
Approach LOS		C			C			D			C	

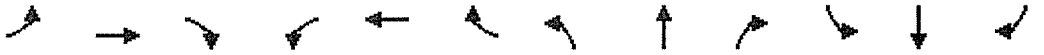
Intersection Summary			
HCM Average Control Delay	29.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1807		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1807		1770	3539	1583	1770	3539	1583
Volume (vph)	163	505	187	59	377	94	197	313	88	147	288	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	549	203	64	410	102	214	340	96	160	313	110
RTOR Reduction (vph)	0	0	114	0	9	0	0	0	75	0	0	89
Lane Group Flow (vph)	177	549	89	64	503	0	214	340	21	160	313	21
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	12.2	34.3	34.3	3.0	25.1		12.3	16.5	16.5	9.3	13.5	13.5
Effective Green, g (s)	12.2	36.3	36.3	3.0	27.1		12.3	18.5	18.5	9.3	15.5	15.5
Actuated g/C Ratio	0.15	0.44	0.44	0.04	0.33		0.15	0.22	0.22	0.11	0.19	0.19
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	260	814	691	64	589		262	788	352	198	660	295
v/s Ratio Prot	c0.10	0.29		0.04	c0.28		c0.12	c0.10		0.09	0.09	
v/s Ratio Perm			0.06						0.01			0.01
v/c Ratio	0.68	0.67	0.13	1.00	0.85		0.82	0.43	0.06	0.81	0.47	0.07
Uniform Delay, d1	33.6	18.7	14.0	40.0	26.1		34.3	27.8	25.5	36.0	30.2	27.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.1	2.2	0.1	112.5	11.5		17.6	0.4	0.1	20.9	0.5	0.1
Delay (s)	40.7	20.9	14.0	152.6	37.6		51.9	28.2	25.5	57.0	30.7	28.0
Level of Service	D	C	B	F	D		D	C	C	E	C	C
Approach Delay (s)		23.2			50.4			35.6			37.4	
Approach LOS		C			D			D			D	

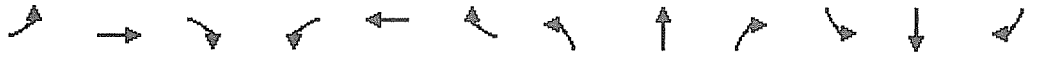
Intersection Summary			
HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



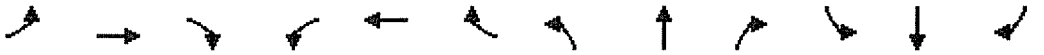
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1810		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1810		1770	3539	1583	1770	3539	1583
Volume (vph)	247	833	144	18	634	147	198	354	42	229	267	156
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	905	157	20	689	160	215	385	46	249	290	170
RTOR Reduction (vph)	0	0	47	0	6	0	0	0	40	0	0	147
Lane Group Flow (vph)	268	905	110	20	843	0	215	385	6	249	290	23
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	21.0	84.2	84.2	2.4	65.6		18.0	16.0	16.0	19.0	17.0	17.0
Effective Green, g (s)	21.0	86.2	86.2	2.4	67.6		18.0	18.0	18.0	19.0	19.0	19.0
Actuated g/C Ratio	0.15	0.61	0.61	0.02	0.48		0.13	0.13	0.13	0.13	0.13	0.13
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	263	1134	964	30	864		225	450	201	238	475	212
v/s Ratio Prot	c0.15	0.49		0.01	c0.47		0.12	c0.11		c0.14	0.08	
v/s Ratio Perm			0.07						0.00			0.01
v/c Ratio	1.02	0.80	0.11	0.67	0.98		0.96	0.86	0.03	1.05	0.61	0.11
Uniform Delay, d1	60.3	21.1	11.6	69.2	36.2		61.4	60.5	54.1	61.3	57.8	53.9
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	60.5	4.0	0.1	44.1	24.6		47.1	14.7	0.1	71.0	2.3	0.2
Delay (s)	120.8	25.1	11.7	113.3	60.8		108.5	75.2	54.2	132.3	60.1	54.1
Level of Service	F	C	B	F	E		F	E	D	F	E	D
Approach Delay (s)		42.8			62.0			84.8			84.0	
Approach LOS		D			E			F			F	

Intersection Summary			
HCM Average Control Delay	63.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	141.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	247	833	144	18	634	147	198	354	42	229	267	156
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	905	157	20	689	160	215	385	46	249	290	170
RTOR Reduction (vph)	0	0	88	0	0	115	0	0	38	0	0	136
Lane Group Flow (vph)	268	905	69	20	689	45	215	385	8	249	290	34
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	15.3	35.1	35.1	1.8	21.6	21.6	12.8	13.5	13.5	14.4	15.1	15.1
Effective Green, g (s)	15.3	37.1	37.1	1.8	23.6	23.6	12.8	15.5	15.5	14.4	17.1	17.1
Actuated g/C Ratio	0.18	0.44	0.44	0.02	0.28	0.28	0.15	0.18	0.18	0.17	0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	319	1548	693	38	985	441	267	647	289	301	714	319
v/s Ratio Prot	c0.15	0.26		0.01	c0.19		0.12	c0.11		c0.14	0.08	
v/s Ratio Perm			0.04			0.03			0.01			0.02
v/c Ratio	0.84	0.58	0.10	0.53	0.70	0.10	0.81	0.60	0.03	0.83	0.41	0.11
Uniform Delay, d1	33.6	18.0	14.0	41.1	27.4	22.7	34.8	31.8	28.5	34.0	29.4	27.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.7	0.6	0.1	12.5	2.2	0.1	16.0	1.5	0.0	16.8	0.4	0.1
Delay (s)	51.3	18.6	14.1	53.6	29.6	22.8	50.8	33.2	28.5	50.8	29.8	27.8
Level of Service	D	B	B	D	C	C	D	C	C	D	C	C
Approach Delay (s)		24.6			28.9			38.8			36.7	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	247	833	238	66	634	147	267	419	103	229	370	156
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	905	259	72	689	160	290	455	112	249	402	170
RTOR Reduction (vph)	0	0	162	0	0	120	0	0	89	0	0	137
Lane Group Flow (vph)	268	905	97	72	689	40	290	455	23	249	402	33
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	14.2	28.5	28.5	3.8	18.1	18.1	15.2	15.0	15.0	13.9	13.7	13.7
Effective Green, g (s)	14.2	30.5	30.5	3.8	20.1	20.1	15.2	17.0	17.0	13.9	15.7	15.7
Actuated g/C Ratio	0.17	0.38	0.38	0.05	0.25	0.25	0.19	0.21	0.21	0.17	0.19	0.19
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	310	1329	595	83	876	392	331	741	331	303	684	306
v/s Ratio Prot	c0.15	0.26		0.04	c0.19		c0.16	c0.13		0.14	0.11	
v/s Ratio Perm			0.06			0.03			0.01			0.02
v/c Ratio	0.86	0.68	0.16	0.87	0.79	0.10	0.88	0.61	0.07	0.82	0.59	0.11
Uniform Delay, d1	32.6	21.3	16.9	38.4	28.5	23.6	32.1	29.1	25.8	32.5	29.8	27.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.3	1.5	0.1	56.5	4.7	0.1	21.9	1.5	0.1	16.2	1.3	0.2
Delay (s)	53.9	22.7	17.0	95.0	33.3	23.7	54.0	30.6	25.9	48.7	31.1	27.1
Level of Service	D	C	B	F	C	C	D	C	C	D	C	C
Approach Delay (s)		27.5			36.4			37.9			35.6	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	33.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: East Panama Rd & Cottonwood Rd - AM Peak
Count Date: 9/17/2008

Exist Peak Hour Volumes

AWS		
>	WBL	2
1	WBT	170
1	WBR	31
>	EBL	16
1	EBT	235
1	EBR	3
>	NBL	9
1	NBT	19
1	NBR	2
>	SBL	31
1	SBT	35
1	SBR	10
TOTAL		563

Year 2035
Fut. Volumes w/o Proj

WBL	3
WBT	635
WBR	68
EBL	36
EBT	829
EBR	4
NBL	12
NBT	15
NBR	3
SBL	73
SBT	30
SBR	25
TOTAL	1731

Year 2035 Fut. Vol
+ Project Traffic

WBL	26
WBT	661
WBR	68
EBL	41
EBT	846
EBR	4
NBL	12
NBT	18
NBR	7
SBL	73
SBT	54
SBR	47
TOTAL	1855

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	375
WBR	47
EBL	25
EBT	496
EBR	3
NBL	10
NBT	17
NBR	2
SBL	49
SBT	33
SBR	17
TOTAL	1077

Year 2020 Fut. Vol
+ Project Traffic

WBL	25
WBT	401
WBR	47
EBL	30
EBT	513
EBR	3
NBL	10
NBT	20
NBR	6
SBL	49
SBT	57
SBR	39
TOTAL	1201

Project Generated Trips - Year 2035

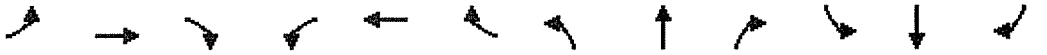
	Total	Indus.	Commer.
WBL	23	21	2
WBT	26	23	3
WBR	0	0	0
EBL	5	2	3
EBT	17	14	3
EBR	0	0	0
NBL	0	0	0
NBT	3	2	1
NBR	4	2	2
SBL	0	0	0
SBT	24	19	5
SBR	22	20	2
TOTAL	124	103	21

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	East Panama Rd & Cottonwood Rd - AM Peak						
	Count Date:	9/17/2008						
2008	ADT							
WB Approach (To)	2.98							
WB Approach (Away)	2.91							
EB Approach (To)	2.83							
EB Approach (Away)	2.70							
NB Approach (To)	0.40							
NB Approach (Away)	0.48							
SB Approach (To)	0.75							
SB Approach (Away)	1.03							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	10.5		WBL	1.97	WBT	3.74	WBR	2.43
WB Approach (Away)	9.9		0.86%	3	5.04%	635	2.96%	68
EB Approach (To)	10.3		EBL	2.50	EBT	3.53	EBR	2.04
EB Approach (Away)	10.7		3.03%	36	4.82%	829	0.94%	4
NB Approach (To)	0.2		NBL	2.21	NBT	0.90	NBR	1.93
NB Approach (Away)	0.2		1.18%	12	-0.90%	15	0.88%	3
SB Approach (To)	1.2		SBL	2.51	SBT	1.03	SBR	2.79
SB Approach (Away)	1.4		3.25%	73	-0.63%	30	3.55%	25
2035	ADT with Proj		2008	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	10.1		WBL	1.92	WBT	3.72	WBR	2.99
WB Approach (Away)	9.8		0.89%	3	5.01%	630	4.14%	92
EB Approach (To)	11.5		EBL	3.34	EBT	3.72	EBR	2.26
EB Approach (Away)	11.0		4.51%	52	5.01%	871	1.25%	4
NB Approach (To)	0.2		NBL	2.27	NBT	1.54	NBR	1.92
NB Approach (Away)	0.2		1.27%	13	0.40%	21	0.90%	3
SB Approach (To)	1.9		SBL	2.98	SBT	1.53	SBR	3.33
SB Approach (Away)	2.7		4.13%	92	0.38%	39	4.50%	33

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	16	235	3	2	170	31	9	19	2	31	35	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	255	3	2	185	34	10	21	2	34	38	11

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	273	3	187	34	30	2	72	11
Volume Left (vph)	17	0	2	0	10	0	34	0
Volume Right (vph)	0	3	0	34	0	2	0	11
Hadj (s)	0.07	-0.67	0.04	-0.67	0.19	-0.67	0.27	-0.67
Departure Headway (s)	5.1	4.4	5.1	4.4	6.0	5.1	6.0	5.1
Degree Utilization, x	0.39	0.00	0.27	0.04	0.05	0.00	0.12	0.02
Capacity (veh/h)	683	794	680	785	553	636	556	651
Control Delay (s)	10.1	6.2	8.7	6.4	8.1	6.9	8.6	6.9
Approach Delay (s)	10.0		8.4		8.0		8.4	
Approach LOS	B		A		A		A	

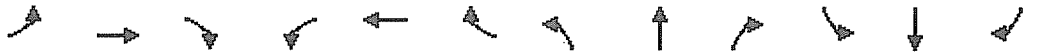
Intersection Summary				
Delay	9.1			
HCM Level of Service	A			
Intersection Capacity Utilization	42.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	496	3	2	375	47	10	17	2	49	33	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	539	3	2	408	51	11	18	2	53	36	18

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	566	3	410	51	29	2	89	18
Volume Left (vph)	27	0	2	0	11	0	53	0
Volume Right (vph)	0	3	0	51	0	2	0	18
Hadj (s)	0.06	-0.67	0.04	-0.67	0.22	-0.67	0.33	-0.67
Departure Headway (s)	5.5	4.8	5.6	4.9	7.4	6.5	7.3	6.3
Degree Utilization, x	0.87	0.00	0.64	0.07	0.06	0.00	0.18	0.03
Capacity (veh/h)	641	721	629	706	448	500	457	525
Control Delay (s)	32.9	6.6	16.7	7.1	9.7	8.4	10.7	8.3
Approach Delay (s)	32.7		15.6		9.6		10.3	
Approach LOS	D		C		A		B	

Intersection Summary				
Delay	23.3			
HCM Level of Service	C			
Intersection Capacity Utilization	64.3%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	30	513	3	25	401	47	10	20	6	49	57	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	558	3	27	436	51	11	22	7	53	62	42

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	590	3	463	51	33	7	115	42
Volume Left (vph)	33	0	27	0	11	0	53	0
Volume Right (vph)	0	3	0	51	0	7	0	42
Hadj (s)	0.06	-0.67	0.06	-0.67	0.20	-0.67	0.27	-0.67
Departure Headway (s)	5.9	5.1	5.9	5.2	7.8	7.0	7.5	6.6
Degree Utilization, x	0.96	0.00	0.76	0.07	0.07	0.01	0.24	0.08
Capacity (veh/h)	608	674	596	670	417	472	452	513
Control Delay (s)	49.9	7.0	24.4	7.4	10.2	8.9	11.7	9.0
Approach Delay (s)	49.7		22.7		10.0		11.0	
Approach LOS	E		C		B		B	

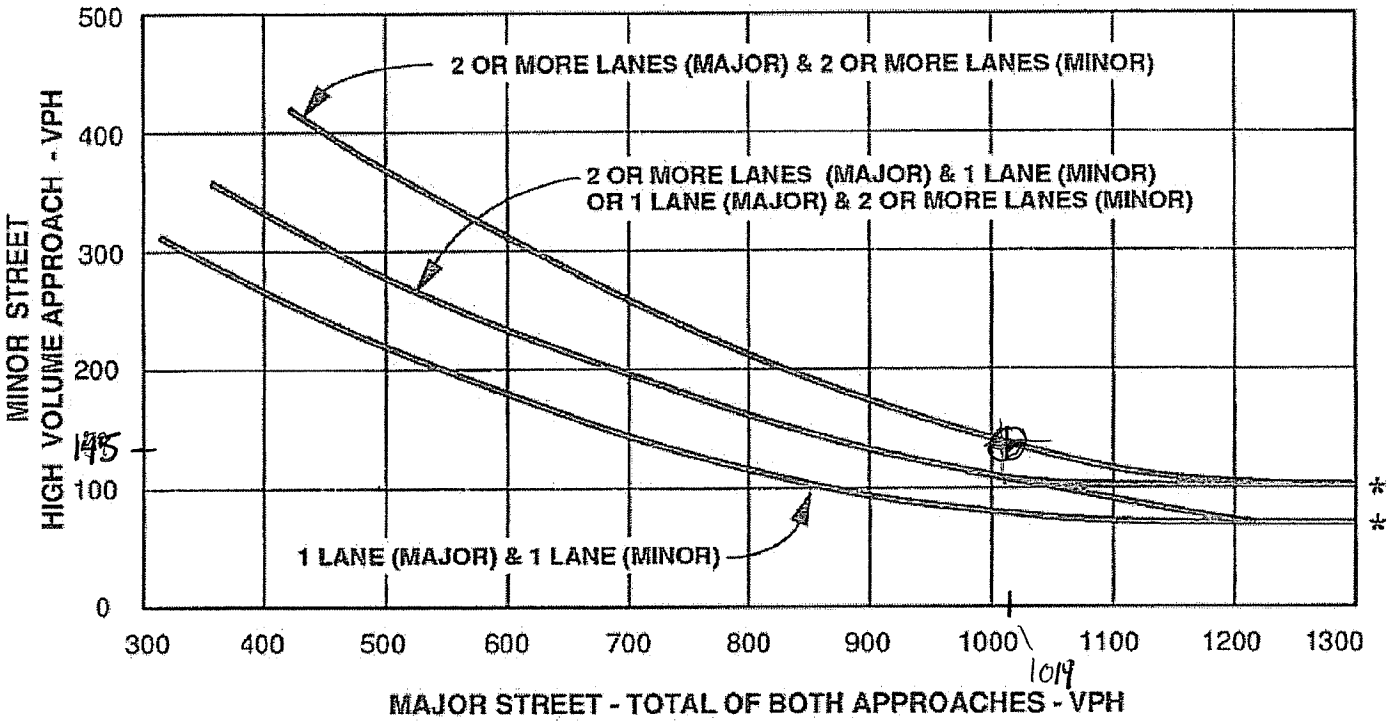
Intersection Summary			
Delay	33.2		
HCM Level of Service	D		
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

East Panama Rd + Cottonwood Rd

2020 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



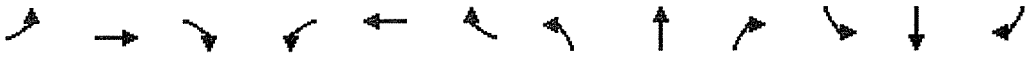
*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

SATISFIED YES ☒ NO ☐

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		0.98	1.00		0.98	1.00
Satd. Flow (prot)		1858	1583		1857	1583		1832	1583		1821	1583
Flt Permitted		0.96	1.00		0.95	1.00		0.88	1.00		0.85	1.00
Satd. Flow (perm)		1787	1583		1770	1583		1645	1583		1574	1583
Volume (vph)	30	513	3	25	401	47	10	20	6	49	57	39
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	558	3	27	436	51	11	22	7	53	62	42
RTOR Reduction (vph)	0	0	1	0	0	25	0	0	5	0	0	30
Lane Group Flow (vph)	0	591	2	0	463	26	0	33	2	0	115	12
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		16.2	16.2		16.2	16.2		8.1	8.1		8.1	8.1
Effective Green, g (s)		18.2	18.2		18.2	18.2		10.1	10.1		10.1	10.1
Actuated g/C Ratio		0.50	0.50		0.50	0.50		0.28	0.28		0.28	0.28
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		896	794		887	794		458	440		438	440
v/s Ratio Prot												
v/s Ratio Perm		c0.33	0.00		0.26	0.02		0.02	0.00		c0.07	0.01
v/c Ratio		0.66	0.00		0.52	0.03		0.07	0.00		0.26	0.03
Uniform Delay, d1		6.7	4.5		6.1	4.6		9.6	9.5		10.2	9.5
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.8	0.0		0.6	0.0		0.1	0.0		0.3	0.0
Delay (s)		8.5	4.5		6.7	4.6		9.7	9.5		10.5	9.6
Level of Service		A	A		A	A		A	A		B	A
Approach Delay (s)		8.5			6.5			9.7			10.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	36.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00
Satd. Flow (prot)		1859	1583		1862	1583		1822	1583		1799	1583
Flt Permitted		0.96	1.00		1.00	1.00		0.85	1.00		0.77	1.00
Satd. Flow (perm)		1785	1583		1857	1583		1592	1583		1438	1583
Volume (vph)	36	829	4	3	635	68	12	15	3	73	30	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	901	4	3	690	74	13	16	3	79	33	27
RTOR Reduction (vph)	0	0	1	0	0	28	0	0	2	0	0	21
Lane Group Flow (vph)	0	940	3	0	693	46	0	29	1	0	112	6
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		30.8	30.8		30.8	30.8		9.5	9.5		9.5	9.5
Effective Green, g (s)		32.8	32.8		32.8	32.8		11.5	11.5		11.5	11.5
Actuated g/C Ratio		0.63	0.63		0.63	0.63		0.22	0.22		0.22	0.22
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1119	993		1165	993		350	348		316	348
v/s Ratio Prot												
v/s Ratio Perm		c0.53	0.00		0.37	0.03		0.02	0.00		c0.08	0.00
v/c Ratio		0.84	0.00		0.59	0.05		0.08	0.00		0.35	0.02
Uniform Delay, d1		7.7	3.6		5.8	3.7		16.2	15.9		17.3	16.0
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		5.8	0.0		0.8	0.0		0.1	0.0		0.7	0.0
Delay (s)		13.5	3.6		6.6	3.8		16.3	15.9		17.9	16.0
Level of Service		B	A		A	A		B	B		B	B
Approach Delay (s)		13.5			6.3			16.3			17.6	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		0.98	1.00		0.97	1.00
Satd. Flow (prot)		1858	1583		1859	1583		1827	1583		1811	1583
Flt Permitted		0.95	1.00		0.87	1.00		0.86	1.00		0.80	1.00
Satd. Flow (perm)		1765	1583		1625	1583		1611	1583		1498	1583
Volume (vph)	41	846	4	26	661	68	12	18	7	73	54	47
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	920	4	28	718	74	13	20	8	79	59	51
RTOR Reduction (vph)	0	0	1	0	0	27	0	0	6	0	0	40
Lane Group Flow (vph)	0	965	3	0	746	47	0	33	2	0	138	11
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		33.9	33.9		33.9	33.9		10.3	10.3		10.3	10.3
Effective Green, g (s)		35.9	35.9		35.9	35.9		12.3	12.3		12.3	12.3
Actuated g/C Ratio		0.64	0.64		0.64	0.64		0.22	0.22		0.22	0.22
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1127	1011		1038	1011		353	346		328	346
v/s Ratio Prot												
v/s Ratio Perm		c0.55	0.00		0.46	0.03		0.02	0.00		c0.09	0.01
v/c Ratio		0.86	0.00		0.72	0.05		0.09	0.01		0.42	0.03
Uniform Delay, d1		8.1	3.7		6.8	3.8		17.5	17.2		18.9	17.3
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		6.6	0.0		2.4	0.0		0.1	0.0		0.9	0.0
Delay (s)		14.7	3.7		9.2	3.8		17.6	17.2		19.8	17.3
Level of Service		B	A		A	A		B	B		B	B
Approach Delay (s)		14.6			8.7			17.5			19.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: East Panama Rd & Cottonwood Rd - PM Peak
Count Date: 9/17/2008

Exist Peak Hour Volumes

AWS		
>	WBL	2
1	WBT	227
1	WBR	52
>	EBL	29
1	EBT	279
1	EBR	2
>	NBL	4
1	NBT	96
1	NBR	5
>	SBL	44
1	SBT	59
1	SBR	14
	TOTAL	813

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	832
WBR	87
EBL	50
EBT	966
EBR	2
NBL	4
NBT	42
NBR	5
SBL	80
SBT	28
SBR	28
TOTAL	2127

Year 2035 Fut. Vol
+ Project Traffic

WBL	12
WBT	862
WBR	87
EBL	59
EBT	1010
EBR	2
NBL	4
NBT	64
NBR	46
SBL	80
SBT	40
SBR	41
TOTAL	2308

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	493
WBR	68
EBL	38
EBT	581
EBR	2
NBL	4
NBT	72
NBR	5
SBL	60
SBT	45
SBR	20
TOTAL	1391

Year 2020 Fut. Vol
+ Project Traffic

WBL	12
WBT	523
WBR	68
EBL	47
EBT	625
EBR	2
NBL	4
NBT	94
NBR	46
SBL	60
SBT	57
SBR	33
TOTAL	1572

Project Generated Trips - Year 2035

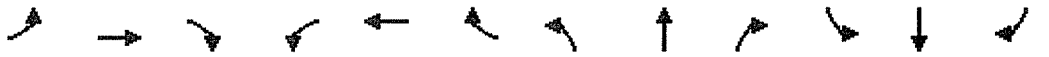
	Total	Indus.	Commer.
WBL	10	10	0
WBT	30	24	6
WBR	0	0	0
EBL	9	5	4
EBT	44	36	8
EBR	0	0	0
NBL	0	0	0
NBT	22	17	5
NBR	41	33	8
SBL	0	0	0
SBT	12	12	0
SBR	13	11	2
TOTAL	181	148	33

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	East Panama Rd & Cottonwood Rd - PM Peak						
	Count Date:	9/17/2008						
2008	ADT							
WB Approach (To)	3.08							
WB Approach (Away)	3.01							
EB Approach (To)	2.84							
EB Approach (Away)	2.71							
NB Approach (To)	0.77							
NB Approach (Away)	0.91							
SB Approach (To)	1.24							
SB Approach (Away)	1.70							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	10.5		WBL	1.81	WBT	3.68	WBR	2.11
WB Approach (Away)	9.9		-0.34%	2	4.97%	832	1.96%	87
EB Approach (To)	10.3		EBL	2.23	EBT	3.47	EBR	1.94
EB Approach (Away)	10.7		2.09%	50	4.74%	966	-0.21%	2
NB Approach (To)	0.2		NBL	2.09	NBT	0.53	NBR	1.76
NB Approach (Away)	0.2		0.00%	4	-3.01%	42	-0.36%	5
SB Approach (To)	1.2		SBL	2.14	SBT	0.60	SBR	2.47
SB Approach (Away)	1.4		2.24%	80	-2.72%	28	2.59%	28
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	10.1		WBL	1.75	WBT	3.66	WBR	2.42
WB Approach (Away)	9.8		-0.32%	2	4.94%	826	3.12%	118
EB Approach (To)	11.5		EBL	2.82	EBT	3.66	EBR	2.15
EB Approach (Away)	11.0		3.54%	74	4.93%	1014	0.10%	2
NB Approach (To)	0.2		NBL	2.15	NBT	0.91	NBR	1.75
NB Approach (Away)	0.2		0.09%	4	-1.73%	60	-0.34%	5
SB Approach (To)	1.9		SBL	2.42	SBT	0.91	SBR	2.81
SB Approach (Away)	2.7		3.10%	100	-1.73%	37	3.53%	35

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	29	279	2	2	227	52	4	96	5	44	59	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	303	2	2	247	57	4	104	5	48	64	15

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	335	2	249	57	109	5	112	15
Volume Left (vph)	32	0	2	0	4	0	48	0
Volume Right (vph)	0	2	0	57	0	5	0	15
Hadj (s)	0.08	-0.67	0.04	-0.67	0.05	-0.67	0.25	-0.67
Departure Headway (s)	5.7	4.9	5.7	5.0	6.4	5.7	6.6	5.7
Degree Utilization, x	0.53	0.00	0.39	0.08	0.19	0.01	0.20	0.02
Capacity (veh/h)	611	693	609	686	516	570	502	575
Control Delay (s)	13.7	6.8	11.1	7.2	9.8	7.6	10.1	7.6
Approach Delay (s)	13.6		10.4		9.7		9.8	
Approach LOS	B		B		A		A	

Intersection Summary			
Delay	11.4		
HCM Level of Service	B		
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	38	581	2	2	493	68	4	72	5	60	45	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	632	2	2	536	74	4	78	5	65	49	22

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	673	2	538	74	83	5	114	22
Volume Left (vph)	41	0	2	0	4	0	65	0
Volume Right (vph)	0	2	0	74	0	5	0	22
Hadj (s)	0.06	-0.67	0.04	-0.67	0.06	-0.67	0.32	-0.67
Departure Headway (s)	6.2	5.5	6.1	5.4	7.9	7.2	8.0	7.0
Degree Utilization, x	1.16	0.00	0.92	0.11	0.18	0.01	0.25	0.04
Capacity (veh/h)	577	632	582	648	435	474	429	487
Control Delay (s)	111.0	7.3	43.1	7.9	11.4	9.0	12.4	9.1
Approach Delay (s)	110.6		38.9		11.3		11.9	
Approach LOS	F		E		B		B	

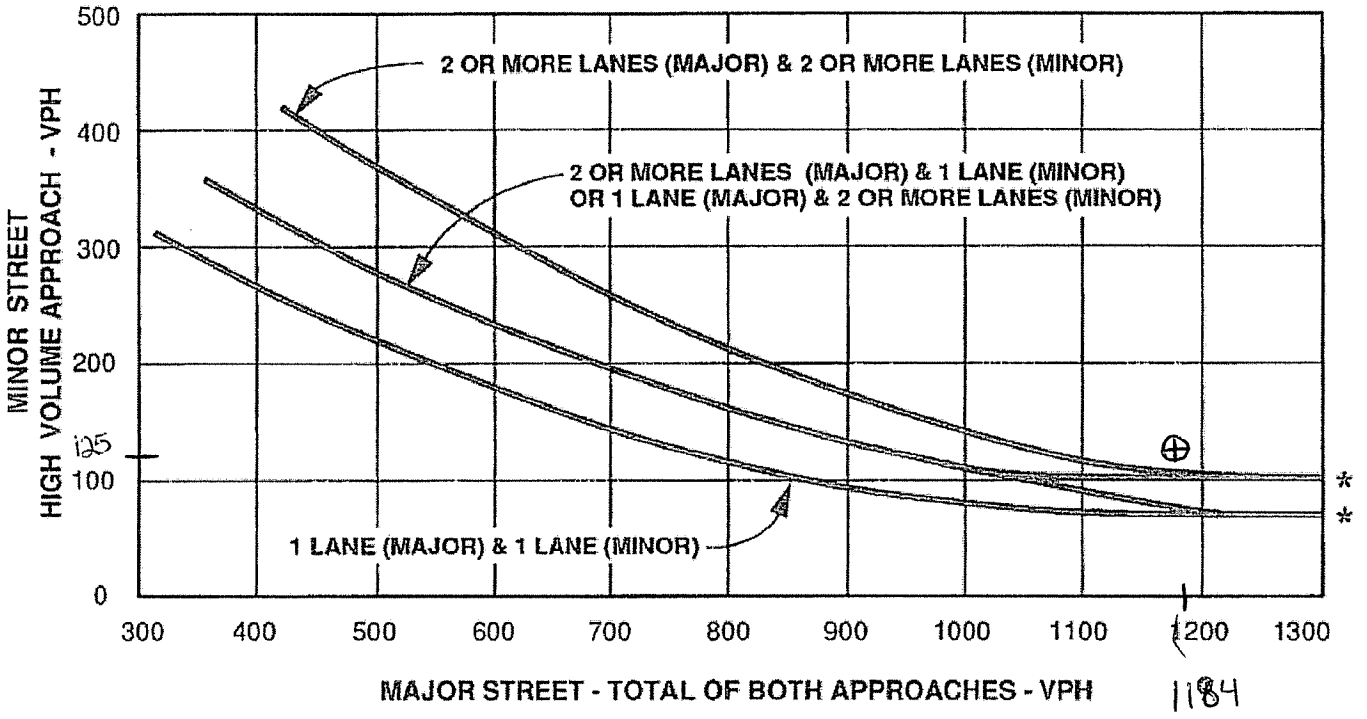
Intersection Summary				
Delay	66.9			
HCM Level of Service	F			
Intersection Capacity Utilization	80.8%	ICU Level of Service	D	
Analysis Period (min)	15			

East Panama Rd & Cottonwood Rd

2020 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied __X__ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More	2 or More
1	2 or More

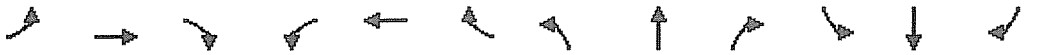
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00		0.97	1.00
Satd. Flow (prot)		1857	1583		1862	1583		1858	1583		1811	1583
Flt Permitted		0.95	1.00		1.00	1.00		0.98	1.00		0.78	1.00
Satd. Flow (perm)		1768	1583		1859	1583		1831	1583		1459	1583
Volume (vph)	38	581	2	2	493	68	4	72	5	60	45	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	632	2	2	536	74	4	78	5	65	49	22
RTOR Reduction (vph)	0	0	1	0	0	34	0	0	4	0	0	16
Lane Group Flow (vph)	0	673	1	0	538	40	0	82	1	0	114	6
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		19.3	19.3		19.3	19.3		8.6	8.6		8.6	8.6
Effective Green, g (s)		21.3	21.3		21.3	21.3		10.6	10.6		10.6	10.6
Actuated g/C Ratio		0.53	0.53		0.53	0.53		0.27	0.27		0.27	0.27
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		944	845		992	845		486	421		388	421
v/s Ratio Prot												
v/s Ratio Perm		c0.38	0.00		0.29	0.02		0.04	0.00		c0.08	0.00
v/c Ratio		0.71	0.00		0.54	0.05		0.17	0.00		0.29	0.01
Uniform Delay, d1		7.0	4.3		6.1	4.4		11.3	10.8		11.7	10.8
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		2.6	0.0		0.6	0.0		0.2	0.0		0.4	0.0
Delay (s)		9.6	4.3		6.7	4.5		11.4	10.8		12.1	10.8
Level of Service		A	A		A	A		B	B		B	B
Approach Delay (s)		9.6			6.4			11.4			11.9	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	39.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

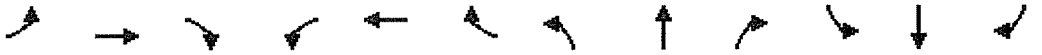
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.00
Satd. Flow (prot)		1856	1583		1861	1583		1859	1583		1816	1583
Flt Permitted		0.94	1.00		0.98	1.00		0.99	1.00		0.79	1.00
Satd. Flow (perm)		1743	1583		1828	1583		1837	1583		1473	1583
Volume (vph)	47	625	2	12	523	68	4	94	46	60	57	33
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	679	2	13	568	74	4	102	50	65	62	36
RTOR Reduction (vph)	0	0	1	0	0	33	0	0	37	0	0	27
Lane Group Flow (vph)	0	730	1	0	581	41	0	106	13	0	127	9
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		21.4	21.4		21.4	21.4		9.0	9.0		9.0	9.0
Effective Green, g (s)		23.4	23.4		23.4	23.4		11.0	11.0		11.0	11.0
Actuated g/C Ratio		0.55	0.55		0.55	0.55		0.26	0.26		0.26	0.26
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		962	874		1009	874		477	411		382	411
v/s Ratio Prot												
v/s Ratio Perm		c0.42	0.00		0.32	0.03		0.06	0.01		c0.09	0.01
v/c Ratio		0.76	0.00		0.58	0.05		0.22	0.03		0.33	0.02
Uniform Delay, d1		7.3	4.3		6.2	4.4		12.3	11.7		12.7	11.7
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		3.5	0.0		0.8	0.0		0.2	0.0		0.5	0.0
Delay (s)		10.8	4.3		7.0	4.4		12.6	11.8		13.2	11.7
Level of Service		B	A		A	A		B	B		B	B
Approach Delay (s)		10.8			6.7			12.3			12.9	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00		0.96	1.00
Satd. Flow (prot)		1858	1583		1863	1583		1855	1583		1796	1583
Flt Permitted		0.92	1.00		1.00	1.00		0.97	1.00		0.75	1.00
Satd. Flow (perm)		1723	1583		1860	1583		1816	1583		1395	1583
Volume (vph)	50	966	2	2	832	87	4	42	5	80	28	28
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1050	2	2	904	95	4	46	5	87	30	30
RTOR Reduction (vph)	0	0	1	0	0	25	0	0	4	0	0	25
Lane Group Flow (vph)	0	1104	1	0	906	70	0	50	1	0	117	5
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		57.3	57.3		57.3	57.3		11.5	11.5		11.5	11.5
Effective Green, g (s)		59.3	59.3		59.3	59.3		13.5	13.5		13.5	13.5
Actuated g/C Ratio		0.73	0.73		0.73	0.73		0.17	0.17		0.17	0.17
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1265	1162		1365	1162		303	264		233	264
v/s Ratio Prot												
v/s Ratio Perm		c0.64	0.00		0.49	0.04		0.03	0.00		c0.08	0.00
v/c Ratio		0.87	0.00		0.66	0.06		0.17	0.00		0.50	0.02
Uniform Delay, d1		8.0	2.9		5.6	3.0		28.8	28.0		30.6	28.1
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		6.9	0.0		1.2	0.0		0.3	0.0		1.7	0.0
Delay (s)		14.9	2.9		6.8	3.0		29.1	28.0		32.3	28.1
Level of Service		B	A		A	A		C	C		C	C
Approach Delay (s)		14.8			6.4			29.0			31.4	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	110.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00		1.00	1.00		0.97	1.00
Satd. Flow (prot)		1858	1583		1861	1583		1858	1583		1802	1583
Flt Permitted		0.85	1.00		0.98	1.00		0.98	1.00		0.75	1.00
Satd. Flow (perm)		1590	1583		1828	1583		1831	1583		1404	1583
Volume (vph)	59	1010	2	12	862	87	4	64	46	80	40	41
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	1098	2	13	937	95	4	70	50	87	43	45
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	42	0	0	38
Lane Group Flow (vph)	0	1162	2	0	950	72	0	74	8	0	130	7
Turn Type	Perm		Perm	Perm		Perm	Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		72.1	72.1		72.1	72.1		13.1	13.1		13.1	13.1
Effective Green, g (s)		74.1	74.1		74.1	74.1		15.1	15.1		15.1	15.1
Actuated g/C Ratio		0.76	0.76		0.76	0.76		0.16	0.16		0.16	0.16
Clearance Time (s)		6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1212	1207		1394	1207		284	246		218	246
v/s Ratio Prot												
v/s Ratio Perm		c0.73	0.00		0.52	0.05		0.04	0.00		c0.09	0.00
v/c Ratio		0.96	0.00		0.68	0.06		0.26	0.03		0.60	0.03
Uniform Delay, d1		10.2	2.7		5.7	2.9		36.1	34.8		38.2	34.8
Progression Factor		1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2		16.7	0.0		1.4	0.0		0.5	0.1		4.3	0.0
Delay (s)		26.9	2.7		7.1	2.9		36.6	34.9		42.5	34.9
Level of Service		C	A		A	A		D	C		D	C
Approach Delay (s)		26.9			6.7			35.9			40.6	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	97.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	121.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: SR 99 Northbound Off Ramp & South H St - AM Peak
Count Date: 8/30/2007

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
1	EBL	34
0	EBT	0
1	EBR	1
0	NBL	0
1	NBT	40
0	NBR	0
0	SBL	0
1	SBT	38
0	SBR	0
	TOTAL	113

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	334
EBT	0
EBR	7
NBL	0
NBT	192
NBR	0
SBL	0
SBT	208
SBR	0
TOTAL	743

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	334
EBT	0
EBR	7
NBL	0
NBT	203
NBR	0
SBL	0
SBT	221
SBR	0
TOTAL	767

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	172
EBT	0
EBR	4
NBL	0
NBT	110
NBR	0
SBL	0
SBT	117
SBR	0
TOTAL	403

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	172
EBT	0
EBR	4
NBL	0
NBT	121
NBR	0
SBL	0
SBT	130
SBR	0
TOTAL	427

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	11	8	3
NBR	0	0	0
SBL	0	0	0
SBT	13	9	4
SBR	0	0	0
TOTAL	24	17	7

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	SR 99 Northbound Off Ramp & South H St - AM Peak						
	Count Date:	8/30/2007						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	0.39							
EB Approach (Away)	*1*							
NB Approach (To)	0.50							
NB Approach (Away)	0.49							
SB Approach (To)	0.19							
SB Approach (Away)	1.21							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	2.36	WBT	1.00	WBR	3.91
WB Approach (Away)	*1*		2.33%	0	0.00%	0	3.44%	0
EB Approach (To)	6.5		EBL	11.70	EBT	8.79	EBR	10.15
EB Approach (Away)	*1*		8.55%	334	5.11%	0	7.44%	7
NB Approach (To)	1.9		NBL	2.39	NBT	5.30	NBR	2.39
NB Approach (Away)	1.8		2.36%	0	5.80%	192	2.36%	0
SB Approach (To)	1.7		SBL	5.04	SBT	6.40	SBR	5.04
SB Approach (Away)	8.3		3.97%	0	6.30%	208	3.97%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	2.21	WBT	1.00	WBR	4.57
WB Approach (Away)	*1*		2.18%	0	0.00%	0	3.77%	0
EB Approach (To)	8.3		EBL	14.66	EBT	11.09	EBR	12.30
EB Approach (Away)	*1*		9.35%	410	5.58%	0	7.76%	8
NB Approach (To)	1.7		NBL	2.20	NBT	5.77	NBR	2.20
NB Approach (Away)	1.7		2.16%	0	5.93%	199	2.16%	0
SB Approach (To)	1.6		SBL	4.65	SBT	5.86	SBR	4.65
SB Approach (Away)	9.9		3.81%	0	5.98%	192	3.81%	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	34	1	0	40	38	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	1	0	43	41	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	85	41	41			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	41	41			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	100	100			
cM capacity (veh/h)	917	1030	1568			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	37	1	43	41
Volume Left	37	0	0	0
Volume Right	0	1	0	0
cSH	917	1030	1700	1700
Volume to Capacity	0.04	0.00	0.03	0.02
Queue Length 95th (ft)	3	0	0	0
Control Delay (s)	9.1	8.5	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.1		0.0	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	2.8	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	172	4	0	110	117	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	187	4	0	120	127	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked	1.00	1.00	1.00			
vC, conflicting volume	247	127	127			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	244	124	124			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	100	100			
cM capacity (veh/h)	742	923	1457			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	187	4	120	127
Volume Left	187	0	0	0
Volume Right	0	4	0	0
cSH	742	923	1700	1700
Volume to Capacity	0.25	0.00	0.07	0.07
Queue Length 95th (ft)	25	0	0	0
Control Delay (s)	11.5	8.9	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.4		0.0	0.0
Approach LOS	B			

Intersection Summary			
Average Delay	5.0	HCM Level of Service	A
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	172	4	0	121	130	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	187	4	0	132	141	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	273	141	141			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	273	141	141			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	74	100	100			
cM capacity (veh/h)	717	907	1442			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	187	4	132	141
Volume Left	187	0	0	0
Volume Right	0	4	0	0
cSH	717	907	1700	1700
Volume to Capacity	0.26	0.00	0.08	0.08
Queue Length 95th (ft)	26	0	0	0
Control Delay (s)	11.8	9.0	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	11.7		0.0	0.0
Approach LOS	B			

Intersection Summary			
Average Delay	4.8	HCM Level of Service	A
Intersection Capacity Utilization	23.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	334	7	0	192	208	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	363	8	0	209	226	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	435	226	226			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	426	214	214			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	37	99	100			
cM capacity (veh/h)	576	813	1335			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	363	8	209	226
Volume Left	363	0	0	0
Volume Right	0	8	0	0
cSH	576	813	1700	1700
Volume to Capacity	0.63	0.01	0.12	0.13
Queue Length 95th (ft)	110	1	0	0
Control Delay (s)	21.3	9.5	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	21.0		0.0	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	9.7	HCM Level of Service	A
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	334	7	0	203	221	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	363	8	0	221	240	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	461	240	240			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	457	235	235			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	35	99	100			
cM capacity (veh/h)	558	799	1323			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	363	8	221	240
Volume Left	363	0	0	0
Volume Right	0	8	0	0
cSH	558	799	1700	1700
Volume to Capacity	0.65	0.01	0.13	0.14
Queue Length 95th (ft)	117	1	0	0
Control Delay (s)	22.7	9.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	22.4		0.0	0.0
Approach LOS	C			

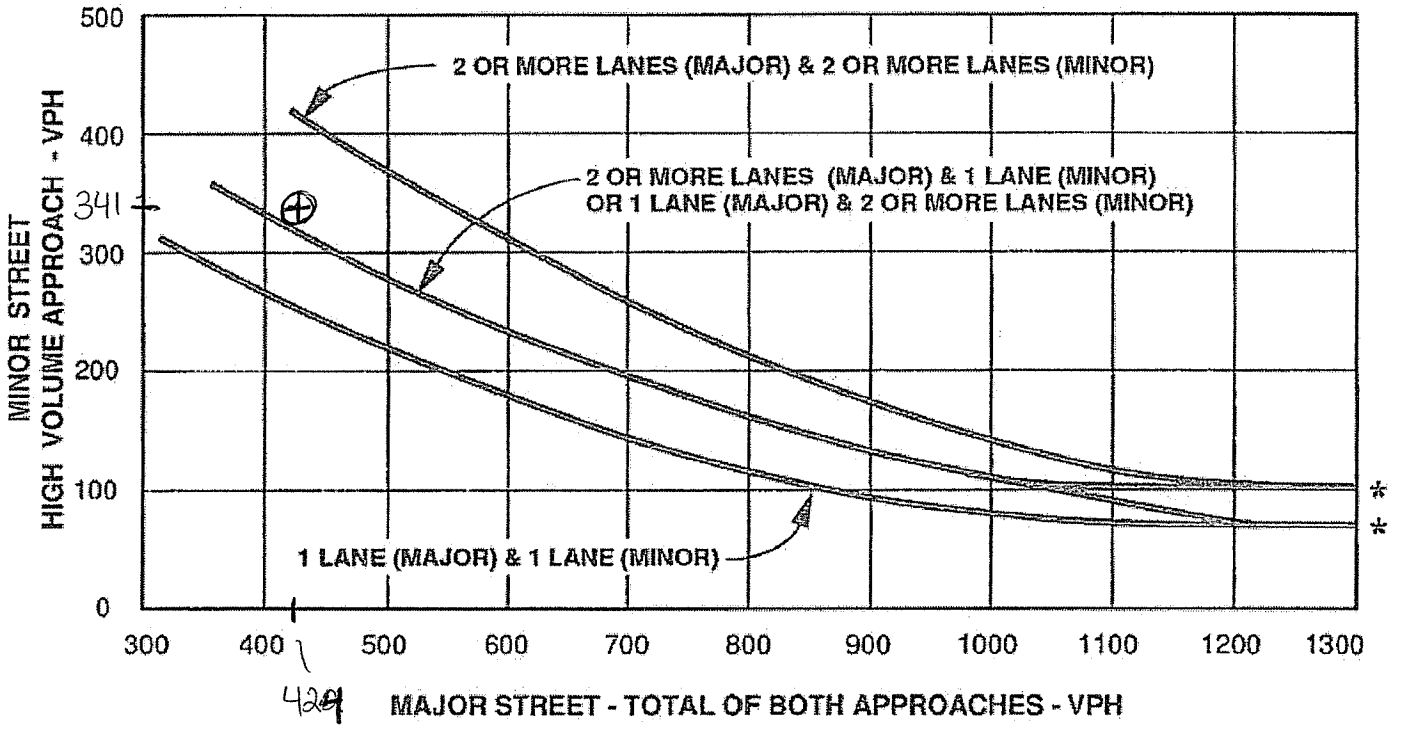
Intersection Summary			
Average Delay	10.0	HCM Level of Service	B
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

State Route 99 Northbound Off Ramp + South H St

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: SR 99 Northbound Off Ramp & South H St - PM Peak
Count Date: 8/14/2007

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
1	EBL	111
0	EBT	0
1	EBR	0
0	NBL	0
1	NBT	60
0	NBR	0
0	SBL	0
1	SBT	64
0	SBR	0
	TOTAL	235

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	542
EBT	0
EBR	0
NBL	0
NBT	203
NBR	0
SBL	0
SBT	244
SBR	0
TOTAL	989

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	558
EBT	0
EBR	14
NBL	0
NBT	205
NBR	0
SBL	0
SBT	245
SBR	0
TOTAL	1022

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	310
EBT	0
EBR	0
NBL	0
NBT	126
NBR	0
SBL	0
SBT	147
SBR	0
TOTAL	583

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	326
EBT	0
EBR	14
NBL	0
NBT	128
NBR	0
SBL	0
SBT	148
SBR	0
TOTAL	616

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	16	16	0
EBT	0	0	0
EBR	14	14	0
NBL	0	0	0
NBT	2	2	0
NBR	0	0	0
SBL	0	0	0
SBT	1	0	1
SBR	0	0	0
TOTAL	33	32	1

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	SR 99 Northbound Off Ramp & South H St - PM Peak						
	Count Date:	8/14/2007						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	0.99							
EB Approach (Away)	*1*							
NB Approach (To)	0.62							
NB Approach (Away)	0.62							
SB Approach (To)	0.32							
SB Approach (Away)	2.03							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.97	WBT	1.00	WBR	2.53
WB Approach (Away)	*1*		1.91%	0	0.00%	0	2.49%	0
EB Approach (To)	6.5		EBL	5.30	EBT	3.77	EBR	4.74
EB Approach (Away)	*1*		5.85%	542	3.36%	0	5.27%	0
NB Approach (To)	1.9		NBL	2.03	NBT	3.56	NBR	2.03
NB Approach (Away)	1.8		1.97%	0	4.46%	203	1.97%	0
SB Approach (To)	1.7		SBL	3.19	SBT	4.16	SBR	3.19
SB Approach (Away)	8.3		3.01%	0	4.91%	244	3.01%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.85	WBT	1.00	WBR	2.93
WB Approach (Away)	*1*		1.75%	0	0.00%	0	2.81%	0
EB Approach (To)	8.3		EBL	6.60	EBT	4.67	EBR	5.52
EB Approach (Away)	*1*		6.63%	665	3.81%	0	5.57%	0
NB Approach (To)	1.7		NBL	1.87	NBT	3.80	NBR	1.87
NB Approach (Away)	1.7		1.78%	0	4.59%	210	1.78%	0
SB Approach (To)	1.6		SBL	2.96	SBT	3.82	SBR	2.96
SB Approach (Away)	9.9		2.84%	0	4.60%	224	2.84%	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	111	0	0	60	64	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	121	0	0	65	70	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	135	70	70			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	135	70	70			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	100	100			
cM capacity (veh/h)	859	993	1531			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	121	0	65	70
Volume Left	121	0	0	0
Volume Right	0	0	0	0
cSH	859	1700	1700	1700
Volume to Capacity	0.14	0.00	0.04	0.04
Queue Length 95th (ft)	12	0	0	0
Control Delay (s)	9.9	0.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	9.9		0.0	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	4.7	HCM Level of Service	A
Intersection Capacity Utilization	16.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	310	0	0	126	147	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	337	0	0	137	160	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	297	160	160			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	297	160	160			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	51	100	100			
cM capacity (veh/h)	694	885	1419			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	337	0	137	160
Volume Left	337	0	0	0
Volume Right	0	0	0	0
cSH	694	1700	1700	1700
Volume to Capacity	0.49	0.00	0.08	0.09
Queue Length 95th (ft)	67	0	0	0
Control Delay (s)	15.0	0.0	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	15.0		0.0	0.0
Approach LOS	B			

Intersection Summary			
Average Delay	8.0	HCM Level of Service	A
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	326	14	0	128	148	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	354	15	0	139	161	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	300	161	161			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	300	161	161			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	49	98	100			
cM capacity (veh/h)	691	884	1418			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	354	15	139	161
Volume Left	354	0	0	0
Volume Right	0	15	0	0
cSH	691	884	1700	1700
Volume to Capacity	0.51	0.02	0.08	0.09
Queue Length 95th (ft)	74	1	0	0
Control Delay (s)	15.5	9.1	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.3		0.0	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	8.4	HCM Level of Service	A
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	542	0	0	203	244	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	589	0	0	221	265	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked	0.99	0.99	0.99			
vC, conflicting volume	486	265	265			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	479	255	255			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	100	100			
cM capacity (veh/h)	538	773	1292			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	589	0	221	265
Volume Left	589	0	0	0
Volume Right	0	0	0	0
cSH	538	1700	1700	1700
Volume to Capacity	1.09	0.01	0.13	0.16
Queue Length 95th (ft)	460	0	0	0
Control Delay (s)	94.3	0.0	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	94.3		0.0	0.0
Approach LOS	F			

Intersection Summary			
Average Delay	51.7	HCM Level of Service	F
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	542	0	0	203	244	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	589	0	0	221	265	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	486	265	265			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	486	265	265			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	100	100			
cM capacity (veh/h)	540	773	1299			

Direction, Lane #	EB 1	EB 2	EB 3	NB 1	SB 1
Volume Total	295	295	0	221	265
Volume Left	295	295	0	0	0
Volume Right	0	0	0	0	0
cSH	540	540	1700	1700	1700
Volume to Capacity	0.55	0.55	0.00	0.13	0.16
Queue Length 95th (ft)	81	81	0	0	0
Control Delay (s)	19.4	19.4	0.0	0.0	0.0
Lane LOS	C	C	A		
Approach Delay (s)	19.4			0.0	0.0
Approach LOS	C				

Intersection Summary			
Average Delay	10.6	HCM Level of Service	B
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	558	14	0	205	245	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	607	15	0	223	266	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)					406	
pX, platoon unblocked						
vC, conflicting volume	489	266	266			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	489	266	266			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	98	100			
cM capacity (veh/h)	538	772	1298			

Direction, Lane #	EB 1	EB 2	EB 3	NB 1	SB 1
Volume Total	303	303	15	223	266
Volume Left	303	303	0	0	0
Volume Right	0	0	15	0	0
cSH	538	538	772	1700	1700
Volume to Capacity	0.56	0.56	0.02	0.13	0.16
Queue Length 95th (ft)	87	87	2	0	0
Control Delay (s)	20.0	20.0	9.8	0.0	0.0
Lane LOS	C	C	A		
Approach Delay (s)	19.7			0.0	0.0
Approach LOS	C				

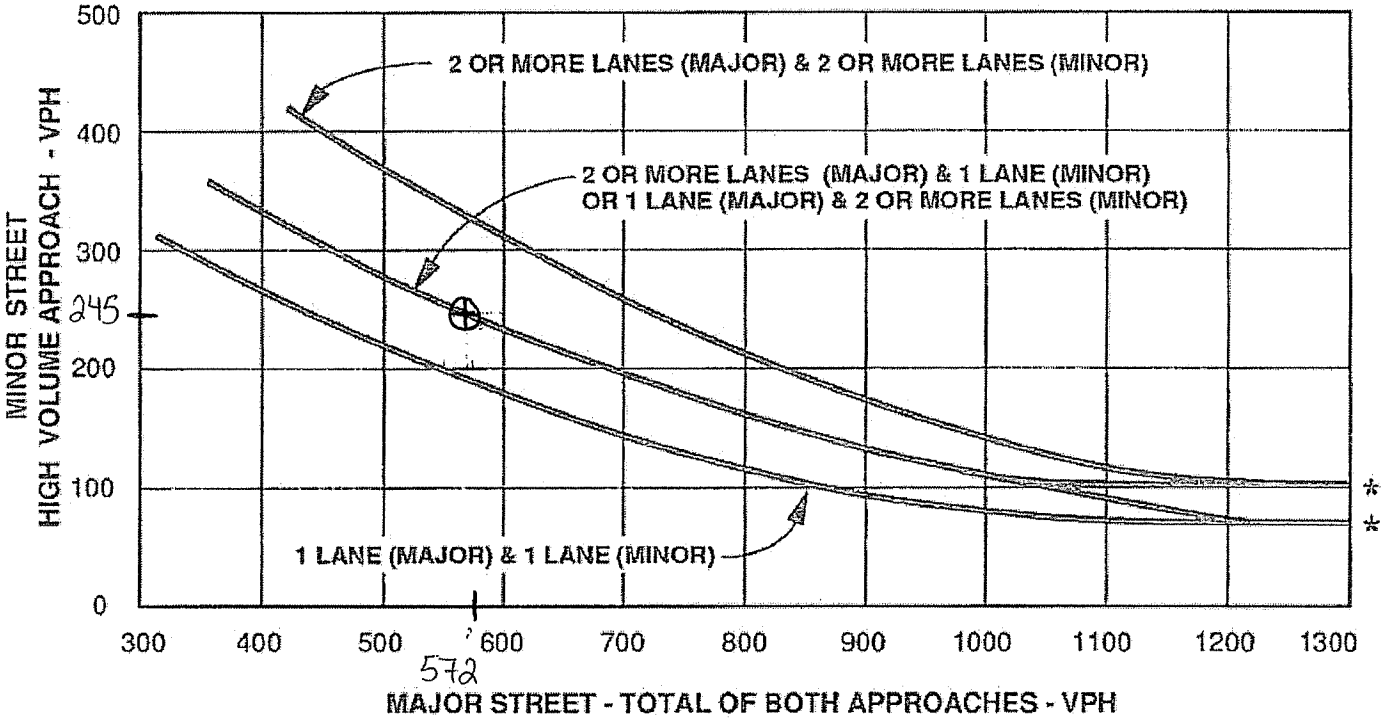
Intersection Summary			
Average Delay	11.0	HCM Level of Service	B
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

State Route 99 NB Off Ramp & South H St

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 5720	1 2450
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 5720	1 2450
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied X

No one condition satisfied, but following conditions fulfilled 80% or more..... 85% (A) 57% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Curnow Rd & South Union Ave - AM Peak
Count Date: 10/7/2008

Exist Peak Hour Volumes

U		
>	WBL	2
1	WBT	5
<	WBR	1
>	EBL	8
1	EBT	6
1	EBR	28
1	NBL	51
2	NBT	119
<	NBR	0
1	SBL	0
2	SBT	124
1	SBR	6
	TOTAL	350

Year 2035
Fut. Volumes w/o Proj

WBL	3
WBT	4
WBR	2
EBL	7
EBT	5
EBR	23
NBL	41
NBT	208
NBR	0
SBL	0
SBT	223
SBR	5
TOTAL	520

Year 2035 Fut. Vol
+ Project Traffic

WBL	26
WBT	4
WBR	2
EBL	7
EBT	5
EBR	47
NBL	54
NBT	293
NBR	4
SBL	0
SBT	520
SBR	5
TOTAL	966

Year 2020
Fut. Volumes w/o Proj

WBL	3
WBT	5
WBR	1
EBL	8
EBT	5
EBR	26
NBL	47
NBT	158
NBR	0
SBL	0
SBT	167
SBR	6
TOTAL	425

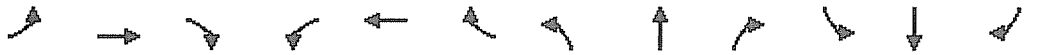
Year 2020 Fut. Vol
+ Project Traffic

WBL	26
WBT	5
WBR	1
EBL	8
EBT	5
EBR	50
NBL	60
NBT	243
NBR	4
SBL	0
SBT	464
SBR	6
TOTAL	871

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	23	20	3
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	24	13	11
NBL	13	9	4
NBT	85	55	30
NBR	4	2	2
SBL	0	0	0
SBT	297	245	52
SBR	0	0	0
TOTAL	446	344	102

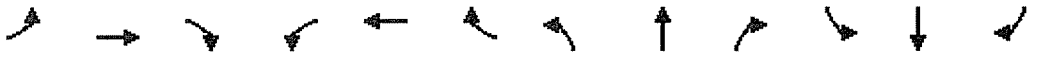
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Curnow Rd & South Union Ave - AM Peak						
	Count Date:	10/7/2008						
2008	ADT							
WB Approach (To)	0.09							
WB Approach (Away)	0.09							
EB Approach (To)	0.67							
EB Approach (Away)	0.63							
NB Approach (To)	2.04							
NB Approach (Away)	2.01							
SB Approach (To)	1.59							
SB Approach (Away)	1.63							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.2		WBL	1.70	WBT	1.07	WBR	1.82
WB Approach (Away)	0.1		2.01%	3	-0.65%	4	2.27%	2
EB Approach (To)	0.3		EBL	1.14	EBT	1.02	EBR	1.02
EB Approach (Away)	0.2		-0.54%	7	-0.79%	5	-0.80%	23
NB Approach (To)	3.3		NBL	1.00	NBT	1.75	NBR	1.63
NB Approach (Away)	3.3		-0.81%	41	2.10%	208	1.85%	0
SB Approach (To)	3.1		SBL	1.80	SBT	1.80	SBR	1.17
SB Approach (Away)	3.1		2.22%	0	2.21%	223	-0.45%	5
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.2		WBL	2.99	WBT	1.33	WBR	3.35
WB Approach (Away)	0.1		3.78%	5	0.93%	6	4.09%	3
EB Approach (To)	0.6		EBL	3.00	EBT	1.29	EBR	2.63
EB Approach (Away)	0.6		3.05%	18	0.84%	7	2.74%	58
NB Approach (To)	8.8		NBL	2.65	NBT	4.67	NBR	2.96
NB Approach (Away)	8.6		2.77%	106	5.92%	554	3.71%	0
SB Approach (To)	8.0		SBL	3.32	SBT	4.66	SBR	3.00
SB Approach (Away)	8.2		4.01%	0	5.91%	577	3.07%	13



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	6	28	2	5	1	51	119	0	0	124	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	7	30	2	5	1	55	129	0	0	135	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	314	375	67	341	382	65	141			129		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	314	375	67	341	382	65	141			129		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	97	100	99	100	96			100		
cM capacity (veh/h)	592	533	982	548	529	986	1439			1454		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	15	30	9	55	86	43	0	67	67	7
Volume Left	9	0	2	55	0	0	0	0	0	0
Volume Right	0	30	1	0	0	0	0	0	0	7
cSH	565	982	567	1439	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.03	0.02	0.04	0.05	0.03	0.00	0.04	0.04	0.00
Queue Length 95th (ft)	2	2	1	3	0	0	0	0	0	0
Control Delay (s)	11.5	8.8	11.5	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A	B	A						
Approach Delay (s)	9.7		11.5	2.3			0.0			
Approach LOS	A		B							

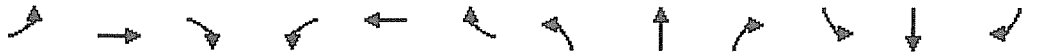
Intersection Summary			
Average Delay	2.5	HCM Level of Service	A
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	5	26	3	5	1	47	158	0	0	167	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	5	28	3	5	1	51	172	0	0	182	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	373	455	91	396	462	86	188			172		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	373	455	91	396	462	86	188			172		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	97	99	99	100	96			100		
cM capacity (veh/h)	537	481	949	503	477	956	1383			1403		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	14	28	10	51	114	57	0	91	91	7
Volume Left	9	0	3	51	0	0	0	0	0	0
Volume Right	0	28	1	0	0	0	0	0	0	7
cSH	514	949	515	1383	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.03	0.02	0.04	0.07	0.03	0.00	0.05	0.05	0.00
Queue Length 95th (ft)	2	2	1	3	0	0	0	0	0	0
Control Delay (s)	12.2	8.9	12.1	7.7	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A	B	A						
Approach Delay (s)	10.0		12.1	1.8			0.0			
Approach LOS	B		B							

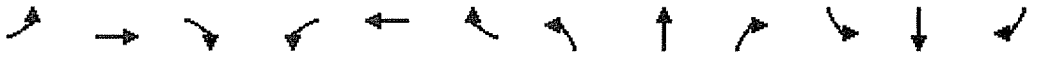
Intersection Summary				
Average Delay	2.0	HCM Level of Service	A
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	5	50	26	5	1	60	243	4	0	464	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	5	54	28	5	1	65	264	4	0	504	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			8									
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	771	903	252	652	908	134	511			268		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	771	903	252	652	908	134	511			268		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	98	93	91	98	100	94			100		
cM capacity (veh/h)	271	258	747	307	257	890	1051			1292		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	68	35	65	176	92	0	252	252	7
Volume Left	9	28	65	0	0	0	0	0	0
Volume Right	54	1	0	0	4	0	0	0	7
cSH	942	304	1051	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.07	0.11	0.06	0.10	0.05	0.00	0.15	0.15	0.00
Queue Length 95th (ft)	6	10	5	0	0	0	0	0	0
Control Delay (s)	12.1	18.4	8.7	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	C	A						
Approach Delay (s)	12.1	18.4	1.7			0.0			
Approach LOS	B	C							

Intersection Summary			
Average Delay	2.1	HCM Level of Service	A
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	5	23	3	4	2	41	208	0	0	223	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	5	25	3	4	2	45	226	0	0	242	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	449	558	121	464	563	113	248			226		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	449	558	121	464	563	113	248			226		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	97	99	99	100	97			100		
cM capacity (veh/h)	476	422	907	451	419	918	1315			1340		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	13	25	10	45	151	75	0	121	121	5
Volume Left	8	0	3	45	0	0	0	0	0	0
Volume Right	0	25	2	0	0	0	0	0	0	5
cSH	452	907	490	1315	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.03	0.02	0.03	0.09	0.04	0.00	0.07	0.07	0.00
Queue Length 95th (ft)	2	2	2	3	0	0	0	0	0	0
Control Delay (s)	13.2	9.1	12.5	7.8	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A	B	A						
Approach Delay (s)	10.5		12.5	1.3			0.0			
Approach LOS	B		B							

Intersection Summary			
Average Delay	1.5	HCM Level of Service	A
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	5	47	26	4	2	54	293	4	0	520	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	5	51	28	4	2	59	318	4	0	565	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	846	1005	283	774	1009	161	571			323		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	846	1005	283	774	1009	161	571			323		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	98	93	89	98	100	94			100		
cM capacity (veh/h)	240	226	714	251	225	855	998			1234		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	13	51	35	59	212	111	0	283	283	5
Volume Left	8	0	28	59	0	0	0	0	0	0
Volume Right	0	51	2	0	0	4	0	0	0	5
cSH	234	714	258	998	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.06	0.07	0.13	0.06	0.12	0.07	0.00	0.17	0.17	0.00
Queue Length 95th (ft)	4	6	11	5	0	0	0	0	0	0
Control Delay (s)	21.3	10.4	21.1	8.8	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	C	B	C	A						
Approach Delay (s)	12.6		21.1	1.4			0.0			
Approach LOS	B		C							

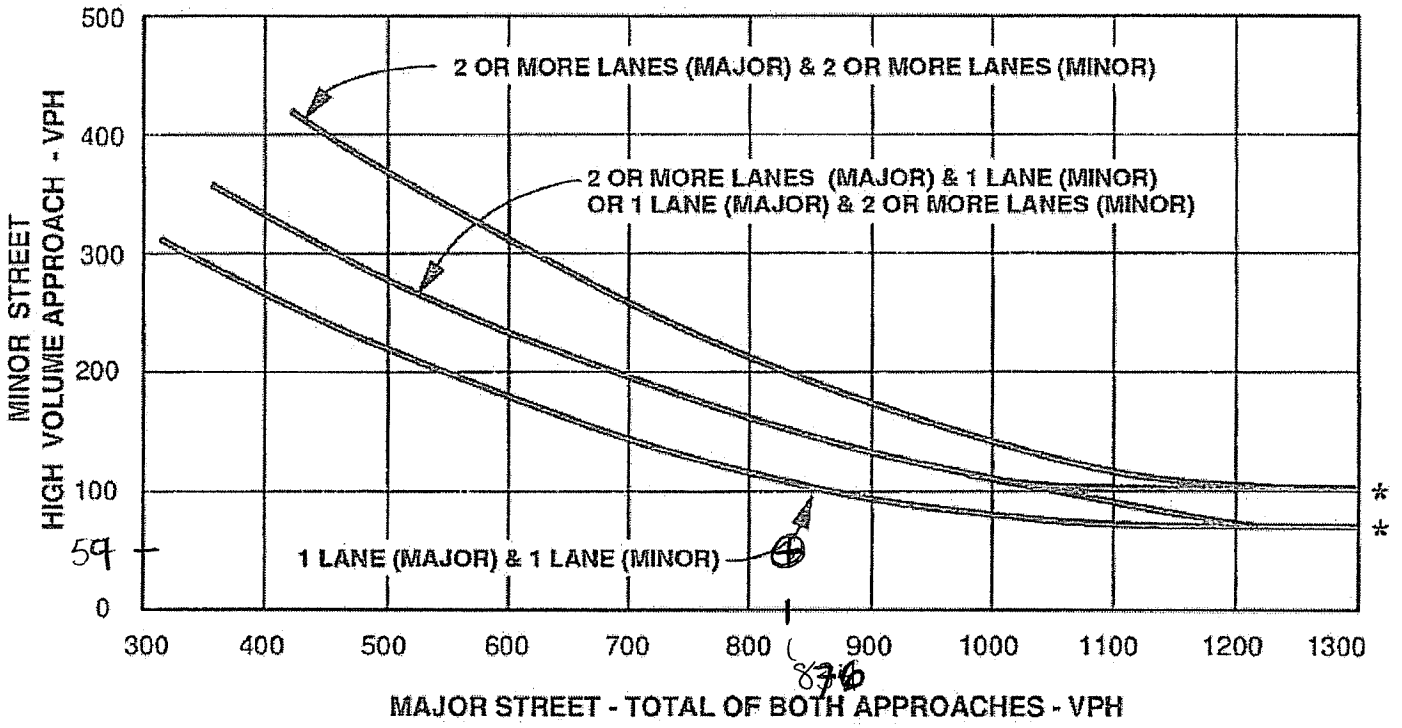
Intersection Summary			
Average Delay	2.0	HCM Level of Service	A
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Curnow Rd & South Union Ave

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Curnow Rd & South Union Ave - PM Peak
Count Date: 10/7/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	4
<	WBR	1
>	EBL	5
1	EBT	20
1	EBR	75
1	NBL	41
2	NBT	234
<	NBR	1
1	SBL	1
2	SBT	150
1	SBR	6
	TOTAL	539

Year 2035
Fut. Volumes w/o Proj

WBL	1
WBT	2
WBR	1
EBL	4
EBT	12
EBR	51
NBL	27
NBT	330
NBR	1
SBL	1
SBT	218
SBR	4
TOTAL	654

Year 2035 Fut. Vol
+ Project Traffic

WBL	28
WBT	2
WBR	1
EBL	4
EBT	12
EBR	80
NBL	35
NBT	549
NBR	8
SBL	1
SBT	475
SBR	4
TOTAL	1201

Year 2020
Fut. Volumes w/o Proj

WBL	1
WBT	3
WBR	1
EBL	4
EBT	17
EBR	64
NBL	35
NBT	276
NBR	1
SBL	1
SBT	180
SBR	5
TOTAL	589

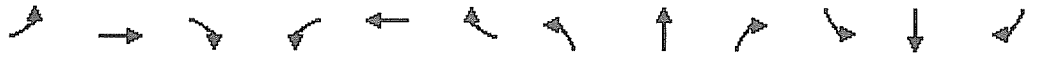
Year 2020 Fut. Vol
+ Project Traffic

WBL	28
WBT	3
WBR	1
EBL	4
EBT	17
EBR	93
NBL	43
NBT	495
NBR	8
SBL	1
SBT	437
SBR	5
TOTAL	1136

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	27	24	3
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	29	19	10
NBL	8	5	3
NBT	219	161	58
NBR	7	4	3
SBL	0	0	0
SBT	257	169	88
SBR	0	0	0
TOTAL	547	382	165

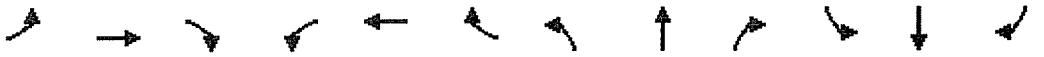
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Curnow Rd & South Union Ave - PM Peak						
	Count Date:	10/7/2008						
2008	ADT							
WB Approach (To)	0.14							
WB Approach (Away)	0.14							
EB Approach (To)	0.77							
EB Approach (Away)	0.74							
NB Approach (To)	2.53							
NB Approach (Away)	2.49							
SB Approach (To)	1.96							
SB Approach (Away)	2.01							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.2		WBL	1.23	WBT	0.73	WBR	1.33
WB Approach (Away)	0.1		0.77%	1	-1.78%	2	1.03%	1
EB Approach (To)	0.3		EBL	0.93	EBT	0.70	EBR	0.84
EB Approach (Away)	0.2		-1.19%	4	-1.88%	12	-1.45%	51
NB Approach (To)	3.3		NBL	0.82	NBT	1.42	NBR	1.18
NB Approach (Away)	3.3		-1.51%	27	1.29%	330	0.61%	1
SB Approach (To)	3.1		SBL	1.32	SBT	1.46	SBR	0.96
SB Approach (Away)	3.1		0.98%	1	1.41%	218	-1.14%	4
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.2		WBL	2.27	WBT	0.96	WBR	2.58
WB Approach (Away)	0.1		2.52%	2	-0.20%	4	2.84%	2
EB Approach (To)	0.6		EBL	2.46	EBT	0.94	EBR	2.15
EB Approach (Away)	0.6		2.38%	9	-0.26%	19	2.06%	129
NB Approach (To)	8.8		NBL	2.16	NBT	3.78	NBR	2.26
NB Approach (Away)	8.6		2.04%	70	5.08%	882	2.45%	2
SB Approach (To)	8.0		SBL	2.56	SBT	3.77	SBR	2.46
SB Approach (Away)	8.2		2.77%	2	5.08%	564	2.36%	11



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	20	75	1	4	1	41	234	1	1	150	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	22	82	1	4	1	45	254	1	1	163	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	385	510	82	520	516	128	170			255		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	385	510	82	520	516	128	170			255		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	95	92	100	99	100	97			100		
cM capacity (veh/h)	530	450	962	377	447	899	1405			1307		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	27	82	7	45	170	86	1	82	82	7
Volume Left	5	0	1	45	0	0	1	0	0	0
Volume Right	0	82	1	0	0	1	0	0	0	7
cSH	464	962	472	1405	1700	1700	1307	1700	1700	1700
Volume to Capacity	0.06	0.08	0.01	0.03	0.10	0.05	0.00	0.05	0.05	0.00
Queue Length 95th (ft)	5	7	1	2	0	0	0	0	0	0
Control Delay (s)	13.2	9.1	12.7	7.6	0.0	0.0	7.8	0.0	0.0	0.0
Lane LOS	B	A	B	A			A			
Approach Delay (s)	10.1		12.7	1.1			0.0			
Approach LOS	B		B							

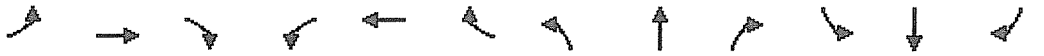
Intersection Summary				
Average Delay	2.6	HCM Level of Service	A
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	17	64	1	3	1	35	276	1	1	180	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	18	70	1	3	1	38	300	1	1	196	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	427	575	98	555	580	151	201			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	427	575	98	555	580	151	201			301		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	96	93	100	99	100	97			100		
cM capacity (veh/h)	497	415	939	362	412	869	1368			1257		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	23	70	5	38	200	101	1	98	98	5
Volume Left	4	0	1	38	0	0	1	0	0	0
Volume Right	0	70	1	0	0	1	0	0	0	5
cSH	428	939	447	1368	1700	1700	1257	1700	1700	1700
Volume to Capacity	0.05	0.07	0.01	0.03	0.12	0.06	0.00	0.06	0.06	0.00
Queue Length 95th (ft)	4	6	1	2	0	0	0	0	0	0
Control Delay (s)	13.9	9.1	13.2	7.7	0.0	0.0	7.9	0.0	0.0	0.0
Lane LOS	B	A	B	A			A			
Approach Delay (s)	10.3		13.2	0.9			0.0			
Approach LOS	B		B							

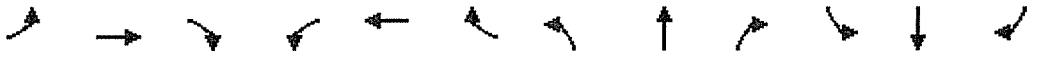
Intersection Summary			
Average Delay	2.1	HCM Level of Service	A
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	17	93	28	3	1	43	495	8	1	437	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	18	101	30	3	1	47	538	9	1	475	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	842	1117	238	986	1118	273	480			547		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	842	1117	238	986	1118	273	480			547		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	91	87	81	98	100	96			100		
cM capacity (veh/h)	245	197	764	157	196	724	1078			1019		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	23	101	35	47	359	188	1	238	238	5
Volume Left	4	0	30	47	0	0	1	0	0	0
Volume Right	0	101	1	0	0	9	0	0	0	5
cSH	204	764	164	1078	1700	1700	1019	1700	1700	1700
Volume to Capacity	0.11	0.13	0.21	0.04	0.21	0.11	0.00	0.14	0.14	0.00
Queue Length 95th (ft)	9	11	19	3	0	0	0	0	0	0
Control Delay (s)	24.8	10.4	32.7	8.5	0.0	0.0	8.5	0.0	0.0	0.0
Lane LOS	C	B	D	A			A			
Approach Delay (s)	13.1		32.7	0.7			0.0			
Approach LOS	B		D							

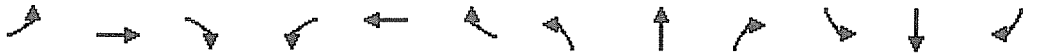
Intersection Summary			
Average Delay	2.6	HCM Level of Service	A
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	12	51	1	2	1	27	330	1	1	218	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	13	55	1	2	1	29	359	1	1	237	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	479	658	118	601	661	180	241			360		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	479	658	118	601	661	180	241			360		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	97	94	100	99	100	98			100		
cM capacity (veh/h)	458	374	911	345	372	832	1322			1195		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	17	55	4	29	239	121	1	118	118	4
Volume Left	4	0	1	29	0	0	1	0	0	0
Volume Right	0	55	1	0	0	1	0	0	0	4
cSH	392	911	422	1322	1700	1700	1195	1700	1700	1700
Volume to Capacity	0.04	0.06	0.01	0.02	0.14	0.07	0.00	0.07	0.07	0.00
Queue Length 95th (ft)	3	5	1	2	0	0	0	0	0	0
Control Delay (s)	14.6	9.2	13.6	7.8	0.0	0.0	8.0	0.0	0.0	0.0
Lane LOS	B	A	B	A			A			
Approach Delay (s)	10.5		13.6	0.6			0.0			
Approach LOS	B		B							

Intersection Summary				
Average Delay	1.5	HCM Level of Service	A
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	12	80	28	2	1	35	549	8	1	475	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	13	87	30	2	1	38	597	9	1	516	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	895	1200	258	1031	1200	303	521			605		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	895	1200	258	1031	1200	303	521			605		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	93	88	80	99	100	96			100		
cM capacity (veh/h)	226	177	741	152	177	693	1042			969		

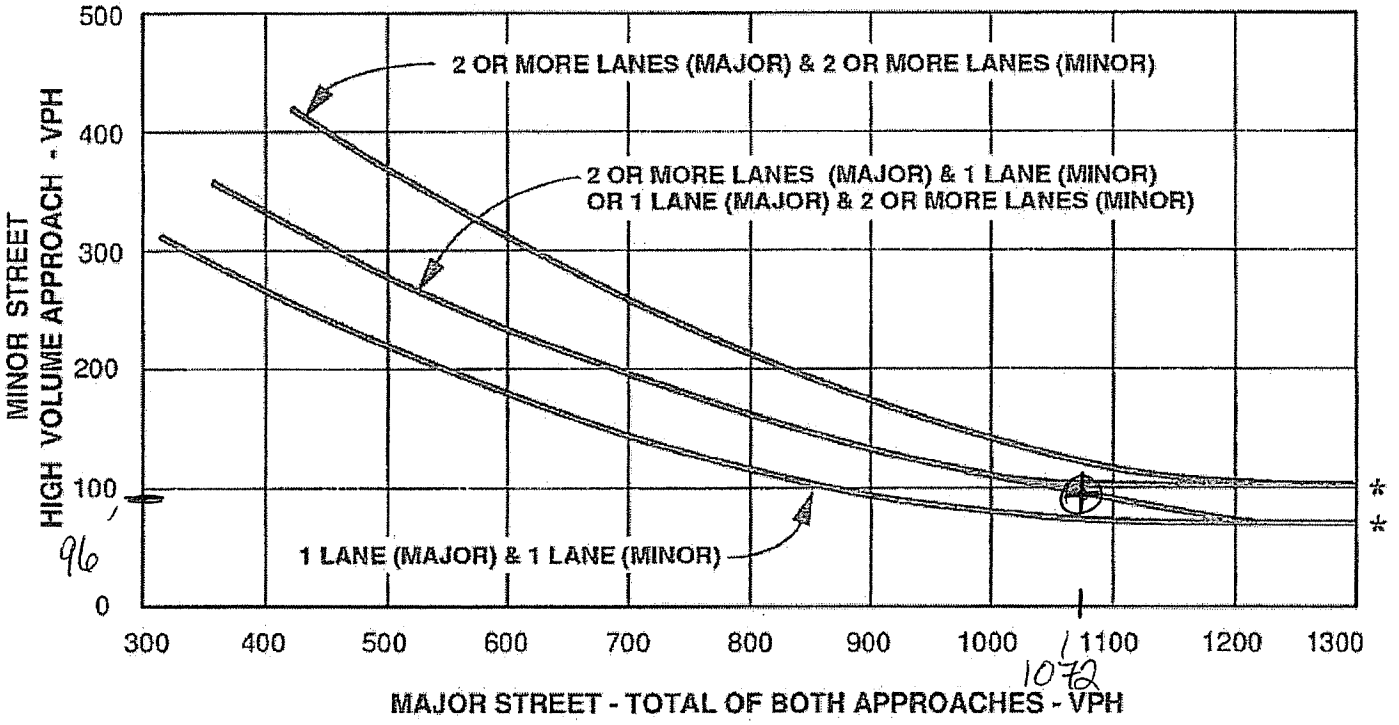
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	17	87	34	38	398	208	1	258	258	4
Volume Left	4	0	30	38	0	0	1	0	0	0
Volume Right	0	87	1	0	0	9	0	0	0	4
cSH	187	741	157	1042	1700	1700	969	1700	1700	1700
Volume to Capacity	0.09	0.12	0.21	0.04	0.23	0.12	0.00	0.15	0.15	0.00
Queue Length 95th (ft)	8	10	20	3	0	0	0	0	0	0
Control Delay (s)	26.2	10.5	34.1	8.6	0.0	0.0	8.7	0.0	0.0	0.0
Lane LOS	D	B	D	A			A			
Approach Delay (s)	13.1		34.1	0.5			0.0			
Approach LOS	B		D							

Intersection Summary			
Average Delay	2.2	HCM Level of Service	A
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Curnow Rd & South Union Ave
2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL...X...

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...10,720...	2 or More...960...
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...10,720...	2 or More...960...
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 43% (A) 86% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Curnow Rd & Cottonwood Rd - AM Peak
Count Date: 10/8/2008

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
>	EBL	1
0	EBT	0
<	EBR	4
>	NBL	3
1	NBT	42
0	NBR	0
0	SBL	0
1	SBT	44
<	SBR	1
	TOTAL	95

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	2
EBT	0
EBR	9
NBL	4
NBT	40
NBR	0
SBL	0
SBT	44
SBR	1
TOTAL	102

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	5
EBT	0
EBR	9
NBL	4
NBT	46
NBR	0
SBL	0
SBT	70
SBR	23
TOTAL	159

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	2
EBT	0
EBR	6
NBL	4
NBT	41
NBR	0
SBL	0
SBT	44
SBR	1
TOTAL	98

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	5
EBT	0
EBR	6
NBL	4
NBT	47
NBR	0
SBL	0
SBT	70
SBR	23
TOTAL	155

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	3	2	1
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	6	4	2
NBR	0	0	0
SBL	0	0	0
SBT	26	23	3
SBR	22	19	3
TOTAL	57	48	9

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Curnow Rd & Cottonwood Rd - AM Peak						
	Count Date:	10/8/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	0.01							
EB Approach (Away)	0.03							
NB Approach (To)	0.22							
NB Approach (Away)	0.22							
SB Approach (To)	0.21							
SB Approach (Away)	0.20							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.03	WBT	1.56	WBR	0.96
WB Approach (Away)	*1*		0.12%	0	1.31%	0	-0.16%	0
EB Approach (To)	0.05		EBL	3.33	EBT	3.38	EBR	3.41
EB Approach (Away)	0.06		2.97%	2	3.13%	0	3.24%	9
NB Approach (To)	0.2		NBL	1.56	NBT	0.96	NBR	1.00
NB Approach (Away)	0.2		1.31%	4	-0.16%	40	0.00%	0
SB Approach (To)	0.2		SBL	0.98	SBT	1.01	SBR	1.53
SB Approach (Away)	0.2		-0.07%	0	0.04%	44	1.24%	1
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.06	WBT	1.39	WBR	0.97
WB Approach (Away)	*1*		0.19%	0	1.01%	0	-0.11%	0
EB Approach (To)	0.04		EBL	3.03	EBT	3.06	EBR	3.12
EB Approach (Away)	0.05		2.80%	2	2.91%	0	3.10%	9
NB Approach (To)	0.2		NBL	1.38	NBT	0.96	NBR	0.99
NB Approach (Away)	0.2		0.98%	4	-0.14%	40	-0.03%	0
SB Approach (To)	0.2		SBL	1.01	SBT	1.07	SBR	1.40
SB Approach (Away)	0.2		0.03%	0	0.22%	47	1.04%	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	1	4	3	42	44	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	4	3	46	48	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	101	48	49			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	101	48	49			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	896	1020	1558			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	5	49	49
Volume Left	1	3	0
Volume Right	4	0	1
cSH	993	1558	1700
Volume to Capacity	0.01	0.00	0.03
Queue Length 95th (ft)	0	0	0
Control Delay (s)	8.6	0.5	0.0
Lane LOS	A	A	
Approach Delay (s)	8.6	0.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.7	HCM Level of Service	A
Intersection Capacity Utilization	14.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	2	6	4	41	44	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	7	4	45	48	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	102	48	49			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	102	48	49			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	894	1020	1558			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	9	49	49
Volume Left	2	4	0
Volume Right	7	0	1
cSH	986	1558	1700
Volume to Capacity	0.01	0.00	0.03
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.7	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.0	HCM Level of Service	A
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	6	4	47	70	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	7	4	51	76	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	148	89	101			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	148	89	101			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	841	970	1491			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	55	101
Volume Left	5	4	0
Volume Right	7	0	25
cSH	907	1491	1700
Volume to Capacity	0.01	0.00	0.06
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.0	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8	HCM Level of Service	A
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	2	9	4	40	44	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	10	4	43	48	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	101	48	49			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	101	48	49			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	896	1020	1558			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	48	49
Volume Left	2	4	0
Volume Right	10	0	1
cSH	995	1558	1700
Volume to Capacity	0.01	0.00	0.03
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.7	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.7	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.3	HCM Level of Service	A
Intersection Capacity Utilization	15.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	5	9	4	46	70	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	10	4	50	76	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	147	89	101			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	147	89	101			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	842	970	1491			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	54	101
Volume Left	5	4	0
Volume Right	10	0	25
cSH	920	1491	1700
Volume to Capacity	0.02	0.00	0.06
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.0	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	0.6	0.0
Approach LOS	A		

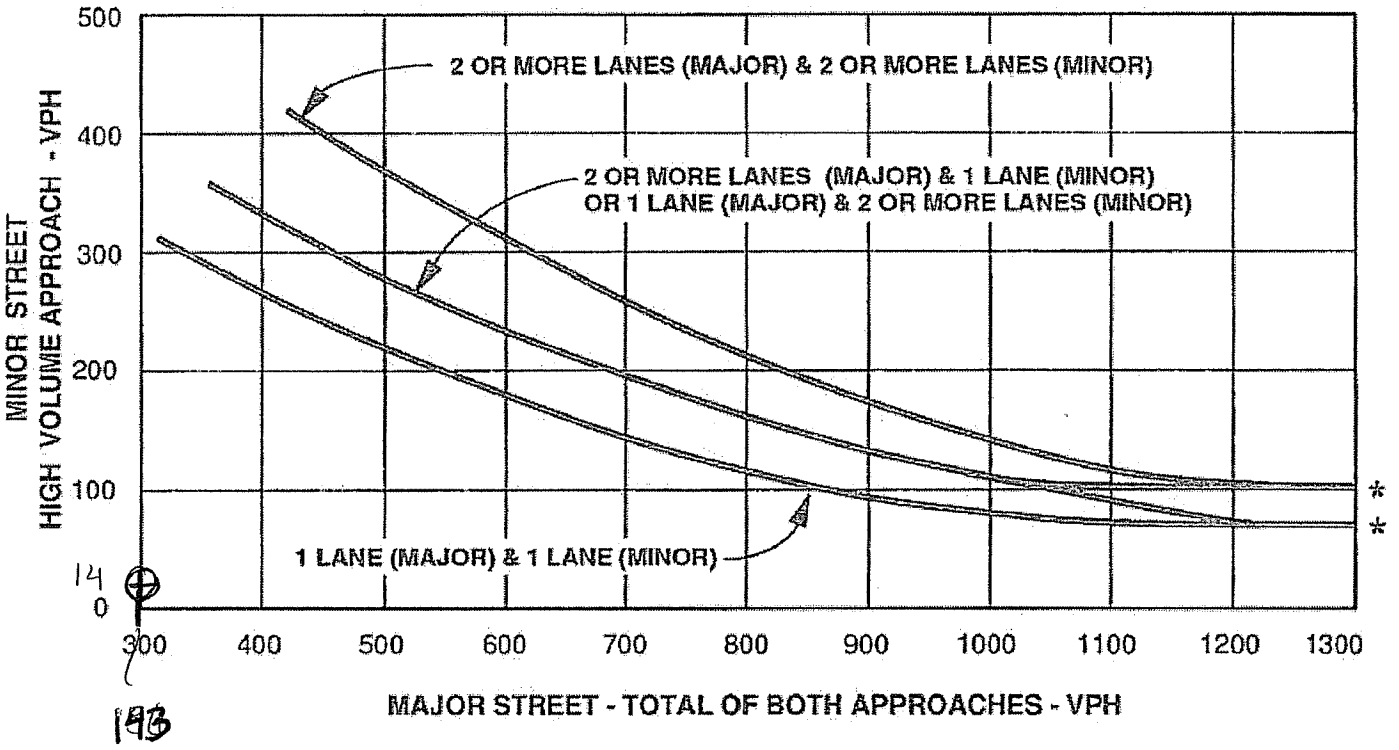
Intersection Summary			
Average Delay	1.0	HCM Level of Service	A
Intersection Capacity Utilization	15.7%	ICU Level of Service	A
Analysis Period (min)	15		

Curnow Rd + Cottonwood Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Curnow Rd & Cottonwood Rd - PM Peak
Count Date: 10/8/2008

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
>	EBL	4
0	EBT	0
<	EBR	11
>	NBL	7
1	NBT	87
0	NBR	0
0	SBL	0
1	SBT	68
<	SBR	3
	TOTAL	180

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	9
EBT	0
EBR	26
NBL	10
NBT	83
NBR	0
SBL	0
SBT	69
SBR	4
TOTAL	201

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	14
EBT	0
EBR	26
NBL	10
NBT	145
NBR	0
SBL	0
SBT	73
SBR	24
TOTAL	292

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	6
EBT	0
EBR	17
NBL	8
NBT	85
NBR	0
SBL	0
SBT	68
SBR	4
TOTAL	189

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	11
EBT	0
EBR	17
NBL	8
NBT	147
NBR	0
SBL	0
SBT	72
SBR	24
TOTAL	280

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	5	2	3
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	62	48	14
NBR	0	0	0
SBL	0	0	0
SBT	4	2	2
SBR	20	20	0
TOTAL	91	72	19

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Curnow Rd & Cottonwood Rd - PM Peak						
	Count Date:	10/8/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	0.01							
EB Approach (Away)	0.03							
NB Approach (To)	0.22							
NB Approach (Away)	0.22							
SB Approach (To)	0.21							
SB Approach (Away)	0.20							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.03	WBT	1.56	WBR	0.96
WB Approach (Away)	*1*		0.12%	0	1.31%	0	-0.16%	0
EB Approach (To)	0.05		EBL	3.33	EBT	3.38	EBR	3.41
EB Approach (Away)	0.06		2.97%	9	3.13%	0	3.24%	26
NB Approach (To)	0.2		NBL	1.56	NBT	0.96	NBR	1.00
NB Approach (Away)	0.2		1.31%	10	-0.16%	83	0.00%	0
SB Approach (To)	0.2		SBL	0.98	SBT	1.01	SBR	1.53
SB Approach (Away)	0.2		-0.07%	0	0.04%	69	1.24%	4
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	1.06	WBT	1.39	WBR	0.97
WB Approach (Away)	*1*		0.19%	0	1.01%	0	-0.11%	0
EB Approach (To)	0.04		EBL	3.03	EBT	3.06	EBR	3.12
EB Approach (Away)	0.05		2.80%	8	2.91%	0	3.10%	25
NB Approach (To)	0.2		NBL	1.38	NBT	0.96	NBR	0.99
NB Approach (Away)	0.2		0.98%	9	-0.14%	84	-0.03%	0
SB Approach (To)	0.2		SBL	1.01	SBT	1.07	SBR	1.40
SB Approach (Away)	0.2		0.03%	0	0.22%	72	1.04%	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	4	11	7	87	68	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	12	8	95	74	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	185	76	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	185	76	77			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	800	986	1521			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	16	102	77
Volume Left	4	8	0
Volume Right	12	0	3
cSH	928	1521	1700
Volume to Capacity	0.02	0.01	0.05
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.9	0.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	0.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.1	HCM Level of Service	A
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	6	17	8	85	68	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	18	9	92	74	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	186	76	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	186	76	78			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	98	99			
cM capacity (veh/h)	799	985	1520			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	25	101	78
Volume Left	7	9	0
Volume Right	18	0	4
cSH	929	1520	1700
Volume to Capacity	0.03	0.01	0.05
Queue Length 95th (ft)	2	0	0
Control Delay (s)	9.0	0.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.0	0.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.4	HCM Level of Service	A
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	11	17	8	147	72	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	18	9	160	78	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	268	91	104			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	268	91	104			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	717	966	1487			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	30	168	104
Volume Left	12	9	0
Volume Right	18	0	26
cSH	850	1487	1700
Volume to Capacity	0.04	0.01	0.06
Queue Length 95th (ft)	3	0	0
Control Delay (s)	9.4	0.4	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.4	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2	HCM Level of Service	A
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	9	26	10	83	69	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	28	11	90	75	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	189	77	79			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	189	77	79			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	97	99			
cM capacity (veh/h)	794	984	1519			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	38	101	79
Volume Left	10	11	0
Volume Right	28	0	4
cSH	927	1519	1700
Volume to Capacity	0.04	0.01	0.05
Queue Length 95th (ft)	3	1	0
Control Delay (s)	9.1	0.8	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	0.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.0	HCM Level of Service	A
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	14	26	10	145	73	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	28	11	158	79	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	272	92	105			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	272	92	105			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	97	99			
cM capacity (veh/h)	712	965	1486			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	168	105
Volume Left	15	11	0
Volume Right	28	0	26
cSH	858	1486	1700
Volume to Capacity	0.05	0.01	0.06
Queue Length 95th (ft)	4	1	0
Control Delay (s)	9.4	0.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	0.5	0.0
Approach LOS	A		

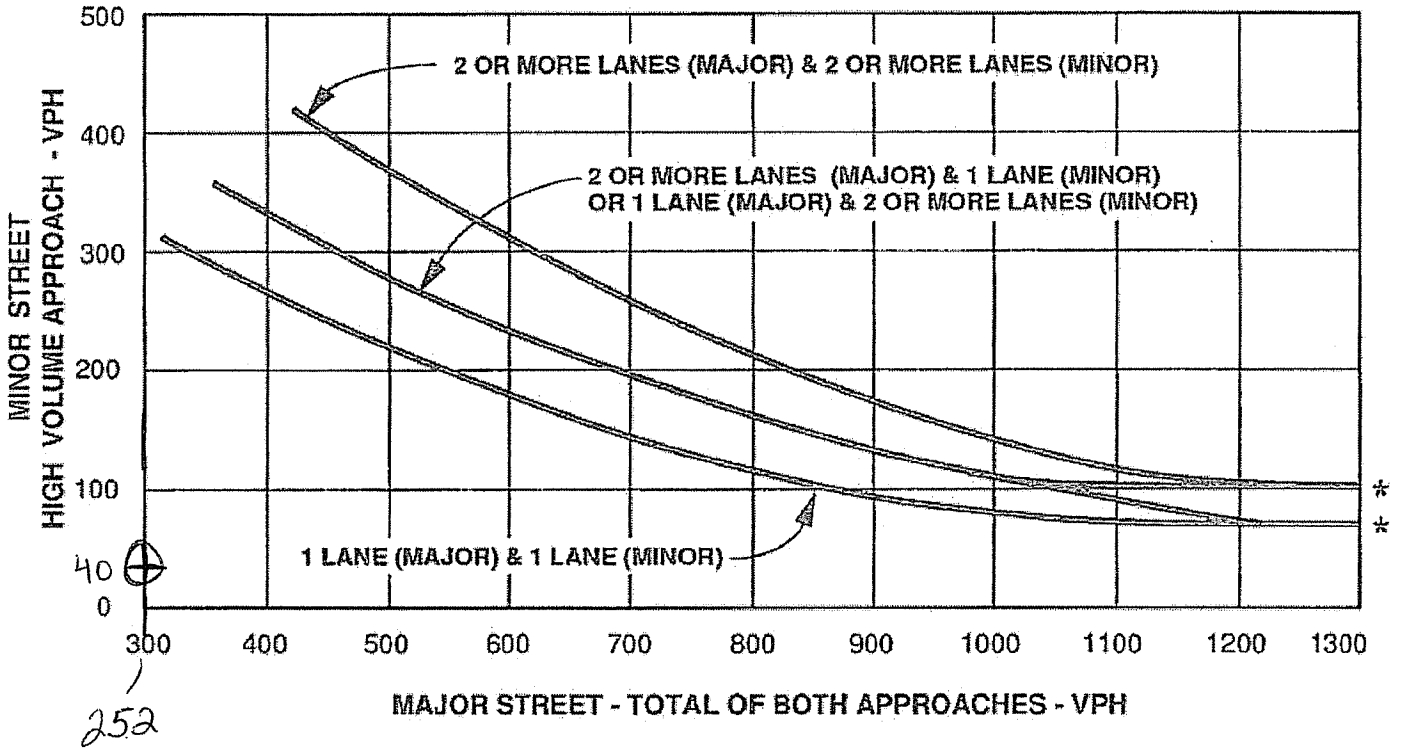
Intersection Summary			
Average Delay	1.6	HCM Level of Service	A
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

Curnow Rd & Cottonwood Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..... X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..... 2520	1..... 400
2 or More.....	1.....
2 or More.....	2 or More.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..... 2520	1..... 400
2 or More.....	1.....
2 or More.....	2 or More.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 34% (A) 39% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & Chevalier Rd - AM Peak
Count Date: *Future Intersection*

Exist Peak Hour Volumes

U	(Future Intersection)	
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	0

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035 Fut. Vol
+ Project Traffic

WBL	104
WBT	60
WBR	0
EBL	0
EBT	27
EBR	5
NBL	142
NBT	0
NBR	50
SBL	0
SBT	0
SBR	0
TOTAL	388

Year 2020

U	Fut. Volumes w/o Proj	
>	WBL	0
1	WBT	0
0	WBR	0
0	EBL	0
1	EBT	0
<	EBR	0
1	NBL	0
0	NBT	0
<	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	0

Year 2020 Fut. Vol
+ Project Traffic

WBL	52
WBT	30
WBR	0
EBL	0
EBT	14
EBR	3
NBL	71
NBT	0
NBR	25
SBL	0
SBT	0
SBR	0
TOTAL	194

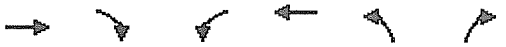
Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	104	100	4
WBT	60	60	0
WBR	0	0	0
EBL	0	0	0
EBT	27	27	0
EBR	5	5	0
NBL	142	142	0
NBT	0	0	0
NBR	50	40	10
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	388	374	14

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	14	3	52	30	71	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	3	57	33	77	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			18		162	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			18		162	17
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	97
cM capacity (veh/h)			1598		799	1062

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	18	89	104
Volume Left	0	57	77
Volume Right	3	0	27
cSH	1700	1598	854
Volume to Capacity	0.01	0.04	0.12
Queue Length 95th (ft)	0	3	10
Control Delay (s)	0.0	4.7	9.8
Lane LOS		A	A
Approach Delay (s)	0.0	4.7	9.8
Approach LOS			A

Intersection Summary			
Average Delay	6.8	HCM Level of Service	A
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	27	5	104	60	142	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	5	113	65	154	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			35		323	32
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			35		323	32
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		75	95
cM capacity (veh/h)			1577		622	1042

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	35	178	209
Volume Left	0	113	154
Volume Right	5	0	54
cSH	1700	1577	695
Volume to Capacity	0.02	0.07	0.30
Queue Length 95th (ft)	0	6	32
Control Delay (s)	0.0	4.9	12.4
Lane LOS		A	B
Approach Delay (s)	0.0	4.9	12.4
Approach LOS			B

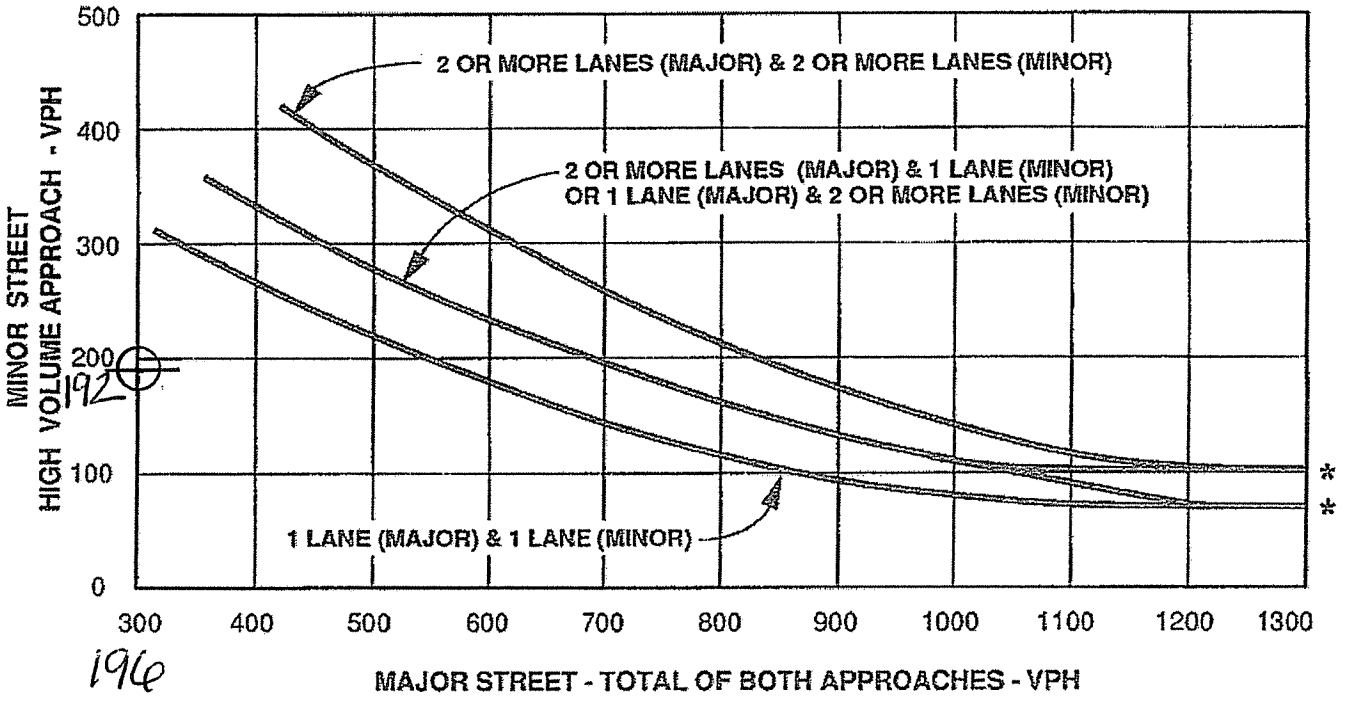
Intersection Summary			
Average Delay	8.2	HCM Level of Service	A
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

DIGIORGIO RD & CHEVALIER RD
2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT NOT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & Chevalier Rd - PM Peak
Count Date: *Future Intersection*

Exist Peak Hour Volumes

U	(Future Intersection)	
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	0

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035 Fut. Vol
+ Project Traffic

WBL	157
WBT	41
WBR	0
EBL	0
EBT	174
EBR	25
NBL	6
NBT	0
NBR	99
SBL	0
SBT	0
SBR	0
TOTAL	502

Year 2020

U	**Fut. Volumes w/o Proj**	
>	WBL	0
1	WBT	0
0	WBR	0
0	EBL	0
1	EBT	0
<	EBR	0
1	NBL	0
0	NBT	0
<	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	0

Year 2020 Fut. Vol
+ Project Traffic

WBL	79
WBT	21
WBR	0
EBL	0
EBT	87
EBR	13
NBL	3
NBT	0
NBR	50
SBL	0
SBT	0
SBR	0
TOTAL	251

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	157	133	24
WBT	41	41	0
WBR	0	0	0
EBL	0	0	0
EBT	174	174	0
EBR	25	25	0
NBL	6	6	0
NBT	0	0	0
NBR	99	83	16
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	502	462	40

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	87	13	79	21	3	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	14	86	23	3	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			109		296	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			109		296	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		100	94
cM capacity (veh/h)			1482		655	954

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	109	109	58
Volume Left	0	86	3
Volume Right	14	0	54
cSH	1700	1482	930
Volume to Capacity	0.06	0.06	0.06
Queue Length 95th (ft)	0	5	5
Control Delay (s)	0.0	6.1	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	6.1	9.1
Approach LOS			A

Intersection Summary			
Average Delay	4.3	HCM Level of Service	A
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	174	25	157	41	6	99
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	189	27	171	45	7	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			216		589	203
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			216		589	203
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		98	87
cM capacity (veh/h)			1353		412	838

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	216	215	114
Volume Left	0	171	7
Volume Right	27	0	108
cSH	1700	1353	791
Volume to Capacity	0.13	0.13	0.14
Queue Length 95th (ft)	0	11	13
Control Delay (s)	0.0	6.6	10.3
Lane LOS		A	B
Approach Delay (s)	0.0	6.6	10.3
Approach LOS			B

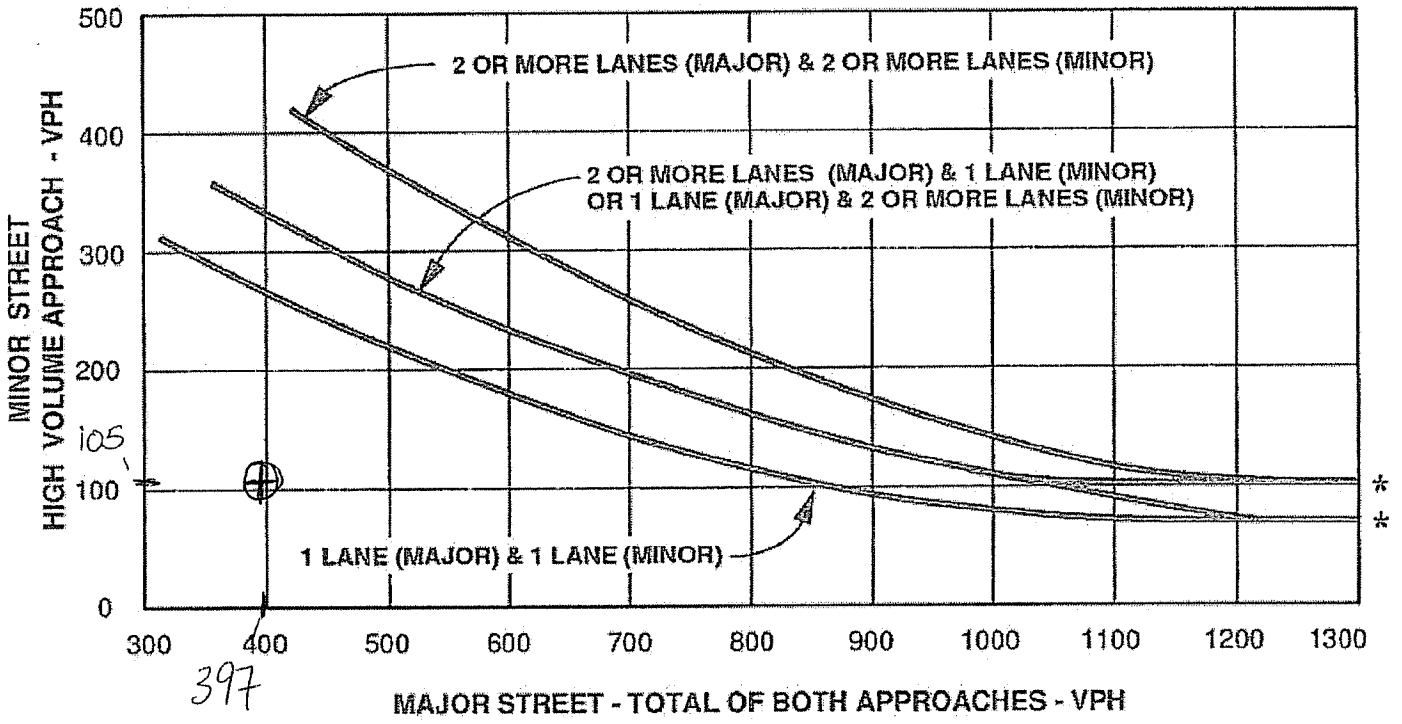
Intersection Summary			
Average Delay	4.8	HCM Level of Service	A
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Di Giorgio Rd & Chevalier Rd

2035 with Project- PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1 3970	1 1050
2 or More	1
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1 3970	1 1050
2 or More	1
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied X

No one condition satisfied, but following conditions fulfilled 80% or more..... A: 67% B: 74%

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & South Union Ave - AM Peak
Count Date: 9/10/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	1
<	WBR	73
>	EBL	0
1	EBT	0
<	EBR	0
1	NBL	1
2	NBT	69
1	NBR	5
1	SBL	57
2	SBT	83
<	SBR	0
	TOTAL	290

Year 2035
Fut. Volumes w/o Proj

WBL	4
WBT	2
WBR	203
EBL	0
EBT	0
EBR	0
NBL	2
NBT	142
NBR	19
SBL	161
SBT	173
SBR	0
TOTAL	705

Year 2035 Fut. Vol
+ Project Traffic

WBL	15
WBT	58
WBR	203
EBL	54
EBT	8
EBR	15
NBL	2
NBT	196
NBR	25
SBL	161
SBT	411
SBR	108
TOTAL	1255

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	2
WBR	130
EBL	0
EBT	0
EBR	0
NBL	1
NBT	101
NBR	11
SBL	103
SBT	123
SBR	0
TOTAL	473

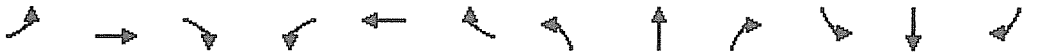
Year 2020 Fut. Vol
+ Project Traffic

WBL	13
WBT	58
WBR	130
EBL	54
EBT	8
EBR	15
NBL	1
NBT	155
NBR	17
SBL	103
SBT	361
SBR	108
TOTAL	1023

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	11	5	6
WBT	56	56	0
WBR	0	0	0
EBL	54	46	8
EBT	8	6	2
EBR	15	15	0
NBL	0	0	0
NBT	54	23	31
NBR	6	1	5
SBL	0	0	0
SBT	238	174	64
SBR	108	104	4
TOTAL	550	430	120

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	DiGiorgio Rd & South Union Ave - AM Peak						
	Count Date:	9/10/2008						
2008	ADT							
WB Approach (To)	0.01							
WB Approach (Away)	0.01							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.99							
NB Approach (Away)	1.00							
SB Approach (To)	1.75							
SB Approach (Away)	1.78							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.1		WBL	3.82	WBT	2.95	WBR	3.23
WB Approach (Away)	0.1		4.96%	4	3.06%	2	3.88%	203
EB Approach (To)	*1*		EBL	1.28	EBT	3.00	EBR	1.86
EB Approach (Away)	*1*		0.82%	0	3.09%	0	1.90%	0
NB Approach (To)	2.7		NBL	1.87	NBT	2.14	NBR	3.87
NB Approach (Away)	2.7		1.91%	2	2.74%	142	5.01%	19
SB Approach (To)	2.8		SBL	3.29	SBT	2.15	SBR	1.29
SB Approach (Away)	2.8		3.96%	161	2.77%	173	0.87%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.3		WBL	17.05	WBT	13.32	WBR	15.26
WB Approach (Away)	0.3		10.58%	15	6.43%	5	9.47%	827
EB Approach (To)	*1*		EBL	2.94	EBT	13.18	EBR	4.74
EB Approach (Away)	*1*		3.04%	0	6.41%	0	4.15%	0
NB Approach (To)	8.4		NBL	4.76	NBT	6.70	NBR	16.94
NB Approach (Away)	8.5		4.16%	3	7.20%	445	10.56%	74
SB Approach (To)	8.5		SBL	15.11	SBT	6.67	SBR	2.93
SB Approach (Away)	8.7		9.44%	641	7.18%	534	3.04%	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	1	1	73	1	69	5	57	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	1	79	1	75	5	62	90	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	334	297	45	246	291	38	90			80		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	334	297	45	246	291	38	90			80		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	92	100			96		
cM capacity (veh/h)	532	588	1015	665	592	1026	1503			1515		

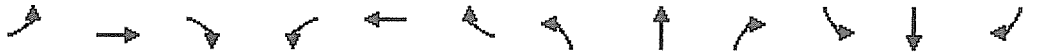
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	0	82	1	38	38	5	62	60	30
Volume Left	0	1	1	0	0	0	62	0	0
Volume Right	0	79	0	0	0	5	0	0	0
cSH	1700	1009	1503	1700	1700	1700	1515	1700	1700
Volume to Capacity	0.00	0.08	0.00	0.02	0.02	0.00	0.04	0.04	0.02
Queue Length 95th (ft)	0	7	0	0	0	0	3	0	0
Control Delay (s)	0.0	8.9	7.4	0.0	0.0	0.0	7.5	0.0	0.0
Lane LOS	A	A	A				A		
Approach Delay (s)	0.0	8.9	0.1				3.0		
Approach LOS	A	A							

Intersection Summary			
Average Delay	3.8	HCM Level of Service	A
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑	↱	↰	↑↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	2	2	130	1	101	11	103	123	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	2	2	141	1	110	12	112	134	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	557	482	67	403	470	55	134			122		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	557	482	67	403	470	55	134			122		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	86	100			92		
cM capacity (veh/h)	333	445	983	501	452	1000	1449			1463		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	0	146	1	55	55	12	112	89	45
Volume Left	0	2	1	0	0	0	112	0	0
Volume Right	0	141	0	0	0	12	0	0	0
cSH	1700	968	1449	1700	1700	1700	1463	1700	1700
Volume to Capacity	0.00	0.15	0.00	0.03	0.03	0.01	0.08	0.05	0.03
Queue Length 95th (ft)	0	13	0	0	0	0	6	0	0
Control Delay (s)	0.0	9.4	7.5	0.0	0.0	0.0	7.7	0.0	0.0
Lane LOS	A	A	A				A		
Approach Delay (s)	0.0	9.4	0.1				3.5		
Approach LOS	A	A							

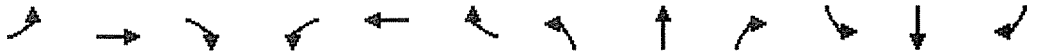
Intersection Summary			
Average Delay	4.3	HCM Level of Service	A
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	54	8	15	13	58	130	1	155	17	103	361	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	9	16	14	63	141	1	168	18	112	392	117
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	934	864	255	611	904	84	510			187		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	934	864	255	611	904	84	510			187		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	59	97	98	96	75	85	100			92		
cM capacity (veh/h)	143	267	744	338	253	958	1052			1385		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	84	218	1	84	84	18	112	262	248
Volume Left	59	14	1	0	0	0	112	0	0
Volume Right	16	141	0	0	0	18	0	0	117
cSH	180	498	1052	1700	1700	1700	1385	1700	1700
Volume to Capacity	0.47	0.44	0.00	0.05	0.05	0.01	0.08	0.15	0.15
Queue Length 95th (ft)	55	55	0	0	0	0	7	0	0
Control Delay (s)	41.4	17.8	8.4	0.0	0.0	0.0	7.8	0.0	0.0
Lane LOS	E	C	A				A		
Approach Delay (s)	41.4	17.8	0.0				1.4		
Approach LOS	E	C							

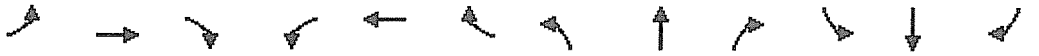
Intersection Summary			
Average Delay	7.4	HCM Level of Service	A
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	4	2	203	2	142	19	161	173	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	4	2	221	2	154	21	175	188	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	841	717	94	603	697	77	188			175		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	841	717	94	603	697	77	188			175		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	99	77	100			87		
cM capacity (veh/h)	179	309	944	346	317	968	1383			1399		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	0	227	2	77	77	21	175	125	63
Volume Left	0	4	2	0	0	0	175	0	0
Volume Right	0	221	0	0	0	21	0	0	0
cSH	1700	918	1383	1700	1700	1700	1399	1700	1700
Volume to Capacity	0.02	0.25	0.00	0.05	0.05	0.01	0.13	0.07	0.04
Queue Length 95th (ft)	0	24	0	0	0	0	11	0	0
Control Delay (s)	0.0	10.2	7.6	0.0	0.0	0.0	7.9	0.0	0.0
Lane LOS	A	B	A				A		
Approach Delay (s)	0.0	10.2	0.1				3.8		
Approach LOS	A	B							

Intersection Summary				
Average Delay	4.9	HCM Level of Service	A
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑↑	↱	↰	↑↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	54	8	15	15	58	203	2	196	25	161	411	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	9	16	16	63	221	2	213	27	175	447	117
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1218	1100	282	811	1132	107	564			240		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1218	1100	282	811	1132	107	564			240		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	13	95	98	93	64	76	100			87		
cM capacity (veh/h)	68	183	715	229	175	927	1004			1324		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	84	300	2	107	107	27	175	298	266
Volume Left	59	16	2	0	0	0	175	0	0
Volume Right	16	221	0	0	0	27	0	0	117
cSH	89	448	1004	1700	1700	1700	1324	1700	1700
Volume to Capacity	0.94	0.67	0.00	0.06	0.06	0.02	0.13	0.18	0.16
Queue Length 95th (ft)	132	121	0	0	0	0	11	0	0
Control Delay (s)	162.9	27.9	8.6	0.0	0.0	0.0	8.1	0.0	0.0
Lane LOS	F	D	A				A		
Approach Delay (s)	162.9	27.9	0.1				1.9		
Approach LOS	F	D							

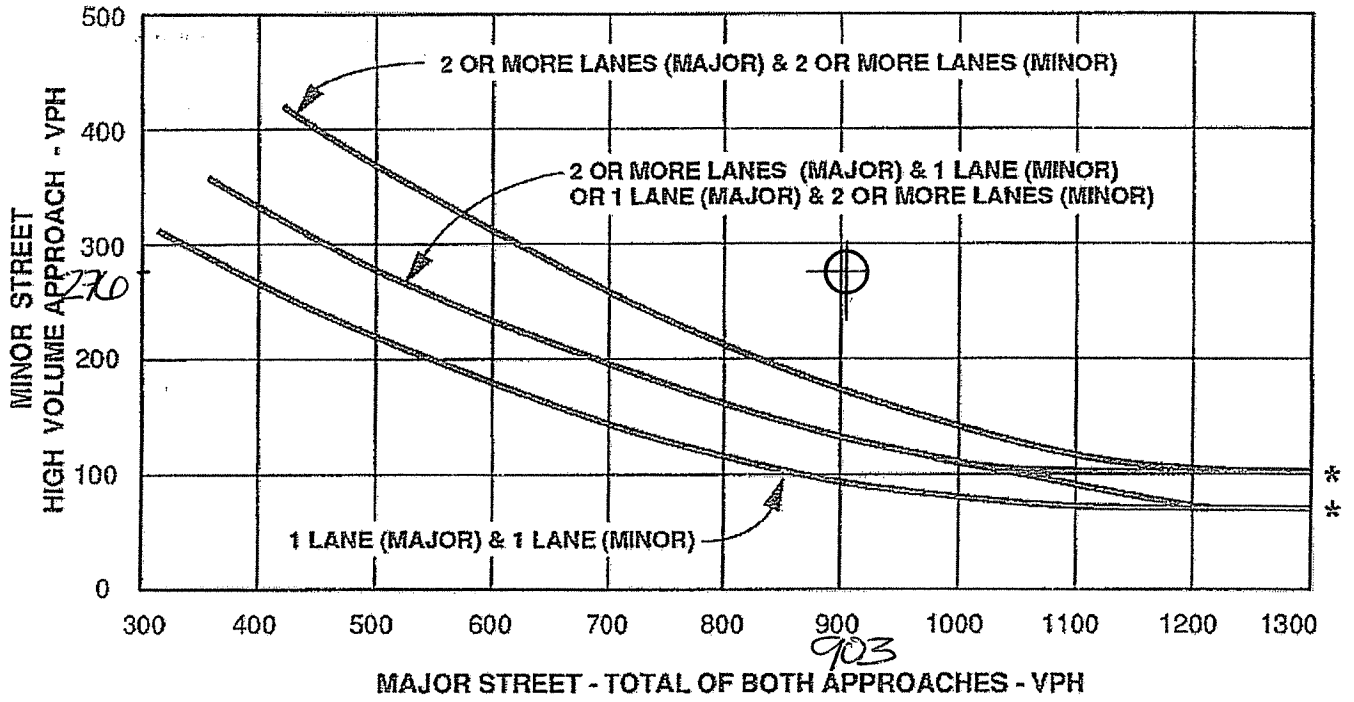
Intersection Summary			
Average Delay	17.2	HCM Level of Service	C
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

DIGIORGIO RD + SOUTH UNION AVE
2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & South Union Ave - PM Peak
Count Date: 9/10/2008

Exist Peak Hour Volumes

U		
>	WBL	5
1	WBT	0
<	WBR	110
>	EBL	1
1	EBT	0
<	EBR	0
1	NBL	1
2	NBT	167
1	NBR	10
1	SBL	151
2	SBT	99
<	SBR	0
	TOTAL	544

Year 2035
Fut. Volumes w/o Proj

WBL	16
WBT	0
WBR	263
EBL	1
EBT	0
EBR	0
NBL	1
NBT	236
NBR	33
SBL	370
SBT	142
SBR	0
TOTAL	1062

Year 2035 Fut. Vol
+ Project Traffic

WBL	25
WBT	6
WBR	263
EBL	100
EBT	52
EBR	118
NBL	1
NBT	379
NBR	70
SBL	370
SBT	285
SBR	186
TOTAL	1855

Year 2020
Fut. Volumes w/o Proj

WBL	10
WBT	0
WBR	177
EBL	1
EBT	0
EBR	0
NBL	1
NBT	197
NBR	20
SBL	247
SBT	118
SBR	0
TOTAL	772

Year 2020 Fut. Vol
+ Project Traffic

WBL	19
WBT	6
WBR	177
EBL	100
EBT	52
EBR	118
NBL	1
NBT	340
NBR	57
SBL	247
SBT	261
SBR	186
TOTAL	1565

Project Generated Trips - Year 2035

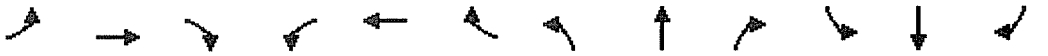
	Total	Indus.	Commer.
WBL	9	0	9
WBT	6	6	0
WBR	0	0	0
EBL	99	89	10
EBT	52	49	3
EBR	118	118	0
NBL	0	0	0
NBT	143	83	60
NBR	37	24	13
SBL	0	0	0
SBT	143	52	91
SBR	186	167	19
TOTAL	793	588	205

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	DiGiorgio Rd & South Union Ave - PM Peak						
	Count Date:	9/10/2008						
2008	ADT							
WB Approach (To)	0.01							
WB Approach (Away)	0.01							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	1.41							
NB Approach (Away)	1.41							
SB Approach (To)	2.61							
SB Approach (Away)	2.67							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.1		WBL	3.67	WBT	3.20	WBR	3.22
WB Approach (Away)	0.1		4.49%	16	3.24%	0	3.31%	263
EB Approach (To)	*1*		EBL	1.02	EBT	3.25	EBR	1.47
EB Approach (Away)	*1*		0.06%	1	3.28%	0	1.24%	0
NB Approach (To)	2.7		NBL	1.46	NBT	1.48	NBR	3.71
NB Approach (Away)	2.7		1.23%	1	1.30%	236	4.52%	33
SB Approach (To)	2.8		SBL	3.28	SBT	1.50	SBR	1.03
SB Approach (Away)	2.8		3.40%	370	1.36%	142	0.11%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.3		WBL	17.10	WBT	14.60	WBR	15.73
WB Approach (Away)	0.3		10.09%	66	6.63%	0	8.88%	1076
EB Approach (To)	*1*		EBL	2.13	EBT	14.45	EBR	3.50
EB Approach (Away)	*1*		2.25%	2	6.61%	0	3.46%	0
NB Approach (To)	8.4		NBL	3.49	NBT	4.62	NBR	16.94
NB Approach (Away)	8.5		3.45%	2	5.70%	738	10.06%	131
SB Approach (To)	8.5		SBL	15.58	SBT	4.63	SBR	2.13
SB Approach (Away)	8.7		8.86%	1472	5.71%	439	2.25%	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	0	5	0	110	1	167	10	151	99	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	5	0	120	1	182	11	164	108	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	648	630	54	566	620	91	108			192		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	648	630	54	566	620	91	108			192		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	99	100	87	100			88		
cM capacity (veh/h)	282	349	1002	370	354	949	1481			1378		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	1	125	1	91	91	11	164	72	36
Volume Left	1	5	1	0	0	0	164	0	0
Volume Right	0	120	0	0	0	11	0	0	0
cSH	282	888	1481	1700	1700	1700	1378	1700	1700
Volume to Capacity	0.00	0.14	0.00	0.05	0.05	0.01	0.12	0.04	0.02
Queue Length 95th (ft)	0	12	0	0	0	0	10	0	0
Control Delay (s)	17.8	9.7	7.4	0.0	0.0	0.0	8.0	0.0	0.0
Lane LOS	C	A	A				A		
Approach Delay (s)	17.8	9.7	0.0				4.8		
Approach LOS	C	A							

Intersection Summary				
Average Delay	4.3	HCM Level of Service	A
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑	↱	↰	↑↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	0	10	0	177	1	197	20	247	118	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	11	0	192	1	214	22	268	128	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	967	903	64	817	882	107	128			236		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	967	903	64	817	882	107	128			236		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	95	100	79	100			80		
cM capacity (veh/h)	140	220	987	226	226	926	1455			1328		

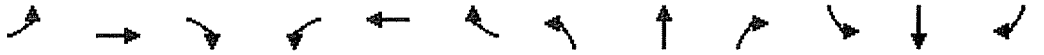
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	1	203	1	107	107	22	268	86	43
Volume Left	1	11	1	0	0	0	268	0	0
Volume Right	0	192	0	0	0	22	0	0	0
cSH	140	795	1455	1700	1700	1700	1328	1700	1700
Volume to Capacity	0.01	0.26	0.00	0.06	0.06	0.01	0.20	0.05	0.03
Queue Length 95th (ft)	1	25	0	0	0	0	19	0	0
Control Delay (s)	31.0	11.1	7.5	0.0	0.0	0.0	8.4	0.0	0.0
Lane LOS	D	B	A				A		
Approach Delay (s)	31.0	11.1	0.0				5.7		
Approach LOS	D	B							

Intersection Summary			
Average Delay	5.4	HCM Level of Service	A
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	100	52	118	19	6	177	1	340	57	247	261	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	57	128	21	7	192	1	370	62	268	284	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1304	1355	243	1207	1395	185	486			432		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1304	1355	243	1207	1395	185	486			432		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	50	83	64	94	77	100			76		
cM capacity (veh/h)	70	113	758	58	107	826	1073			1124		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	293	220	1	185	185	62	268	189	297
Volume Left	109	21	1	0	0	0	268	0	0
Volume Right	128	192	0	0	0	62	0	0	202
cSH	132	338	1073	1700	1700	1700	1124	1700	1700
Volume to Capacity	2.22	0.65	0.00	0.11	0.11	0.04	0.24	0.11	0.17
Queue Length 95th (ft)	615	108	0	0	0	0	23	0	0
Control Delay (s)	624.8	33.4	8.4	0.0	0.0	0.0	9.2	0.0	0.0
Lane LOS	F	D	A				A		
Approach Delay (s)	624.8	33.4	0.0				3.3		
Approach LOS	F	D							

Intersection Summary			
Average Delay	113.6	HCM Level of Service	F
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	100	52	118	19	6	177	1	340	57	247	261	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	57	128	21	7	192	1	370	62	268	284	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1011	1254	142	1207	1395	185	486			432		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1011	1254	142	1207	1395	185	486			432		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	6	56	85	68	94	77	100			76		
cM capacity (veh/h)	116	130	880	65	107	826	1073			1124		

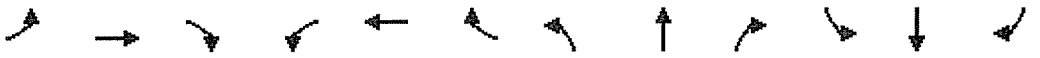
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	109	185	27	192	1	185	185	62	268	142	142	202
Volume Left	109	0	21	0	1	0	0	0	268	0	0	0
Volume Right	0	128	0	192	0	0	0	62	0	0	0	202
cSH	116	318	72	826	1073	1700	1700	1700	1124	1700	1700	1700
Volume to Capacity	0.94	0.58	0.38	0.23	0.00	0.11	0.11	0.04	0.24	0.08	0.08	0.12
Queue Length 95th (ft)	149	86	36	23	0	0	0	0	23	0	0	0
Control Delay (s)	137.8	31.0	83.1	10.7	8.4	0.0	0.0	0.0	9.2	0.0	0.0	0.0
Lane LOS	F	D	F	B	A				A			
Approach Delay (s)	70.5		19.6		0.0				3.3			
Approach LOS	F		C									

Intersection Summary			
Average Delay	16.2	HCM Level of Service	C
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	0	0	16	0	263	1	236	33	370	142	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	0	0	17	0	286	1	257	36	402	154	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1089	1253	77	1140	1217	128	154			292		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1089	1253	77	1140	1217	128	154			292		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	85	100	68	100			68		
cM capacity (veh/h)	87	116	968	117	122	898	1424			1266		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	1	0	17	286	1	128	128	36	402	77	77	0
Volume Left	1	0	17	0	1	0	0	0	402	0	0	0
Volume Right	0	0	0	286	0	0	0	36	0	0	0	0
cSH	87	1700	117	898	1424	1700	1700	1700	1266	1700	1700	1700
Volume to Capacity	0.01	0.00	0.15	0.32	0.00	0.08	0.08	0.02	0.32	0.05	0.05	0.00
Queue Length 95th (ft)	1	0	13	34	0	0	0	0	34	0	0	0
Control Delay (s)	46.8	0.0	40.9	10.9	7.5	0.0	0.0	0.0	9.2	0.0	0.0	0.0
Lane LOS	E	A	E	B	A				A			
Approach Delay (s)	46.8		12.6		0.0				6.6			
Approach LOS	E		B									

Intersection Summary			
Average Delay	6.6	HCM Level of Service	A
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	100	52	118	25	6	263	1	379	70	370	285	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	57	128	27	7	286	1	412	76	402	310	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1326	1604	155	1530	1730	206	512			488		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1326	1604	155	1530	1730	206	512			488		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	13	85	0	88	64	100			62		
cM capacity (veh/h)	47	65	863	14	54	800	1050			1071		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	109	185	34	286	1	206	206	76	402	155	155	202
Volume Left	109	0	27	0	1	0	0	0	402	0	0	0
Volume Right	0	128	0	286	0	0	0	76	0	0	0	202
cSH	47	182	16	800	1050	1700	1700	1700	1071	1700	1700	1700
Volume to Capacity	2.30	1.02	2.12	0.36	0.00	0.12	0.12	0.04	0.38	0.09	0.09	0.12
Queue Length 95th (ft)	282	213	121	41	0	0	0	0	44	0	0	0
Control Delay (s)	779.3	123.7	1012.8	12.0	8.4	0.0	0.0	0.0	10.4	0.0	0.0	0.0
Lane LOS	F	F	F	B	A				B			
Approach Delay (s)	366.5		117.5		0.0				4.6			
Approach LOS	F		F									

Intersection Summary			
Average Delay	74.0	HCM Level of Service	F
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	100	52	118	25	6	263	1	379	70	370	285	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	109	57	128	27	7	286	1	412	76	402	310	202

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	109	185	34	286	1	412	76	402	310	202
Volume Left (vph)	109	0	27	0	1	0	0	402	0	0
Volume Right (vph)	0	128	0	286	0	0	76	0	0	202
Hadj (s)	0.53	-0.45	0.20	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	8.0	7.0	8.2	3.2	7.3	6.8	3.2	6.9	6.4	3.2
Degree Utilization, x	0.24	0.36	0.08	0.25	0.00	0.78	0.07	0.77	0.55	0.18
Capacity (veh/h)	429	489	390	1112	471	516	1121	513	553	1121
Control Delay (s)	12.3	12.6	11.9	7.3	9.1	28.3	5.2	28.0	15.7	5.7
Approach Delay (s)	12.5		7.8		24.6			18.9		
Approach LOS	B		A		C			C		

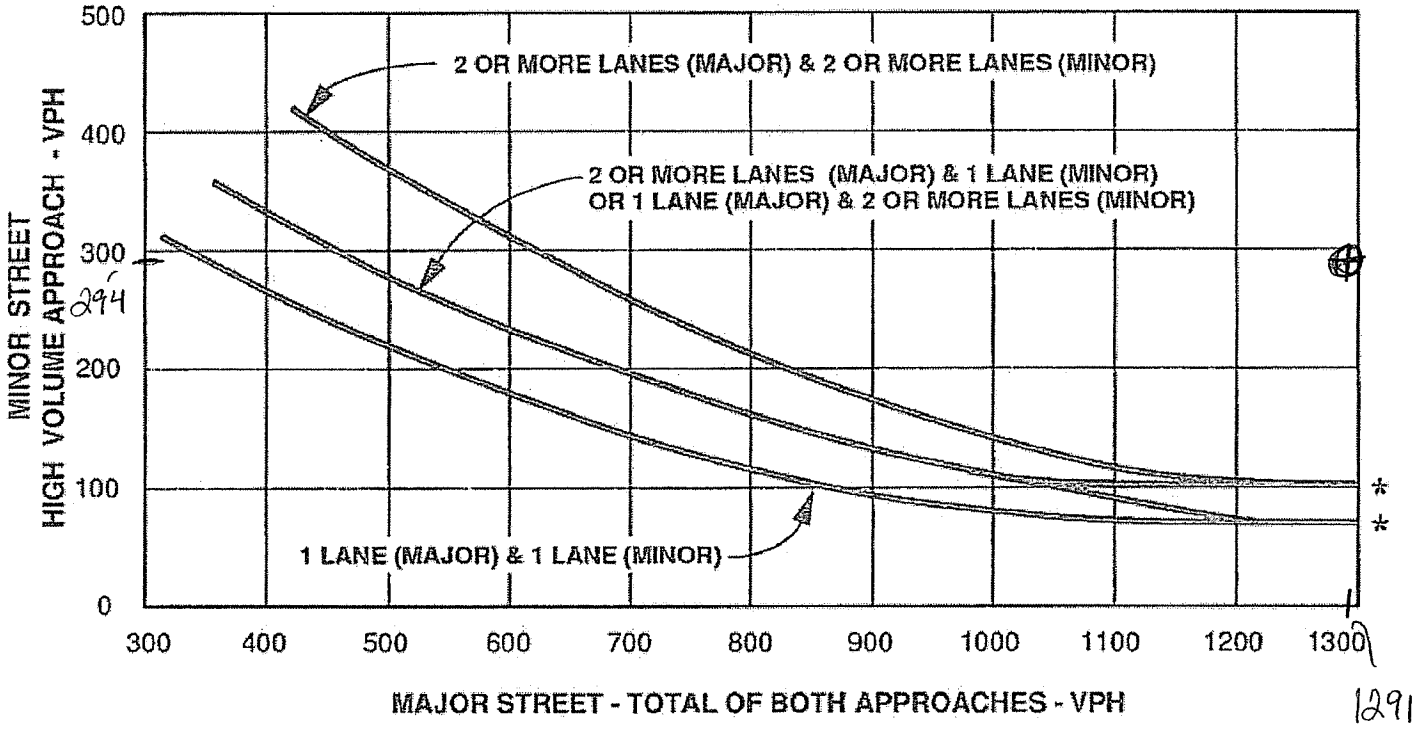
Intersection Summary			
Delay	17.6		
HCM Level of Service	C		
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

Di Giorgio Rd & South Union Ave

2035 with Project- PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....1291.0.....	2 or More.....2940.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....1291.0.....	2 or More.....2940.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & Cottonwood Rd - AM Peak
Count Date: 9/11/2008

Exist Peak Hour Volumes

AWS		
>	WBL	3
1	WBT	72
<	WBR	24
>	EBL	1
1	EBT	76
<	EBR	0
>	NBL	0
1	NBT	10
<	NBR	3
>	SBL	14
1	SBT	20
<	SBR	1
	TOTAL	224

Year 2035
Fut. Volumes w/o Proj

WBL	6
WBT	109
WBR	16
EBL	2
EBT	110
EBR	0
NBL	0
NBT	29
NBR	6
SBL	9
SBT	64
SBR	2
TOTAL	354

Year 2035 Fut. Vol
+ Project Traffic

WBL	8
WBT	160
WBR	16
EBL	6
EBT	120
EBR	1
NBL	0
NBT	30
NBR	6
SBL	9
SBT	77
SBR	18
TOTAL	452

Year 2020
Fut. Volumes w/o Proj

WBL	4
WBT	88
WBR	20
EBL	2
EBT	91
EBR	0
NBL	0
NBT	19
NBR	4
SBL	12
SBT	39
SBR	2
TOTAL	281

Year 2020 Fut. Vol
+ Project Traffic

WBL	6
WBT	139
WBR	20
EBL	6
EBT	101
EBR	1
NBL	0
NBT	20
NBR	4
SBL	12
SBT	52
SBR	18
TOTAL	379

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	2	2	0
WBT	51	47	4
WBR	0	0	0
EBL	4	2	2
EBT	10	5	5
EBR	1	0	1
NBL	0	0	0
NBT	1	1	0
NBR	0	0	0
SBL	0	0	0
SBT	13	11	2
SBR	16	14	2
TOTAL	98	82	16

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	DiGiorgio Rd & Cottonwood Rd - AM Peak						
	Count Date:	9/11/2008						
2006	ADT							
WB Approach (To)	0.21							
WB Approach (Away)	0.21							
EB Approach (To)	0.01							
EB Approach (Away)	0.01							
NB Approach (To)	0.02							
NB Approach (Away)	0.02							
SB Approach (To)	0.22							
SB Approach (Away)	0.22							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.1		WBL	5.80	WBT	3.03	WBR	0.69
WB Approach (Away)	0.1		2.82%	6	1.55%	109	-1.58%	16
EB Approach (To)	0.1		EBL	3.09	EBT	2.80	EBR	8.20
EB Approach (Away)	0.1		2.91%	2	1.38%	110	7.31%	0
NB Approach (To)	0.2		NBL	7.79	NBT	5.44	NBR	5.15
NB Approach (Away)	0.2		7.23%	0	4.10%	29	2.58%	6
SB Approach (To)	0.2		SBL	0.72	SBT	6.12	SBR	3.36
SB Approach (Away)	0.2		-1.48%	9	4.44%	64	3.18%	2
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.3		WBL	6.58	WBT	15.96	WBR	1.22
WB Approach (Away)	0.3		5.12%	11	6.95%	437	0.63%	28
EB Approach (To)	0.3		EBL	14.09	EBT	14.32	EBR	19.45
EB Approach (Away)	0.3		6.02%	5	6.71%	433	10.51%	0
NB Approach (To)	0.2		NBL	20.13	NBT	5.39	NBR	5.63
NB Approach (Away)	0.2		10.40%	0	4.08%	29	4.76%	10
SB Approach (To)	0.2		SBL	1.27	SBT	6.40	SBR	15.77
SB Approach (Away)	0.2		0.81%	17	4.62%	67	6.45%	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	76	0	3	72	24	0	10	3	14	20	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	83	0	3	78	26	0	11	3	15	22	1

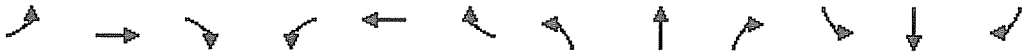
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	84	108	14	38
Volume Left (vph)	1	3	0	15
Volume Right (vph)	0	26	3	1
Hadj (s)	0.04	-0.11	-0.10	0.10
Departure Headway (s)	4.2	4.0	4.2	4.4
Degree Utilization, x	0.10	0.12	0.02	0.05
Capacity (veh/h)	846	882	800	777
Control Delay (s)	7.6	7.5	7.3	7.6
Approach Delay (s)	7.6	7.5	7.3	7.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	91	0	4	88	20	0	19	4	12	39	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	99	0	4	96	22	0	21	4	13	42	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	101	122	25	58
Volume Left (vph)	2	4	0	13
Volume Right (vph)	0	22	4	2
Hadj (s)	0.04	-0.07	-0.07	0.06
Departure Headway (s)	4.3	4.1	4.4	4.5
Degree Utilization, x	0.12	0.14	0.03	0.07
Capacity (veh/h)	822	849	770	754
Control Delay (s)	7.8	7.8	7.5	7.8
Approach Delay (s)	7.8	7.8	7.5	7.8
Approach LOS	A	A	A	A

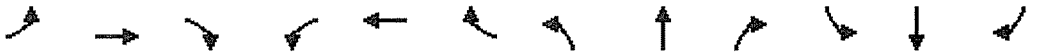
Intersection Summary			
Delay	7.8		
HCM Level of Service	A		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	101	1	6	139	20	0	20	4	12	52	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	110	1	7	151	22	0	22	4	13	57	20

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	117	179	26	89
Volume Left (vph)	7	7	0	13
Volume Right (vph)	1	22	4	20
Hadj (s)	0.04	-0.03	-0.07	-0.07
Departure Headway (s)	4.4	4.3	4.6	4.5
Degree Utilization, x	0.14	0.21	0.03	0.11
Capacity (veh/h)	787	807	721	737
Control Delay (s)	8.1	8.4	7.8	8.1
Approach Delay (s)	8.1	8.4	7.8	8.1
Approach LOS	A	A	A	A

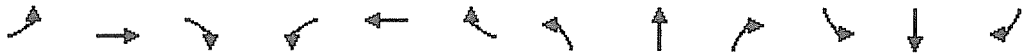
Intersection Summary			
Delay	8.2		
HCM Level of Service	A		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	110	0	6	109	16	0	29	6	9	64	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	120	0	7	118	17	0	32	7	10	70	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	122	142	38	82
Volume Left (vph)	2	7	0	10
Volume Right (vph)	0	17	7	2
Hadj (s)	0.04	-0.03	-0.07	0.04
Departure Headway (s)	4.4	4.3	4.5	4.6
Degree Utilization, x	0.15	0.17	0.05	0.10
Capacity (veh/h)	793	801	740	732
Control Delay (s)	8.1	8.2	7.8	8.1
Approach Delay (s)	8.1	8.2	7.8	8.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay			8.1	
HCM Level of Service			A	
Intersection Capacity Utilization		27.3%	ICU Level of Service	A
Analysis Period (min)			15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	120	1	8	160	16	0	30	6	9	77	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	130	1	9	174	17	0	33	7	10	84	20

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	138	200	39	113
Volume Left (vph)	7	9	0	10
Volume Right (vph)	1	17	7	20
Hadj (s)	0.04	-0.01	-0.07	-0.05
Departure Headway (s)	4.5	4.4	4.8	4.7
Degree Utilization, x	0.17	0.25	0.05	0.15
Capacity (veh/h)	759	775	692	710
Control Delay (s)	8.5	8.9	8.0	8.5
Approach Delay (s)	8.5	8.9	8.0	8.5
Approach LOS	A	A	A	A

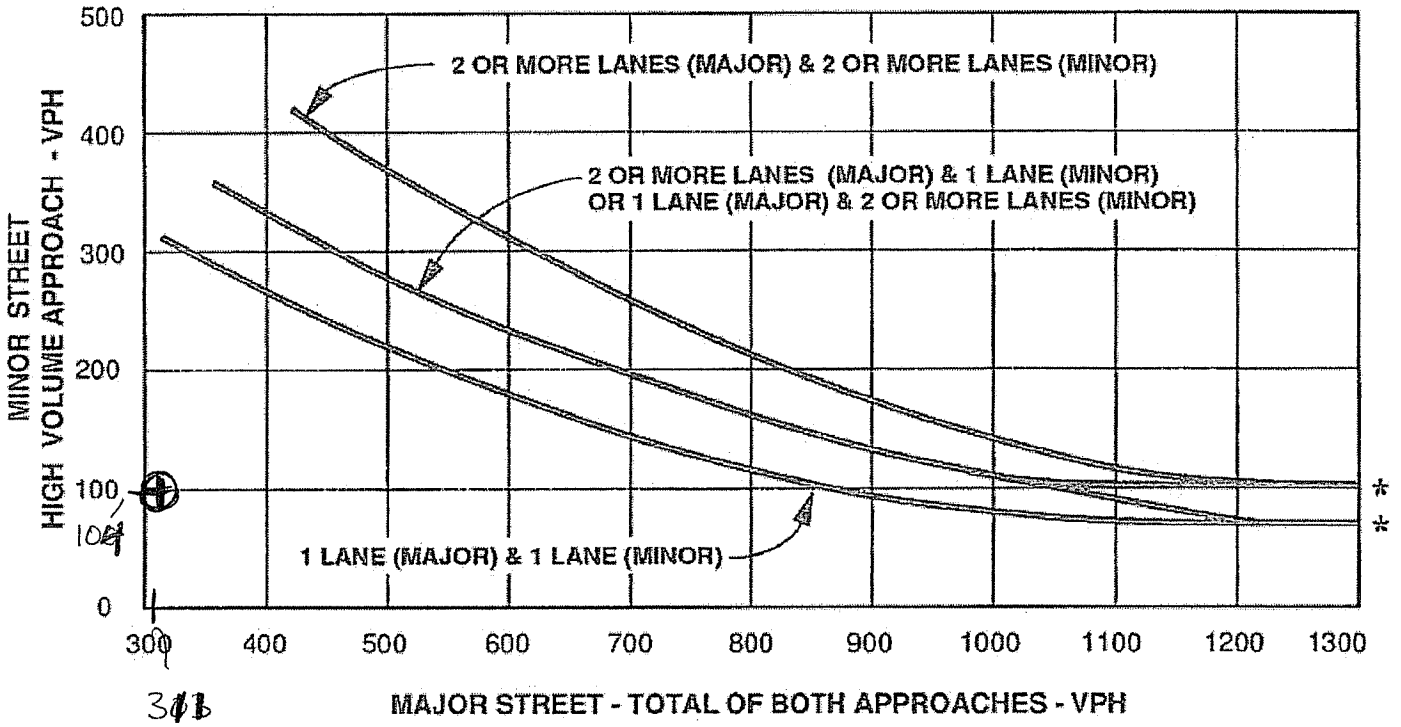
Intersection Summary			
Delay	8.6		
HCM Level of Service	A		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

DiGiorgio Rd & Cottonwood Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: DiGiorgio Rd & Cottonwood Rd - PM Peak
Count Date: 9/11/2008

Exist Peak Hour Volumes

AWS		
>	WBL	2
1	WBT	85
<	WBR	28
>	EBL	0
1	EBT	141
<	EBR	1
>	NBL	0
1	NBT	32
<	NBR	4
>	SBL	64
1	SBT	13
<	SBR	3
	TOTAL	373

Year 2035
Fut. Volumes w/o Proj

WBL	4
WBT	128
WBR	18
EBL	0
EBT	204
EBR	7
NBL	0
NBT	94
NBR	8
SBL	43
SBT	42
SBR	7
TOTAL	555

Year 2035 Fut. Vol
+ Project Traffic

WBL	7
WBT	136
WBR	18
EBL	57
EBT	217
EBR	20
NBL	0
NBT	105
NBR	12
SBL	43
SBT	42
SBR	11
TOTAL	668

Year 2020
Fut. Volumes w/o Proj

WBL	3
WBT	104
WBR	24
EBL	0
EBT	169
EBR	3
NBL	0
NBT	59
NBR	6
SBL	55
SBT	26
SBR	5
TOTAL	453

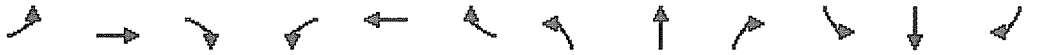
Year 2020 Fut. Vol
+ Project Traffic

WBL	6
WBT	112
WBR	24
EBL	57
EBT	182
EBR	16
NBL	0
NBT	70
NBR	10
SBL	55
SBT	26
SBR	9
TOTAL	566

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	3	0	3
WBT	8	2	6
WBR	0	0	0
EBL	57	47	10
EBT	13	10	3
EBR	13	10	3
NBL	0	0	0
NBT	11	6	5
NBR	4	1	3
SBL	0	0	0
SBT	0	0	0
SBR	4	2	2
TOTAL	113	78	35

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	DiGiorgio Rd & Cottonwood Rd - PM Peak					
	Count Date:	9/11/2008					
2006	ADT						
WB Approach (To)	0.21						
WB Approach (Away)	0.21						
EB Approach (To)	0.01						
EB Approach (Away)	0.01						
NB Approach (To)	0.02						
NB Approach (Away)	0.02						
SB Approach (To)	0.22						
SB Approach (Away)	0.22						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	0.1		WBL	5.80	WBT	3.03	WBR 0.69
WB Approach (Away)	0.1		2.82%	4	1.55%	128	-1.58% 18
EB Approach (To)	0.1		EBL	3.09	EBT	2.80	EBR 8.20
EB Approach (Away)	0.1		2.91%	0	1.38%	204	7.31% 7
NB Approach (To)	0.2		NBL	7.79	NBT	5.44	NBR 5.15
NB Approach (Away)	0.2		7.23%	0	4.10%	94	2.58% 8
SB Approach (To)	0.2		SBL	0.72	SBT	6.12	SBR 3.36
SB Approach (Away)	0.2		-1.48%	43	4.44%	42	3.18% 7
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	0.3		WBL	6.58	WBT	15.96	WBR 1.22
WB Approach (Away)	0.3		5.12%	8	6.95%	515	0.63% 33
EB Approach (To)	0.3		EBL	14.09	EBT	14.32	EBR 19.45
EB Approach (Away)	0.3		6.02%	0	6.71%	804	10.51% 15
NB Approach (To)	0.2		NBL	20.13	NBT	5.39	NBR 5.63
NB Approach (Away)	0.2		10.40%	0	4.08%	93	4.76% 14
SB Approach (To)	0.2		SBL	1.27	SBT	6.40	SBR 15.77
SB Approach (Away)	0.2		0.81%	79	4.62%	44	6.45% 16



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	141	1	2	85	28	0	32	4	64	13	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	153	1	2	92	30	0	35	4	70	14	3

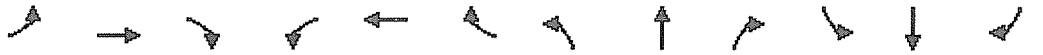
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	154	125	39	87
Volume Left (vph)	0	2	0	70
Volume Right (vph)	1	30	4	3
Hadj (s)	0.03	-0.11	-0.03	0.17
Departure Headway (s)	4.4	4.3	4.6	4.8
Degree Utilization, x	0.19	0.15	0.05	0.11
Capacity (veh/h)	794	801	725	706
Control Delay (s)	8.4	8.0	7.9	8.4
Approach Delay (s)	8.4	8.0	7.9	8.4
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.2		
HCM Level of Service	A		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	169	3	3	104	24	0	59	6	55	26	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	184	3	3	113	26	0	64	7	60	28	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	187	142	71	93
Volume Left (vph)	0	3	0	60
Volume Right (vph)	3	26	7	5
Hadj (s)	0.02	-0.07	-0.02	0.13
Departure Headway (s)	4.5	4.5	4.8	4.9
Degree Utilization, x	0.23	0.18	0.09	0.13
Capacity (veh/h)	767	762	697	680
Control Delay (s)	8.9	8.4	8.3	8.6
Approach Delay (s)	8.9	8.4	8.3	8.6
Approach LOS	A	A	A	A

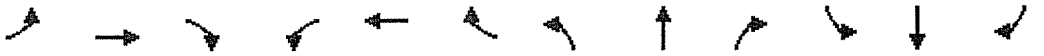
Intersection Summary			
Delay	8.6		
HCM Level of Service	A		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	182	16	6	112	24	0	70	10	55	26	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	198	17	7	122	26	0	76	11	60	28	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	277	154	87	98
Volume Left (vph)	62	7	0	60
Volume Right (vph)	17	26	11	10
Hadj (s)	0.04	-0.06	-0.04	0.10
Departure Headway (s)	4.6	4.7	5.0	5.2
Degree Utilization, x	0.36	0.20	0.12	0.14
Capacity (veh/h)	740	725	648	633
Control Delay (s)	10.2	8.8	8.7	9.0
Approach Delay (s)	10.2	8.8	8.7	9.0
Approach LOS	B	A	A	A

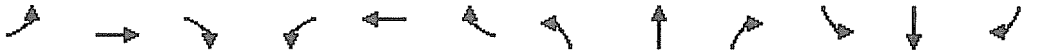
Intersection Summary			
Delay	9.4		
HCM Level of Service	A		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	204	7	4	128	18	0	94	8	43	42	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	222	8	4	139	20	0	102	9	47	46	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	229	163	111	100
Volume Left (vph)	0	4	0	47
Volume Right (vph)	8	20	9	8
Hadj (s)	0.01	-0.03	-0.01	0.08
Departure Headway (s)	4.7	4.7	5.0	5.1
Degree Utilization, x	0.30	0.21	0.15	0.14
Capacity (veh/h)	727	718	662	644
Control Delay (s)	9.6	9.0	8.9	8.9
Approach Delay (s)	9.6	9.0	8.9	8.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay		9.2	
HCM Level of Service		A	
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	57	217	20	7	136	18	0	105	12	43	42	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	236	22	8	148	20	0	114	13	47	46	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	320	175	127	104
Volume Left (vph)	62	8	0	47
Volume Right (vph)	22	20	13	12
Hadj (s)	0.03	-0.02	-0.03	0.05
Departure Headway (s)	4.8	4.9	5.3	5.4
Degree Utilization, x	0.43	0.24	0.19	0.16
Capacity (veh/h)	711	679	608	598
Control Delay (s)	11.3	9.5	9.5	9.4
Approach Delay (s)	11.3	9.5	9.5	9.4
Approach LOS	B	A	A	A

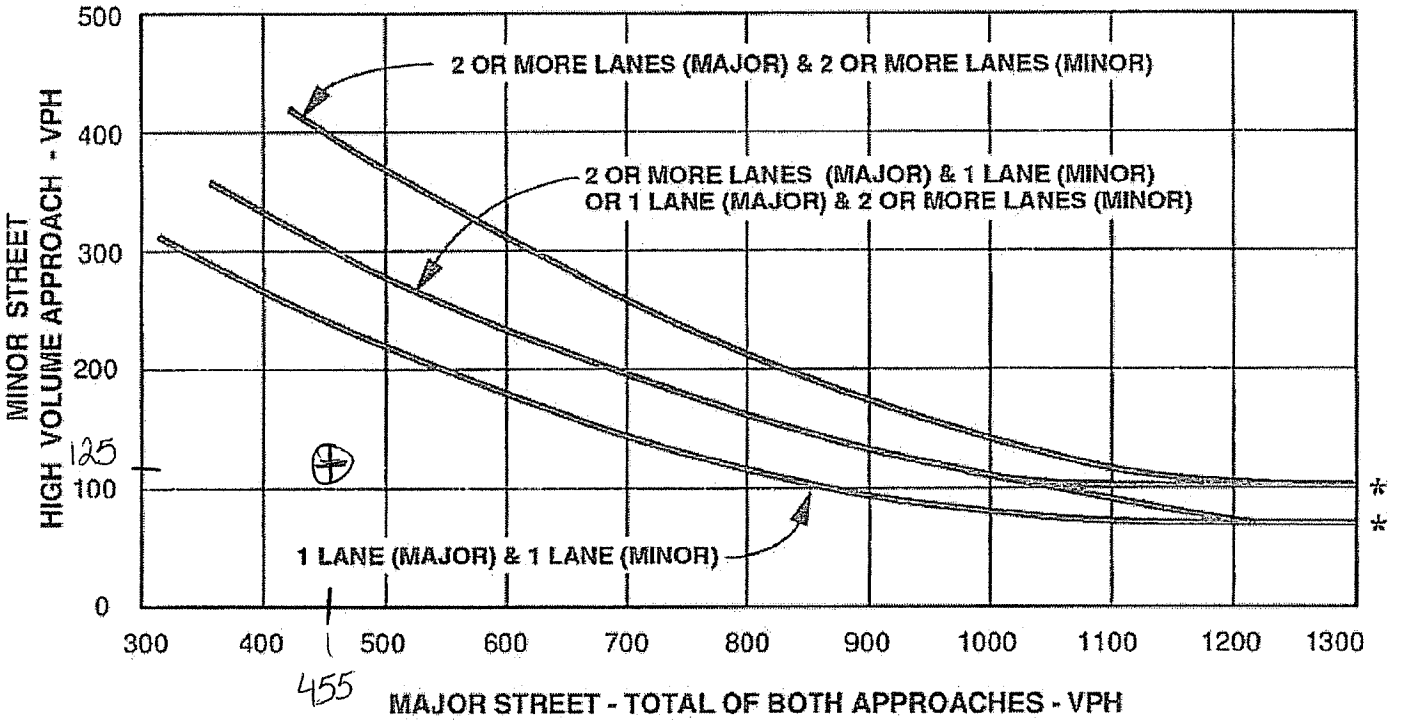
Intersection Summary			
Delay	10.3		
HCM Level of Service	B		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

Di Giorgio Rd & Cottonwood Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN.. ..... RURAL..... X .....

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..... 4550	1..... 1250 .....
2 or More.....	1.....
2 or More.....	2 or More.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..... 4550	1..... 1250 .....
2 or More.....	1.....
2 or More.....	2 or More.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 78% (A) 77% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Lamb Ave/ Project Entrance # 1 & Chevalier Rd - AM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035 Fut. Vol
+ Project Traffic

WBL	33
WBT	26
WBR	36
EBL	19
EBT	4
EBR	114
NBL	456
NBT	226
NBR	342
SBL	9
SBT	94
SBR	51
TOTAL	1410

Year 2020
Fut. Volumes w/o Proj

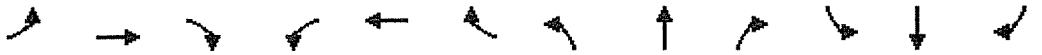
WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2020 Fut. Vol
U **+ Project Traffic**

>	WBL	33
1	WBT	26
<	WBR	36
>	EBL	19
1	EBT	4
<	EBR	114
>	NBL	456
1	NBT	226
<	NBR	342
>	SBL	9
1	SBT	94
<	SBR	51
	TOTAL	1410

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	33	29	4
WBT	26	26	0
WBR	36	34	2
EBL	19	19	0
EBT	4	4	0
EBR	114	114	0
NBL	456	456	0
NBT	226	215	11
NBR	342	333	9
SBL	9	9	0
SBT	94	89	5
SBR	51	51	0
TOTAL	1410	1379	31



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	19	4	114	33	26	36	456	226	342	9	94	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	4	124	36	28	39	496	246	372	10	102	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1626	1758	130	1698	1600	432	158			617		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1626	1758	130	1698	1600	432	158			617		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	47	92	87	17	59	94	65			99		
cM capacity (veh/h)	39	55	920	43	68	624	1422			963		

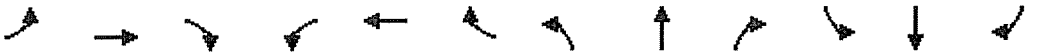
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	149	103	1113	167
Volume Left	21	36	496	10
Volume Right	124	39	372	55
cSH	199	79	1422	963
Volume to Capacity	0.75	1.31	0.35	0.01
Queue Length 95th (ft)	124	198	40	1
Control Delay (s)	62.9	298.1	6.7	0.6
Lane LOS	F	F	A	A
Approach Delay (s)	62.9	298.1	6.7	0.6
Approach LOS	F	F		

Intersection Summary			
Average Delay	31.1	HCM LOS	D
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑	↱		↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	19	4	114	33	26	36	456	226	342	9	94	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	4	124	36	28	39	496	246	372	10	102	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1440	1758	130	1512	1414	246	158			617		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1440	1758	130	1512	1414	246	158			617		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	65	92	87	38	68	95	65			99		
cM capacity (veh/h)	58	55	920	58	89	793	1422			963		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1
Volume Total	149	103	496	246	372	167
Volume Left	21	36	496	0	0	10
Volume Right	124	39	0	0	372	55
cSH	262	105	1422	1700	1700	963
Volume to Capacity	0.57	0.98	0.35	0.14	0.22	0.01
Queue Length 95th (ft)	80	153	40	0	0	1
Control Delay (s)	35.4	159.3	8.9	0.0	0.0	0.6
Lane LOS	E	F	A			A
Approach Delay (s)	35.4	159.3	4.0			0.6
Approach LOS	E	F				

Intersection Summary			
Average Delay	17.1	HCM Level of Service	C
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑	↱		↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	19	4	114	33	26	36	456	226	342	9	94	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	4	124	36	28	39	496	246	372	10	102	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1440	1758	130	1512	1414	246	158			617		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1440	1758	130	1512	1414	246	158			617		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	65	92	87	38	68	95	65			99		
cM capacity (veh/h)	58	55	920	58	89	793	1422			963		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1
Volume Total	149	103	496	246	372	167
Volume Left	21	36	496	0	0	10
Volume Right	124	39	0	0	372	55
cSH	262	105	1422	1700	1700	963
Volume to Capacity	0.57	0.98	0.35	0.14	0.22	0.01
Queue Length 95th (ft)	80	153	40	0	0	1
Control Delay (s)	35.4	159.3	8.9	0.0	0.0	0.6
Lane LOS	E	F	A			A
Approach Delay (s)	35.4	159.3	4.0			0.6
Approach LOS	E	F				

Intersection Summary			
Average Delay	17.1	HCM Level of Service	C
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

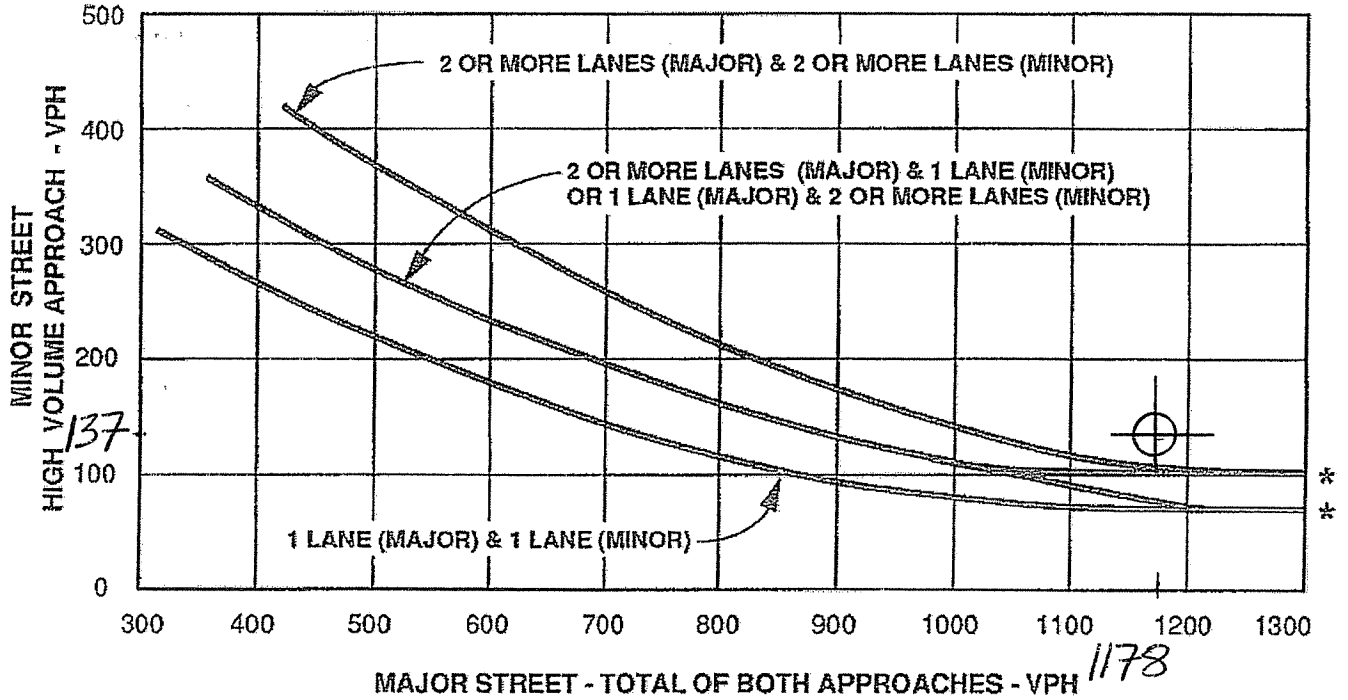
Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

LAMB AVE / PROJECT ENTRANCE #1 + CHEVALIER

2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Lamb Ave/ Project Entrance # 1 & Chevalier Rd - PM Peak
Count Date: Future Intersection

Exist Peak Hour Volumes

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035 Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2035 Fut. Vol + Project Traffic

WBL	269
WBT	5
WBR	6
EBL	42
EBT	163
EBR	458
NBL	117
NBT	82
NBR	109
SBL	60
SBT	306
SBR	54
TOTAL	1671

Year 2020 Fut. Volumes w/o Proj

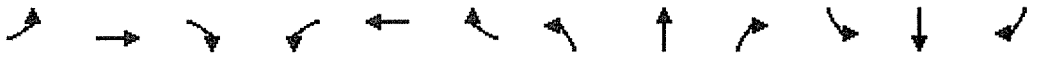
WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	0

Year 2020 Fut. Vol + Project Traffic

>	WBL	269
1	WBT	5
<	WBR	6
>	EBL	42
1	EBT	163
<	EBR	458
>	NBL	117
1	NBT	82
<	NBR	109
>	SBL	60
1	SBT	306
<	SBR	54
	TOTAL	1671

Project Generated Trips - Year 2035

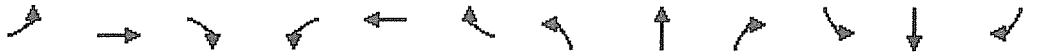
	Total	Indus.	Commer.
WBL	269	236	33
WBT	5	5	0
WBR	6	6	0
EBL	42	42	0
EBT	163	163	0
EBR	458	458	0
NBL	117	117	0
NBT	82	66	16
NBR	109	75	34
SBL	60	53	7
SBT	306	289	17
SBR	54	54	0
TOTAL	1671	1564	107



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	42	163	458	269	5	6	117	82	109	60	306	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	177	498	292	5	7	127	89	118	65	333	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	904	954	362	1482	924	148	391			208		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	904	954	362	1482	924	148	391			208		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	19	27	0	98	99	89			95		
cM capacity (veh/h)	222	219	683	8	228	898	1167			1363		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	721	304	335	457
Volume Left	46	292	127	65
Volume Right	498	7	118	59
cSH	414	9	1167	1363
Volume to Capacity	1.74	35.19	0.11	0.05
Queue Length 95th (ft)	1111	Err	9	4
Control Delay (s)	367.1	Err	3.9	1.5
Lane LOS	F	F	A	A
Approach Delay (s)	367.1	Err	3.9	1.5
Approach LOS	F	F		

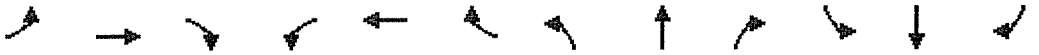
Intersection Summary			
Average Delay	1822.2	HCM Level of Service	F
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	42	163	458	269	5	6	117	82	109	60	306	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	177	498	292	5	7	127	89	118	65	333	59

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	223	498	292	12	216	118	398	59
Volume Left (vph)	46	0	292	0	127	0	65	0
Volume Right (vph)	0	498	0	7	0	118	0	59
Hadj (s)	0.07	-0.57	0.53	-0.35	0.33	-0.67	0.12	-0.67
Departure Headway (s)	8.0	3.2	8.2	7.3	8.0	7.0	7.5	6.7
Degree Utilization, x	0.49	0.44	0.67	0.02	0.48	0.23	0.83	0.11
Capacity (veh/h)	413	1115	415	456	416	474	463	514
Control Delay (s)	18.5	8.7	25.2	9.3	17.2	10.9	36.1	9.3
Approach Delay (s)	11.7		24.6		15.0		32.7	
Approach LOS	B		C		B		D	

Intersection Summary			
Delay	19.7		
HCM Level of Service	C		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	42	163	458	269	5	6	117	82	109	60	306	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	46	177	498	292	5	7	127	89	118	65	333	59

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	223	498	292	12	216	118	398	59
Volume Left (vph)	46	0	292	0	127	0	65	0
Volume Right (vph)	0	498	0	7	0	118	0	59
Hadj (s)	0.07	-0.57	0.53	-0.35	0.33	-0.67	0.12	-0.67
Departure Headway (s)	8.0	3.2	8.2	7.3	8.0	7.0	7.5	6.7
Degree Utilization, x	0.49	0.44	0.67	0.02	0.48	0.23	0.83	0.11
Capacity (veh/h)	413	1115	415	456	416	474	463	514
Control Delay (s)	18.5	8.7	25.2	9.3	17.2	10.9	36.1	9.3
Approach Delay (s)	11.7		24.6		15.0		32.7	
Approach LOS	B		C		B		D	

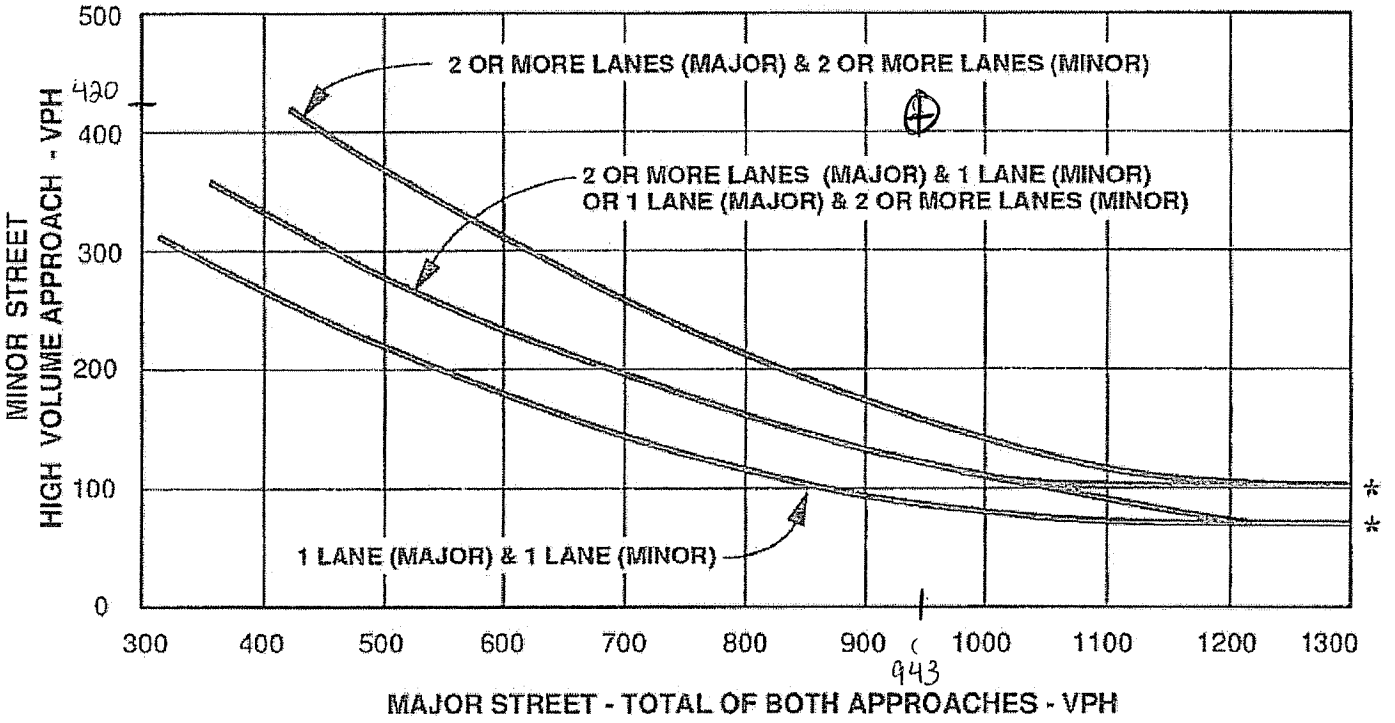
Intersection Summary			
Delay	19.7		
HCM Level of Service	C		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

Lamb Ave / Project Entrance #1 & Chevalier Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN ..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 9430	2 or More 4200
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 9430	2 or More 4200
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more ..... A _____ B _____

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Lamb Ave & South Union Ave - AM Peak
Count Date: 9/23/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	0
<	WBR	5
>	EBL	2
1	EBT	0
<	EBR	1
1	NBL	1
2	NBT	79
<	NBR	3
1	SBL	8
2	SBT	91
<	SBR	2
	TOTAL	193

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	10
EBL	4
EBT	0
EBR	2
NBL	2
NBT	306
NBR	6
SBL	15
SBT	321
SBR	4
TOTAL	672

Year 2035 Fut. Vol
+ Project Traffic

WBL	16
WBT	27
WBR	10
EBL	62
EBT	6
EBR	34
NBL	10
NBT	308
NBR	6
SBL	20
SBT	401
SBR	182
TOTAL	1082

Year 2020
Fut. Volumes w/o Proj

WBL	1
WBT	0
WBR	7
EBL	3
EBT	0
EBR	1
NBL	1
NBT	179
NBR	4
SBL	11
SBT	192
SBR	3
TOTAL	403

Year 2020 Fut. Vol
+ Project Traffic

WBL	15
WBT	27
WBR	7
EBL	61
EBT	6
EBR	33
NBL	9
NBT	181
NBR	4
SBL	16
SBT	272
SBR	181
TOTAL	813

Project Generated Trips - Year 2035

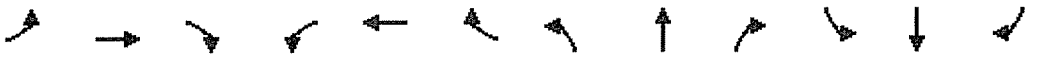
	Total	Indus.	Commer.
WBL	14	7	7
WBT	27	21	6
WBR	0	0	0
EBL	58	25	33
EBT	6	2	4
EBR	32	25	7
NBL	8	6	2
NBT	2	0	2
NBR	0	0	0
SBL	5	5	0
SBT	80	22	58
SBR	178	167	11
TOTAL	410	280	130

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Lamb Ave & South Union Ave - AM Peak					
	Count Date:	9/23/2008					
2006	ADT						
WB Approach (To)	*1*						
WB Approach (Away)	*1*						
EB Approach (To)	*1*						
EB Approach (Away)	*1*						
NB Approach (To)	0.63						
NB Approach (Away)	0.70						
SB Approach (To)	0.70						
SB Approach (Away)	0.63						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	*1*		WBL	2.44	WBT	1.00	WBR 2.65
WB Approach (Away)	*1*		2.41%	2	0.00%	0	2.59% 10
EB Approach (To)	*1*		EBL	2.65	EBT	1.00	EBR 2.44
EB Approach (Away)	*1*		2.59%	4	0.00%	0	2.41% 2
NB Approach (To)	2.7		NBL	2.65	NBT	4.30	NBR 2.65
NB Approach (Away)	2.7		2.59%	2	5.19%	306	2.59% 6
SB Approach (To)	2.7		SBL	2.44	SBT	3.89	SBR 2.44
SB Approach (Away)	2.7		2.41%	15	4.82%	321	2.41% 4
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	*1*		WBL	4.42	WBT	2.37	WBR 6.86
WB Approach (Away)	*1*		3.70%	3	2.34%	0	4.61% 17
EB Approach (To)	3.6		EBL	8.14	EBT	2.28	EBR 5.70
EB Approach (Away)	3.7		6.85%	12	2.25%	0	5.95% 5
NB Approach (To)	5.6		NBL	6.38	NBT	10.87	NBR 5.01
NB Approach (Away)	5.5		6.30%	5	8.57%	714	3.96% 8
SB Approach (To)	7.9		SBL	6.22	SBT	9.64	SBR 7.59
SB Approach (Away)	7.9		4.41%	25	8.11%	734	6.74% 11

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	0	1	1	0	5	1	79	3	8	91	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	1	1	0	5	1	86	3	9	99	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	168	209	51	158	208	45	101			89		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168	209	51	158	208	45	101			89		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	100			99		
cM capacity (veh/h)	772	683	1007	789	683	1016	1489			1504		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	7	1	57	32	9	66	35
Volume Left	2	1	1	0	0	9	0	0
Volume Right	1	5	0	0	3	0	0	2
cSH	837	969	1489	1700	1700	1504	1700	1700
Volume to Capacity	0.00	0.01	0.00	0.03	0.02	0.01	0.04	0.02
Queue Length 95th (ft)	0	1	0	0	0	0	0	0
Control Delay (s)	9.3	8.7	7.4	0.0	0.0	7.4	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	9.3	8.7	0.1			0.6		
Approach LOS	A	A						

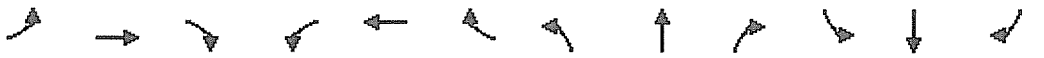
Intersection Summary			
Average Delay	0.8	HCM Level of Service	A
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	1	1	0	7	1	179	4	11	192	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	1	1	0	8	1	195	4	12	209	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	341	435	106	328	435	99	212			199		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	341	435	106	328	435	99	212			199		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	99	100			99		
cM capacity (veh/h)	580	508	928	596	508	937	1356			1371		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	9	1	130	69	12	139	73
Volume Left	3	1	1	0	0	12	0	0
Volume Right	1	8	0	0	4	0	0	3
cSH	640	874	1356	1700	1700	1371	1700	1700
Volume to Capacity	0.01	0.01	0.00	0.08	0.04	0.01	0.08	0.04
Queue Length 95th (ft)	1	1	0	0	0	1	0	0
Control Delay (s)	10.7	9.2	7.7	0.0	0.0	7.6	0.0	0.0
Lane LOS	B	A	A			A		
Approach Delay (s)	10.7	9.2	0.0			0.4		
Approach LOS	B	A						

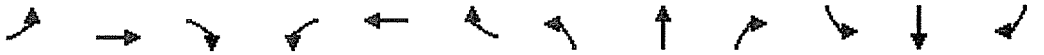
Intersection Summary				
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	61	6	33	15	27	7	9	181	4	16	272	181
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	7	36	16	29	8	10	197	4	17	296	197
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	569	649	246	440	746	101	492			201		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	569	649	246	440	746	101	492			201		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	82	98	95	96	91	99	99			99		
cM capacity (veh/h)	368	379	754	463	333	935	1067			1368		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	109	53	10	131	70	17	197	295
Volume Left	66	16	10	0	0	17	0	0
Volume Right	36	8	0	0	4	0	0	197
cSH	444	405	1067	1700	1700	1368	1700	1700
Volume to Capacity	0.24	0.13	0.01	0.08	0.04	0.01	0.12	0.17
Queue Length 95th (ft)	24	11	1	0	0	1	0	0
Control Delay (s)	15.7	15.2	8.4	0.0	0.0	7.7	0.0	0.0
Lane LOS	C	C	A			A		
Approach Delay (s)	15.7	15.2	0.4			0.3		
Approach LOS	C	C						

Intersection Summary			
Average Delay	3.1	HCM Level of Service	A
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	2	2	0	10	2	306	6	15	321	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	2	2	0	11	2	333	7	16	349	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	565	727	177	549	726	170	353			339		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	565	727	177	549	726	170	353			339		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	99	100			99		
cM capacity (veh/h)	398	344	836	412	344	845	1202			1217		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	7	13	2	222	117	16	233	121
Volume Left	4	2	2	0	0	16	0	0
Volume Right	2	11	0	0	7	0	0	4
cSH	482	719	1202	1700	1700	1217	1700	1700
Volume to Capacity	0.01	0.02	0.00	0.13	0.07	0.01	0.14	0.07
Queue Length 95th (ft)	1	1	0	0	0	1	0	0
Control Delay (s)	12.6	10.1	8.0	0.0	0.0	8.0	0.0	0.0
Lane LOS	B	B	A			A		
Approach Delay (s)	12.6	10.1	0.1			0.4		
Approach LOS	B	B						

Intersection Summary				
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	62	6	34	16	27	10	10	308	6	20	401	182
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	7	37	17	29	11	11	335	7	22	436	198
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	793	941	317	661	1037	171	634			341		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	793	941	317	661	1037	171	634			341		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	72	97	95	94	87	99	99			98		
cM capacity (veh/h)	242	254	679	315	223	843	945			1214		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	111	58	11	223	118	22	291	343
Volume Left	67	17	11	0	0	22	0	0
Volume Right	37	11	0	0	7	0	0	198
cSH	310	289	945	1700	1700	1214	1700	1700
Volume to Capacity	0.36	0.20	0.01	0.13	0.07	0.02	0.17	0.20
Queue Length 95th (ft)	39	18	1	0	0	1	0	0
Control Delay (s)	23.0	20.6	8.9	0.0	0.0	8.0	0.0	0.0
Lane LOS	C	C	A			A		
Approach Delay (s)	23.0	20.6	0.3			0.3		
Approach LOS	C	C						

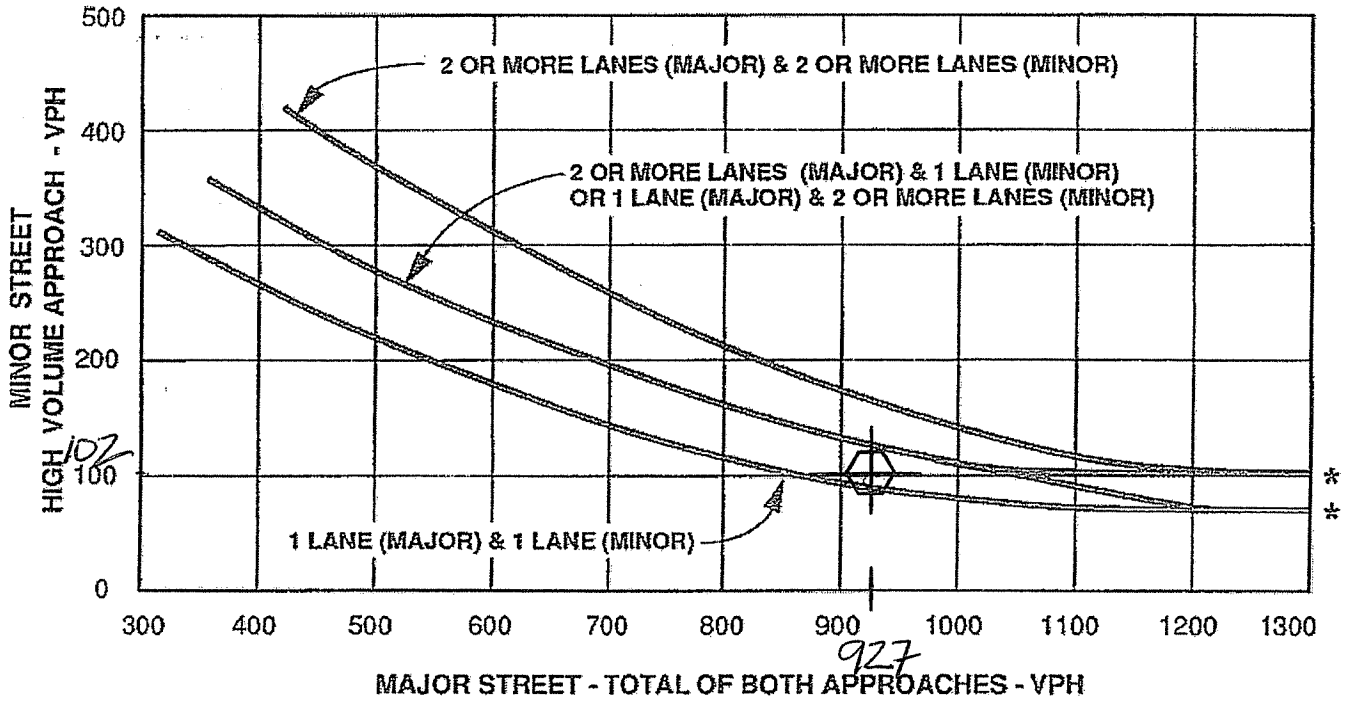
Intersection Summary			
Average Delay	3.4	HCM Level of Service	A
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

LAMB AVE + SOUTH UNION AVE
2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT NOT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Lamb Ave & South Union Ave - PM Peak
Count Date: 9/23/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	0
<	WBR	7
>	EBL	3
1	EBT	0
<	EBR	1
1	NBL	4
2	NBT	186
<	NBR	0
1	SBL	6
2	SBT	99
<	SBR	2
TOTAL		309

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	14
EBL	6
EBT	0
EBR	2
NBL	8
NBT	721
NBR	0
SBL	11
SBT	349
SBR	4
TOTAL	1116

Year 2035 Fut. Vol
+ Project Traffic

WBL	5
WBT	3
WBR	14
EBL	136
EBT	3
EBR	313
NBL	8
NBT	772
NBR	0
SBL	13
SBT	542
SBR	78
TOTAL	1886

Year 2020
Fut. Volumes w/o Proj

WBL	1
WBT	0
WBR	10
EBL	4
EBT	0
EBR	1
NBL	6
NBT	421
NBR	0
SBL	8
SBT	209
SBR	3
TOTAL	664

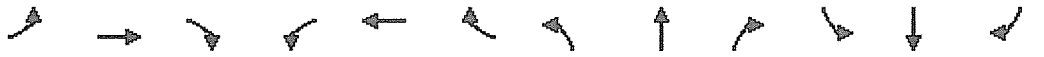
Year 2020 Fut. Vol
+ Project Traffic

WBL	4
WBT	3
WBR	10
EBL	134
EBT	3
EBR	312
NBL	6
NBT	472
NBR	0
SBL	10
SBT	402
SBR	77
TOTAL	1434

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	3	0	3
WBT	3	0	3
WBR	0	0	0
EBL	130	57	73
EBT	3	0	3
EBR	311	286	25
NBL	0	0	0
NBT	51	51	0
NBR	0	0	0
SBL	2	2	0
SBT	193	123	70
SBR	74	45	29
TOTAL	770	564	206

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Lamb Ave & South Union Ave - PM Peak						
	Count Date:	9/23/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.63							
NB Approach (Away)	0.70							
SB Approach (To)	0.70							
SB Approach (Away)	0.63							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	2.44	WBT	1.00	WBR	2.65
WB Approach (Away)	*1*		2.41%	2	0.00%	0	2.59%	14
EB Approach (To)	*1*		EBL	2.65	EBT	1.00	EBR	2.44
EB Approach (Away)	*1*		2.59%	6	0.00%	0	2.41%	2
NB Approach (To)	2.7		NBL	2.65	NBT	4.30	NBR	2.65
NB Approach (Away)	2.7		2.59%	8	5.19%	721	2.59%	0
SB Approach (To)	2.7		SBL	2.44	SBT	3.89	SBR	2.44
SB Approach (Away)	2.7		2.41%	11	4.82%	349	2.41%	4
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	4.42	WBT	2.37	WBR	6.86
WB Approach (Away)	*1*		3.70%	3	2.34%	0	4.61%	23
EB Approach (To)	3.6		EBL	8.14	EBT	2.28	EBR	5.70
EB Approach (Away)	3.7		6.85%	18	2.25%	0	5.95%	5
NB Approach (To)	5.6		NBL	6.38	NBT	10.87	NBR	5.01
NB Approach (Away)	5.5		6.30%	21	8.57%	1682	3.96%	0
SB Approach (To)	7.9		SBL	6.22	SBT	9.64	SBR	7.59
SB Approach (Away)	7.9		4.41%	19	8.11%	799	6.74%	11



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	1	1	0	7	4	186	0	6	99	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	1	1	0	8	4	202	0	7	108	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	239	333	55	279	334	101	110			202		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	239	333	55	279	334	101	110			202		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	100			100		
cM capacity (veh/h)	685	581	1000	647	581	935	1478			1367		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	9	4	135	67	7	72	38
Volume Left	3	1	4	0	0	7	0	0
Volume Right	1	8	0	0	0	0	0	2
cSH	744	885	1478	1700	1700	1367	1700	1700
Volume to Capacity	0.01	0.01	0.00	0.08	0.04	0.00	0.04	0.02
Queue Length 95th (ft)	0	1	0	0	0	0	0	0
Control Delay (s)	9.9	9.1	7.4	0.0	0.0	7.6	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	9.9	9.1	0.2			0.4		
Approach LOS	A	A						

Intersection Summary			
Average Delay	0.6	HCM Level of Service	A
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	1	1	0	10	6	421	0	8	209	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	1	1	0	11	7	458	0	9	227	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	499	717	115	603	718	229	230			458		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	499	717	115	603	718	229	230			458		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	99	100			99		
cM capacity (veh/h)	444	349	915	379	349	774	1335			1100		

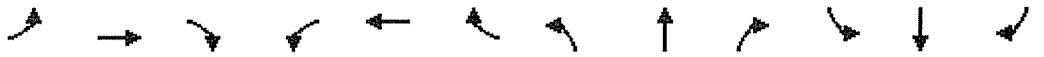
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	12	7	305	153	9	151	79
Volume Left	4	1	7	0	0	9	0	0
Volume Right	1	11	0	0	0	0	0	3
cSH	495	707	1335	1700	1700	1100	1700	1700
Volume to Capacity	0.01	0.02	0.00	0.18	0.09	0.01	0.09	0.05
Queue Length 95th (ft)	1	1	0	0	0	1	0	0
Control Delay (s)	12.4	10.2	7.7	0.0	0.0	8.3	0.0	0.0
Lane LOS	B	B	A			A		
Approach Delay (s)	12.4	10.2	0.1			0.3		
Approach LOS	B	B						

Intersection Summary			
Average Delay	0.4	HCM Level of Service	A
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	134	3	312	4	3	10	6	472	0	10	402	77
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	146	3	339	4	3	11	7	513	0	11	437	84
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	783	1027	260	1107	1068	257	521			513		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	783	1027	260	1107	1068	257	521			513		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	47	99	54	95	98	99	99			99		
cM capacity (veh/h)	273	229	738	87	216	743	1042			1049		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	488	18	7	342	171	11	291	229
Volume Left	146	4	7	0	0	11	0	0
Volume Right	339	11	0	0	0	0	0	84
cSH	485	232	1042	1700	1700	1049	1700	1700
Volume to Capacity	1.01	0.08	0.01	0.20	0.10	0.01	0.17	0.13
Queue Length 95th (ft)	343	6	0	0	0	1	0	0
Control Delay (s)	71.9	21.9	8.5	0.0	0.0	8.5	0.0	0.0
Lane LOS	F	C	A			A		
Approach Delay (s)	71.9	21.9	0.1			0.2		
Approach LOS	F	C						

Intersection Summary			
Average Delay	22.9	HCM Level of Service	C
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	0	2	2	0	14	8	721	0	11	349	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	2	2	0	15	9	784	0	12	379	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	830	1207	192	1017	1209	392	384			784		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	830	1207	192	1017	1209	392	384			784		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	100	99	100	97	99			99		
cM capacity (veh/h)	252	178	817	188	178	607	1171			830		

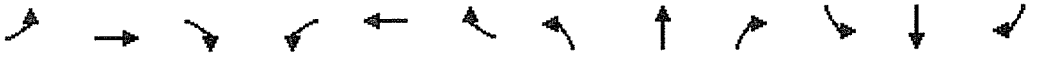
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	9	17	9	522	261	12	253	131
Volume Left	7	2	9	0	0	12	0	0
Volume Right	2	15	0	0	0	0	0	4
cSH	304	475	1171	1700	1700	830	1700	1700
Volume to Capacity	0.03	0.04	0.01	0.31	0.15	0.01	0.15	0.08
Queue Length 95th (ft)	2	3	1	0	0	1	0	0
Control Delay (s)	17.2	12.9	8.1	0.0	0.0	9.4	0.0	0.0
Lane LOS	C	B	A			A		
Approach Delay (s)	17.2	12.9	0.1			0.3		
Approach LOS	C	B						

Intersection Summary			
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	136	3	313	5	3	14	8	772	0	13	542	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	3	340	5	3	15	9	839	0	14	589	85
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1114	1516	337	1521	1559	420	674			839		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1114	1516	337	1521	1559	420	674			839		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	3	97	48	86	97	97	99			98		
cM capacity (veh/h)	152	115	659	38	108	582	913			791		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	491	24	9	559	280	14	393	281
Volume Left	148	5	9	0	0	14	0	0
Volume Right	340	15	0	0	0	0	0	85
cSH	324	119	913	1700	1700	791	1700	1700
Volume to Capacity	1.52	0.20	0.01	0.33	0.16	0.02	0.23	0.17
Queue Length 95th (ft)	691	18	1	0	0	1	0	0
Control Delay (s)	278.4	42.6	9.0	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	E	A			A		
Approach Delay (s)	278.4	42.6	0.1			0.2		
Approach LOS	F	E						

Intersection Summary				
Average Delay	67.3	HCM Level of Service	F
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	136	3	313	5	3	14	8	772	0	13	542	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	148	3	340	5	3	15	9	839	0	14	589	85
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1114	1516	337	1181	1559	420	674			839		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1114	1516	337	1181	1559	420	674			839		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	3	97	48	92	97	97	99			98		
cM capacity (veh/h)	152	115	659	67	108	582	913			791		

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	151	340	24	9	559	280	14	393	281
Volume Left	148	0	5	9	0	0	14	0	0
Volume Right	0	340	15	0	0	0	0	0	85
cSH	151	659	175	913	1700	1700	791	1700	1700
Volume to Capacity	1.00	0.52	0.14	0.01	0.33	0.16	0.02	0.23	0.17
Queue Length 95th (ft)	189	75	12	1	0	0	1	0	0
Control Delay (s)	133.1	16.1	28.9	9.0	0.0	0.0	9.6	0.0	0.0
Lane LOS	F	C	D	A			A		
Approach Delay (s)	52.1		28.9	0.1			0.2		
Approach LOS	F		D						

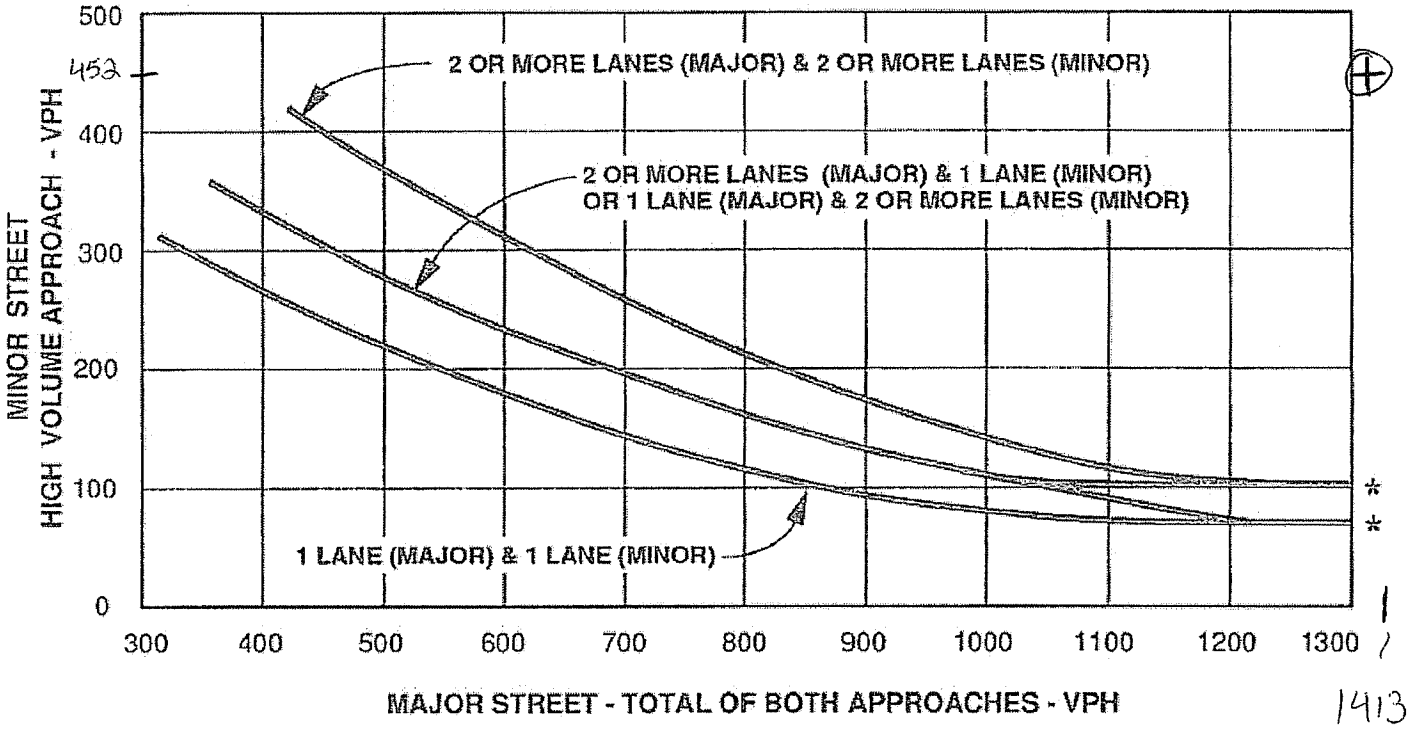
Intersection Summary			
Average Delay	12.9	HCM Level of Service	B
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lamb Ave & South Union Ave

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN ..... RURAL X	Minimum Requirements EADT	
CONDITION A - Minimum Vehicular Volume	Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
Satisfied X Not Satisfied _____	Urban / Rural	Urban / Rural
Number of lanes for moving traffic on each approach Major Street / Minor Street 1 ..... / 1 ..... 2 or More ..... / 1 ..... 2 or More ..... 4130 / 2 or More ..... 4520 1 ..... / 2 or More	8,000 5,600 9,600 6,720 9,600 6,720 8,000 5,600	2,400 1,680 2,400 1,680 3,200 2,240 3,200 2,240
CONDITION B - Interruption of Continuous Traffic	Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
Satisfied _____ Not Satisfied _____		
Number of lanes for moving traffic on each approach Major Street / Minor Street 1 ..... / 1 ..... 2 or More ..... / 1 ..... 2 or More ..... / 2 or More ..... 1 ..... / 2 or More	Urban / Rural 12,000 8,400 14,400 10,080 14,400 10,080 12,000 8,400	Urban / Rural 1,200 850 1,200 850 1,600 1,120 1,600 1,120
Combination of CONDITIONS A + B	2 CONDITIONS 80%	2 CONDITIONS 80%
Satisfied _____ Not Satisfied _____ No one condition satisfied, but following conditions fulfilled 80% or more ..... A _____ B _____		

NOTE: Use of 70% of the values in Condition A and Condition B is recommended if the 85th-percentile speed of the major street traffic exceeds 40 mph (70 km/h) or in an isolated community with a population of less than 10,000.

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Project Entrance # 2 & South Union Ave - AM Peak
Count Date: *9/23/2008*

Exist Peak Hour Volumes

U		Future Intersection
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
2	NBT	73
0	NBR	0
0	SBL	0
2	SBT	97
0	SBR	0
	TOTAL	170

Year 2035

Fut. Volumes w/o Proj	
WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	275
NBR	0
SBL	0
SBT	341
SBR	0
TOTAL	616

Year 2035 Fut. Vol

+ Project Traffic	
WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	26
NBL	33
NBT	284
NBR	0
SBL	0
SBT	409
SBR	76
TOTAL	828

Year 2020

U	**Fut. Volumes w/o Proj**	
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
1	EBR	0
>	NBL	0
2	NBT	162
0	NBR	0
0	SBL	0
2	SBT	204
<	SBR	0
	TOTAL	366

Year 2020 Fut. Vol

+ Project Traffic	
WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	26
NBL	33
NBT	171
NBR	0
SBL	0
SBT	272
SBR	76
TOTAL	578

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	26	0	26
NBL	33	0	33
NBT	9	6	3
NBR	0	0	0
SBL	0	0	0
SBT	68	54	14
SBR	76	0	76
TOTAL	212	60	152

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	26	33	171	272	76
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	28	36	186	296	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	502	189	378			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	502	189	378			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	97			
cM capacity (veh/h)	484	821	1177			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	28	98	124	197	181
Volume Left	0	36	0	0	0
Volume Right	28	0	0	0	83
cSH	821	1177	1700	1700	1700
Volume to Capacity	0.03	0.03	0.07	0.12	0.11
Queue Length 95th (ft)	3	2	0	0	0
Control Delay (s)	9.5	3.2	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.5	1.4		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.9	HCM Level of Service	A
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	26	33	284	409	76
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	28	36	309	445	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	712	264	527			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	712	264	527			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	97			
cM capacity (veh/h)	354	735	1036			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	28	139	206	296	231
Volume Left	0	36	0	0	0
Volume Right	28	0	0	0	83
cSH	735	1036	1700	1700	1700
Volume to Capacity	0.04	0.03	0.12	0.17	0.14
Queue Length 95th (ft)	3	3	0	0	0
Control Delay (s)	10.1	2.5	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	10.1	1.0		0.0	
Approach LOS	B				

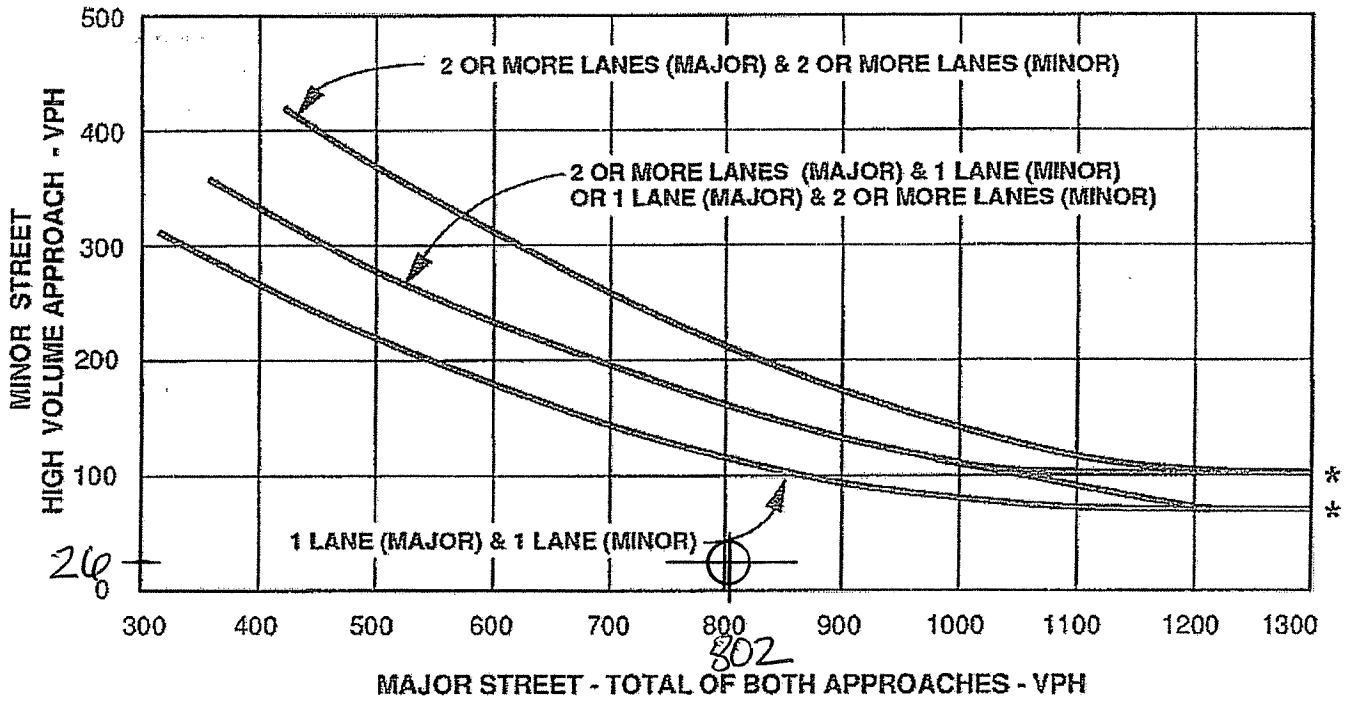
Intersection Summary			
Average Delay	0.7	HCM Level of Service	A
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

PROJECT ENTRANCE #2 & SOUTH UNION AVE
2035 WITH PROJECT- AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT NOT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Project Entrance # 2 & South Union Ave - PM Peak
Count Date: *9/23/2008*

Exist Peak Hour Volumes

U		Future Intersection
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
2	NBT	180
0	NBR	0
0	SBL	0
2	SBT	108
0	SBR	0
	TOTAL	288

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	0
NBT	698
NBR	0
SBL	0
SBT	761
SBR	0
TOTAL	1459

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	140
NBL	43
NBT	735
NBR	0
SBL	0
SBT	1188
SBR	86
TOTAL	2192

Year 2020

U	Fut. Volumes w/o Proj	
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
1	EBR	0
>	NBL	0
2	NBT	408
0	NBR	0
0	SBL	0
2	SBT	395
<	SBR	0
	TOTAL	803

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	140
NBL	43
NBT	445
NBR	0
SBL	0
SBT	822
SBR	86
TOTAL	1536

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	140	0	140
NBL	43	0	43
NBT	37	37	0
NBR	0	0	0
SBL	0	0	0
SBT	427	401	26
SBR	86	0	86
TOTAL	733	438	295

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	140	43	445	822	86
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	152	47	484	893	93
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1276	493	987			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1276	493	987			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	71	93			
cM capacity (veh/h)	148	521	696			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	152	208	322	596	391
Volume Left	0	47	0	0	0
Volume Right	152	0	0	0	93
cSH	521	696	1700	1700	1700
Volume to Capacity	0.29	0.07	0.19	0.35	0.23
Queue Length 95th (ft)	30	5	0	0	0
Control Delay (s)	14.7	3.0	0.0	0.0	0.0
Lane LOS	B	A			
Approach Delay (s)	14.7	1.2		0.0	
Approach LOS	B				

Intersection Summary			
Average Delay	1.7	HCM Level of Service	A
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	140	43	735	1188	86
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	152	47	799	1291	93
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1831	692	1385			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1831	692	1385			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	61	90			
cM capacity (veh/h)	61	386	491			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	152	313	533	861	524
Volume Left	0	47	0	0	0
Volume Right	152	0	0	0	93
cSH	386	491	1700	1700	1700
Volume to Capacity	0.39	0.10	0.31	0.51	0.31
Queue Length 95th (ft)	46	8	0	0	0
Control Delay (s)	20.3	3.2	0.0	0.0	0.0
Lane LOS	C	A			
Approach Delay (s)	20.3	1.2		0.0	
Approach LOS	C				

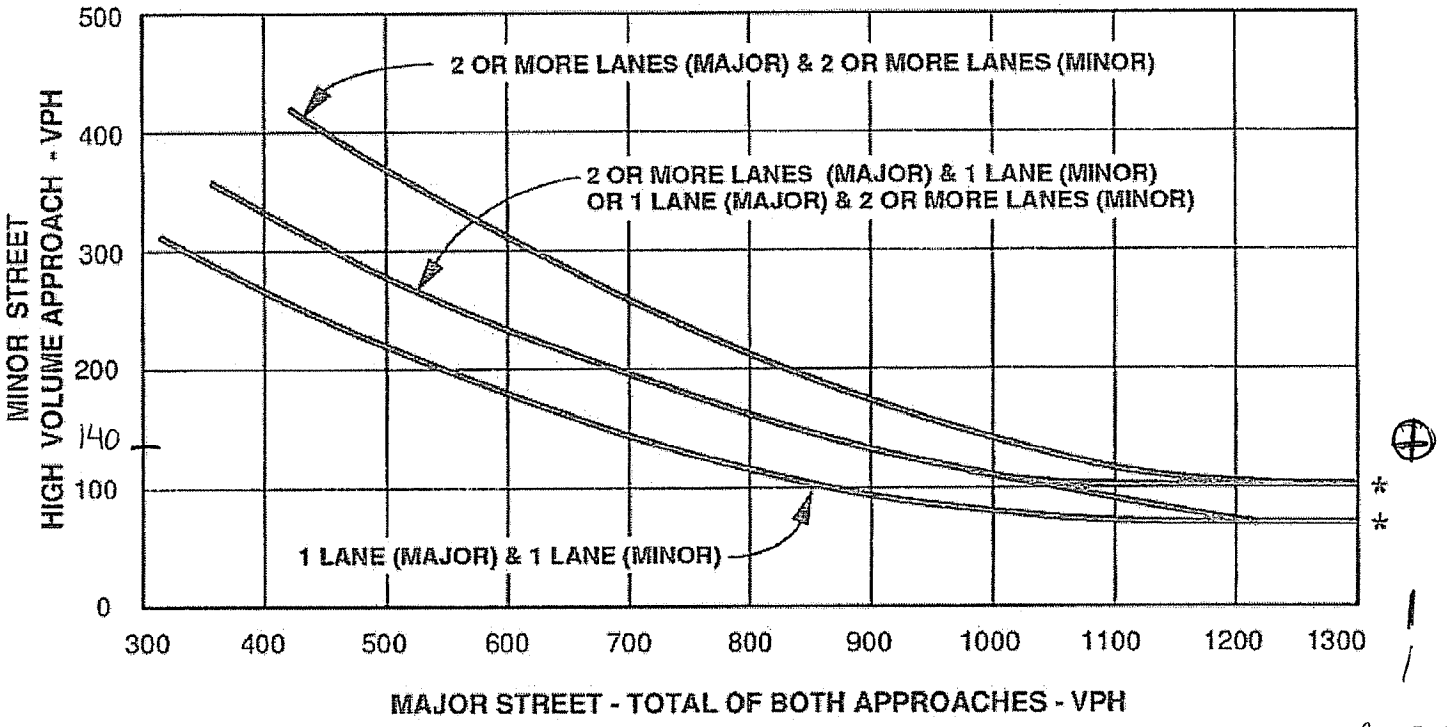
Intersection Summary			
Average Delay	1.7	HCM Level of Service	A
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

Project Entrance # 2 & South Union Ave

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



2052

*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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 20520	1 1400
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 20520	1 1400
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Mugsy Ave & South Union Ave - AM Peak
Count Date: 9/24/2008

Exist Peak Hour Volumes

U		
>	WBL	0
0	WBT	0
<	WBR	4
0	EBL	0
0	EBT	0
0	EBR	0
1	NBL	3
2	NBT	58
<	NBR	3
1	SBL	2
2	SBT	99
<	SBR	0
	TOTAL	169

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	8
EBL	0
EBT	0
EBR	0
NBL	6
NBT	227
NBR	6
SBL	4
SBT	353
SBR	0
TOTAL	604

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	17
EBL	0
EBT	0
EBR	42
NBL	104
NBT	252
NBR	6
SBL	8
SBT	411
SBR	19
TOTAL	859

Year 2020

U	Fut. Volumes w/o Proj	
>	WBL	0
1	WBT	0
<	WBR	6
>	EBL	0
1	EBT	0
<	EBR	0
1	NBL	4
2	NBT	132
<	NBR	4
1	SBL	3
2	SBT	211
<	SBR	0
	TOTAL	360

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	15
EBL	0
EBT	0
EBR	42
NBL	102
NBT	157
NBR	4
SBL	7
SBT	269
SBR	19
TOTAL	615

Project Generated Trips - Year 2035

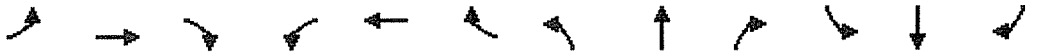
	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	9	6	3
EBL	0	0	0
EBT	0	0	0
EBR	42	39	3
NBL	98	85	13
NBT	25	0	25
NBR	0	0	0
SBL	4	2	2
SBT	58	33	25
SBR	19	19	0
TOTAL	255	184	71

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Mugsy Ave & South Union Ave - AM Peak						
	Count Date:	9/24/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.61							
NB Approach (Away)	0.68							
SB Approach (To)	0.70							
SB Approach (Away)	0.63							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	2.49	WBT	1.00	WBR	2.65
WB Approach (Away)	*1*		2.45%	0	0.00%	0	2.59%	8
EB Approach (To)	*1*		EBL	2.65	EBT	1.00	EBR	2.49
EB Approach (Away)	*1*		2.59%	0	0.00%	0	2.45%	0
NB Approach (To)	2.7		NBL	2.71	NBT	4.36	NBR	2.71
NB Approach (Away)	2.7		2.64%	6	5.23%	227	2.64%	6
SB Approach (To)	2.7		SBL	2.44	SBT	3.93	SBR	2.44
SB Approach (Away)	2.7		2.41%	4	4.86%	353	2.41%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.20	WBT	1.00	WBR	3.59
WB Approach (Away)	*1*		3.01%	0	0.00%	0	3.26%	9
EB Approach (To)	*1*		EBL	3.59	EBT	1.00	EBR	3.20
EB Approach (Away)	*1*		3.26%	0	0.00%	0	3.01%	0
NB Approach (To)	3.9		NBL	3.69	NBT	6.29	NBR	3.69
NB Approach (Away)	3.6		3.32%	7	6.58%	319	3.32%	7
SB Approach (To)	3.6		SBL	3.12	SBT	5.32	SBR	3.12
SB Approach (Away)	3.9		2.96%	4	5.96%	467	2.96%	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	4	3	58	3	2	99	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	4	3	63	3	2	108	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	154	185	54	129	183	33	108			66		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	154	185	54	129	183	33	108			66		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	792	706	1002	828	707	1033	1481			1533		

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	3	42	24	2	72	36
Volume Left	0	3	0	0	2	0	0
Volume Right	4	0	0	3	0	0	0
cSH	1033	1481	1700	1700	1533	1700	1700
Volume to Capacity	0.00	0.00	0.02	0.01	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	8.5	7.4	0.0	0.0	7.4	0.0	0.0
Lane LOS	A	A			A		
Approach Delay (s)	8.5	0.3			0.1		
Approach LOS	A						

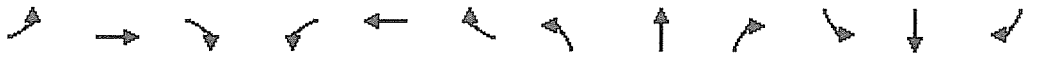
Intersection Summary				
Average Delay	0.4	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	6	4	132	4	3	211	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	7	4	143	4	3	229	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	323	392	115	276	390	74	229			148		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	323	392	115	276	390	74	229			148		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	100			100		
cM capacity (veh/h)	600	539	916	652	541	973	1336			1431		

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	7	4	96	52	3	153	76
Volume Left	0	4	0	0	3	0	0
Volume Right	7	0	0	4	0	0	0
cSH	973	1336	1700	1700	1431	1700	1700
Volume to Capacity	0.01	0.00	0.06	0.03	0.00	0.09	0.04
Queue Length 95th (ft)	1	0	0	0	0	0	0
Control Delay (s)	8.7	7.7	0.0	0.0	7.5	0.0	0.0
Lane LOS	A	A			A		
Approach Delay (s)	8.7	0.2			0.1		
Approach LOS	A						

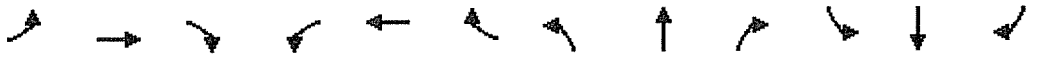
Intersection Summary			
Average Delay	0.3	HCM Level of Service	A
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	42	0	0	15	102	157	4	7	269	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	46	0	0	16	111	171	4	8	292	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	641	715	157	602	723	88	313			175		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	641	715	157	602	723	88	313			175		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	95	100	100	98	91			99		
cM capacity (veh/h)	328	321	861	337	318	953	1244			1399		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	46	16	111	114	61	8	195	118
Volume Left	0	0	111	0	0	8	0	0
Volume Right	46	16	0	0	4	0	0	21
cSH	861	953	1244	1700	1700	1399	1700	1700
Volume to Capacity	0.05	0.02	0.09	0.07	0.04	0.01	0.11	0.07
Queue Length 95th (ft)	4	1	7	0	0	0	0	0
Control Delay (s)	9.4	8.8	8.2	0.0	0.0	7.6	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	9.4	8.8	3.2			0.2		
Approach LOS	A	A						

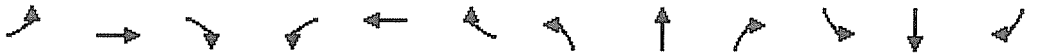
Intersection Summary			
Average Delay	2.3	HCM Level of Service	A
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	8	6	227	6	4	353	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	9	7	247	7	4	384	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	538	659	192	464	655	127	384			253		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	538	659	192	464	655	127	384			253		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	99			100		
cM capacity (veh/h)	420	379	817	478	381	900	1171			1309		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	0	9	7	164	89	4	256	128
Volume Left	0	0	7	0	0	4	0	0
Volume Right	0	9	0	0	7	0	0	0
cSH	1700	900	1171	1700	1700	1309	1700	1700
Volume to Capacity	0.05	0.01	0.01	0.10	0.05	0.00	0.15	0.08
Queue Length 95th (ft)	0	1	0	0	0	0	0	0
Control Delay (s)	0.0	9.0	8.1	0.0	0.0	7.8	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	0.0	9.0	0.2			0.1		
Approach LOS	A	A						

Intersection Summary			
Average Delay	0.3	HCM Level of Service	A
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	42	0	0	17	104	252	6	8	411	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	46	0	0	18	113	274	7	9	447	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	856	981	234	790	988	140	467			280		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	856	981	234	790	988	140	467			280		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	94	100	100	98	90			99		
cM capacity (veh/h)	225	221	768	242	219	882	1090			1279		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	46	18	113	183	98	9	298	170
Volume Left	0	0	113	0	0	9	0	0
Volume Right	46	18	0	0	7	0	0	21
cSH	768	882	1090	1700	1700	1279	1700	1700
Volume to Capacity	0.06	0.02	0.10	0.11	0.06	0.01	0.18	0.10
Queue Length 95th (ft)	5	2	9	0	0	1	0	0
Control Delay (s)	10.0	9.2	8.7	0.0	0.0	7.8	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	10.0	9.2	2.5			0.1		
Approach LOS	A	A						

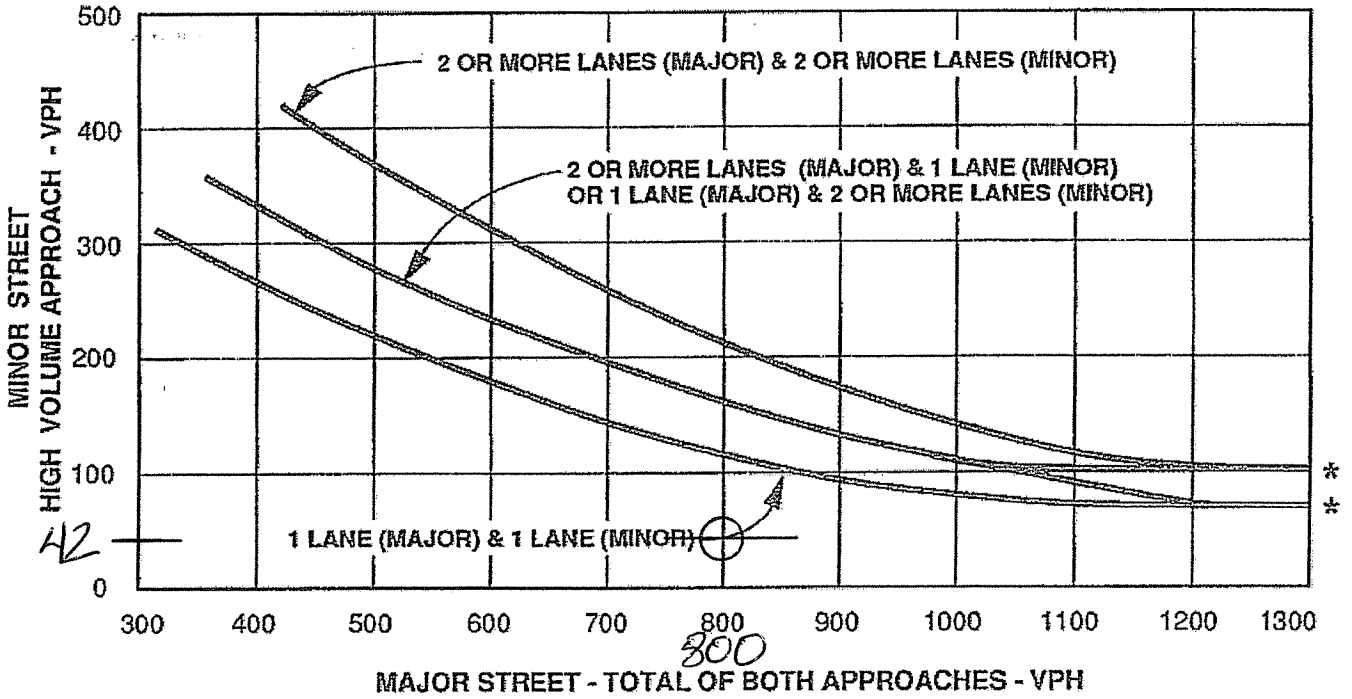
Intersection Summary			
Average Delay	1.8	HCM Level of Service	A
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

MUGSY AVE + SOUTH UNION AVE
2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT NOT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Mugsy Ave & South Union Ave - PM Peak
Count Date: 9/24/2008

Exist Peak Hour Volumes

U		
>	WBL	0
0	WBT	0
<	WBR	0
0	EBL	0
0	EBT	0
0	EBR	0
1	NBL	1
2	NBT	170
<	NBR	0
1	SBL	1
2	SBT	114
<	SBR	0
	TOTAL	286

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	0
NBL	2
NBT	666
NBR	0
SBL	2
SBT	406
SBR	0
TOTAL	1076

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	3
EBL	0
EBT	0
EBR	74
NBL	143
NBT	734
NBR	0
SBL	11
SBT	927
SBR	11
TOTAL	1903

Year 2020

U	**Fut. Volumes w/o Proj**	
>	WBL	0
1	WBT	0
<	WBR	0
>	EBL	0
1	EBT	0
<	EBR	0
1	NBL	1
2	NBT	388
<	NBR	0
1	SBL	1
2	SBT	242
<	SBR	0
	TOTAL	633

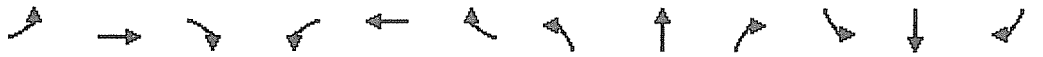
Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	3
EBL	0
EBT	0
EBR	74
NBL	142
NBT	456
NBR	0
SBL	10
SBT	763
SBR	11
TOTAL	1460

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	3	0	3
EBL	0	0	0
EBT	0	0	0
EBR	74	45	29
NBL	141	42	99
NBT	68	37	31
NBR	0	0	0
SBL	9	2	7
SBT	521	399	122
SBR	11	7	4
TOTAL	827	532	295

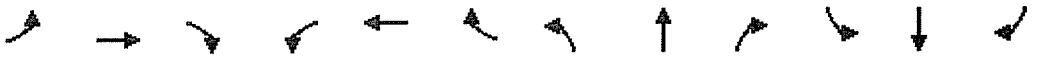
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Mugsy Ave & South Union Ave - PM Peak						
	Count Date:	9/24/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.61							
NB Approach (Away)	0.68							
SB Approach (To)	0.70							
SB Approach (Away)	0.63							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	2.49	WBT	1.00	WBR	2.65
WB Approach (Away)	*1*		2.45%	0	0.00%	0	2.59%	0
EB Approach (To)	*1*		EBL	2.65	EBT	1.00	EBR	2.49
EB Approach (Away)	*1*		2.59%	0	0.00%	0	2.45%	0
NB Approach (To)	2.7		NBL	2.71	NBT	4.36	NBR	2.71
NB Approach (Away)	2.7		2.64%	2	5.23%	666	2.64%	0
SB Approach (To)	2.7		SBL	2.44	SBT	3.93	SBR	2.44
SB Approach (Away)	2.7		2.41%	2	4.86%	406	2.41%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.20	WBT	1.00	WBR	3.59
WB Approach (Away)	*1*		3.01%	0	0.00%	0	3.26%	0
EB Approach (To)	*1*		EBL	3.59	EBT	1.00	EBR	3.20
EB Approach (Away)	*1*		3.26%	0	0.00%	0	3.01%	0
NB Approach (To)	3.9		NBL	3.69	NBT	6.29	NBR	3.69
NB Approach (Away)	3.6		3.32%	2	6.58%	936	3.32%	0
SB Approach (To)	3.6		SBL	3.12	SBT	5.32	SBR	3.12
SB Approach (Away)	3.9		2.96%	2	5.96%	538	2.96%	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	1	170	0	1	114	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	1	185	0	1	124	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	221	313	62	251	313	92	124			185		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	221	313	62	251	313	92	124			185		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	715	600	990	681	600	947	1461			1387		

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	0	1	123	62	1	83	41
Volume Left	0	1	0	0	1	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1461	1700	1700	1387	1700	1700
Volume to Capacity	0.00	0.00	0.07	0.04	0.00	0.05	0.02
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	7.5	0.0	0.0	7.6	0.0	0.0
Lane LOS	A	A			A		
Approach Delay (s)	0.0	0.0			0.1		
Approach LOS	A						

Intersection Summary				
Average Delay	0.1	HCM Level of Service	A
Intersection Capacity Utilization	8.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	1	388	0	1	242	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	1	422	0	1	263	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	478	689	132	558	689	211	263			422		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	478	689	132	558	689	211	263			422		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	470	366	894	412	366	795	1298			1134		

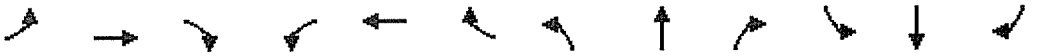
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	0	1	281	141	1	175	88
Volume Left	0	1	0	0	1	0	0
Volume Right	0	0	0	0	0	0	0
cSH	1700	1298	1700	1700	1134	1700	1700
Volume to Capacity	0.00	0.00	0.17	0.08	0.00	0.10	0.05
Queue Length 95th (ft)	0	0	0	0	0	0	0
Control Delay (s)	0.0	7.8	0.0	0.0	8.2	0.0	0.0
Lane LOS	A	A			A		
Approach Delay (s)	0.0	0.0			0.0		
Approach LOS	A						

Intersection Summary				
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	14.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	74	0	0	3	142	456	0	10	763	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	80	0	0	3	154	496	0	11	829	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1417	1661	421	1321	1667	248	841			496		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1417	1661	421	1321	1667	248	841			496		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	86	100	100	100	80			99		
cM capacity (veh/h)	82	77	581	83	76	752	790			1064		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	80	3	154	330	165	11	553	288
Volume Left	0	0	154	0	0	11	0	0
Volume Right	80	3	0	0	0	0	0	12
cSH	581	752	790	1700	1700	1064	1700	1700
Volume to Capacity	0.14	0.00	0.20	0.19	0.10	0.01	0.33	0.17
Queue Length 95th (ft)	12	0	18	0	0	1	0	0
Control Delay (s)	12.2	9.8	10.7	0.0	0.0	8.4	0.0	0.0
Lane LOS	B	A	B			A		
Approach Delay (s)	12.2	9.8	2.5			0.1		
Approach LOS	B	A						

Intersection Summary			
Average Delay	1.7	HCM Level of Service	A
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	0	0	0	2	666	0	2	406	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	2	724	0	2	441	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	812	1174	221	953	1174	362	441			724		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	812	1174	221	953	1174	362	441			724		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	270	190	783	213	190	635	1115			874		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	0	0	2	483	241	2	294	147
Volume Left	0	0	2	0	0	2	0	0
Volume Right	0	0	0	0	0	0	0	0
cSH	1700	1700	1115	1700	1700	874	1700	1700
Volume to Capacity	0.13	0.01	0.00	0.28	0.14	0.00	0.17	0.09
Queue Length 95th (ft)	0	0	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	8.2	0.0	0.0	9.1	0.0	0.0
Lane LOS	A	A	A			A		
Approach Delay (s)	0.0	0.0	0.0			0.0		
Approach LOS	A	A						

Intersection Summary				
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↰	↑↑↱		↰	↑↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	74	0	0	3	143	734	0	11	927	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	80	0	0	3	155	798	0	12	1008	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1751	2146	510	1717	2152	399	1020			798		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1751	2146	510	1717	2152	399	1020			798		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	84	100	100	99	77			99		
cM capacity (veh/h)	44	36	509	40	36	601	676			820		

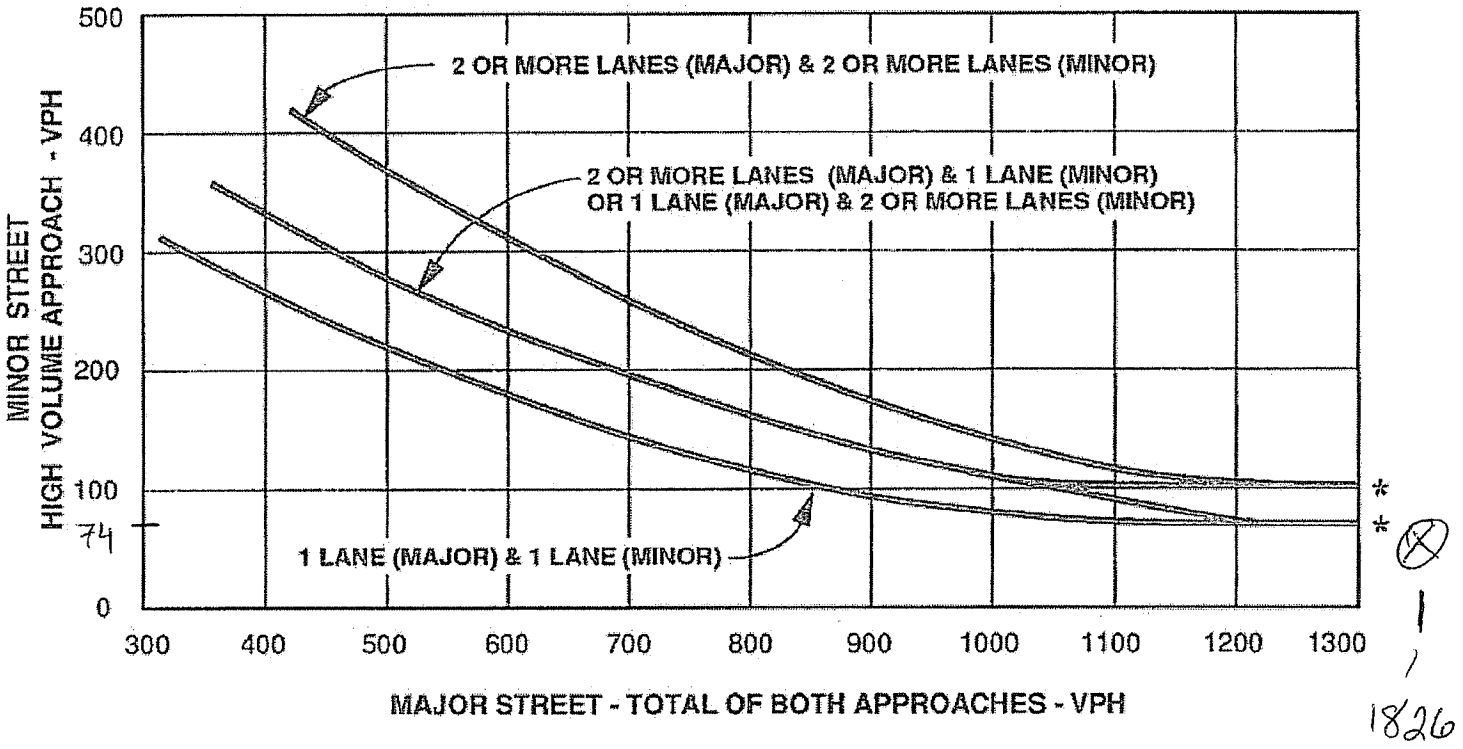
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	80	3	155	532	266	12	672	348
Volume Left	0	0	155	0	0	12	0	0
Volume Right	80	3	0	0	0	0	0	12
cSH	509	601	676	1700	1700	820	1700	1700
Volume to Capacity	0.16	0.01	0.23	0.31	0.16	0.01	0.40	0.20
Queue Length 95th (ft)	14	0	22	0	0	1	0	0
Control Delay (s)	13.4	11.0	11.9	0.0	0.0	9.5	0.0	0.0
Lane LOS	B	B	B			A		
Approach Delay (s)	13.4	11.0	1.9			0.1		
Approach LOS	B	B						

Intersection Summary				
Average Delay	1.5	HCM Level of Service	A
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

Mugsy Ave & South Union Ave
2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 1820	1 740
2 or More	2 or More
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More 1820	1 740
2 or More	2 or More
1	2 or More

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied X

No one condition satisfied, but following conditions fulfilled 80% or more..... 44% (A) 87% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Stine Rd - AM Peak
Count Date: 8/9/2007

Exist Peak Hour Volumes

AWS		
>	WBL	3
1	WBT	19
<	WBR	5
>	EBL	5
1	EBT	54
<	EBR	0
>	NBL	1
1	NBT	4
<	NBR	6
>	SBL	4
1	SBT	17
1	SBR	5
	TOTAL	123

Year 2035
Fut. Volumes w/o Proj

WBL	7
WBT	22
WBR	4
EBL	5
EBT	62
EBR	0
NBL	3
NBT	8
NBR	14
SBL	3
SBT	34
SBR	5
TOTAL	167

Year 2035 Fut. Vol
+ Project Traffic

WBL	7
WBT	26
WBR	6
EBL	5
EBT	77
EBR	0
NBL	3
NBT	8
NBR	17
SBL	9
SBT	34
SBR	5
TOTAL	197

Year 2020
Fut. Volumes w/o Proj

WBL	5
WBT	20
WBR	5
EBL	5
EBT	58
EBR	0
NBL	2
NBT	6
NBR	10
SBL	4
SBT	25
SBR	5
TOTAL	143

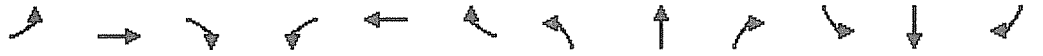
Year 2020 Fut. Vol
+ Project Traffic

WBL	5
WBT	24
WBR	7
EBL	5
EBT	73
EBR	0
NBL	2
NBT	6
NBR	13
SBL	10
SBT	25
SBR	5
TOTAL	173

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	4	2	2
WBR	2	1	1
EBL	0	0	0
EBT	15	12	3
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	3	2	1
SBL	6	4	2
SBT	0	0	0
SBR	0	0	0
TOTAL	30	21	9

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Stine Rd - AM Peak						
	Count Date:	8/9/2007						
2007	ADT							
WB Approach (To)	0.58							
WB Approach (Away)	0.56							
EB Approach (To)	0.52							
EB Approach (Away)	0.53							
NB Approach (To)	0.19							
NB Approach (Away)	0.19							
SB Approach (To)	0.25							
SB Approach (Away)	0.25							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.6		WBL	3.11	WBT	1.15	WBR	0.86
WB Approach (Away)	0.5		2.98%	7	0.45%	22	-0.54%	4
EB Approach (To)	0.7		EBL	1.07	EBT	1.16	EBR	3.31
EB Approach (Away)	0.7		0.10%	5	0.48%	62	3.62%	0
NB Approach (To)	*1*		NBL	3.31	NBT	3.02	NBR	3.11
NB Approach (Away)	*1*		3.60%	3	2.61%	8	2.99%	14
SB Approach (To)	0.2		SBL	0.85	SBT	3.00	SBR	1.05
SB Approach (Away)	0.2		-0.60%	3	2.54%	34	0.01%	5
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.5		WBL	3.08	WBT	1.10	WBR	0.85
WB Approach (Away)	0.5		2.87%	7	0.27%	20	-0.58%	4
EB Approach (To)	0.7		EBL	1.04	EBT	1.09	EBR	3.27
EB Approach (Away)	0.7		0.06%	5	0.26%	58	3.52%	0
NB Approach (To)	*1*		NBL	3.28	NBT	3.03	NBR	3.08
NB Approach (Away)	*1*		3.53%	3	2.68%	8	2.87%	13
SB Approach (To)	0.2		SBL	0.85	SBT	3.03	SBR	1.05
SB Approach (Away)	0.2		-0.58%	3	2.68%	36	0.08%	5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	54	0	3	19	5	1	4	6	4	17	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	59	0	3	21	5	1	4	7	4	18	5

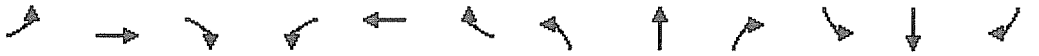
Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	64	29	12	23	5
Volume Left (vph)	5	3	1	4	0
Volume Right (vph)	0	5	7	0	5
Hadj (s)	0.05	-0.05	-0.28	0.13	-0.67
Departure Headway (s)	4.1	4.0	4.0	4.8	4.0
Degree Utilization, x	0.07	0.03	0.01	0.03	0.01
Capacity (veh/h)	869	884	877	727	859
Control Delay (s)	7.4	7.1	7.0	6.8	5.9
Approach Delay (s)	7.4	7.1	7.0	6.6	
Approach LOS	A	A	A	A	

Intersection Summary				
Delay	7.1			
HCM Level of Service	A			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	58	0	5	20	5	2	6	10	4	25	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	63	0	5	22	5	2	7	11	4	27	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	68	33	20	32	5
Volume Left (vph)	5	5	2	4	0
Volume Right (vph)	0	5	11	0	5
Hadj (s)	0.05	-0.03	-0.28	0.10	-0.67
Departure Headway (s)	4.1	4.1	4.0	4.8	4.1
Degree Utilization, x	0.08	0.04	0.02	0.04	0.01
Capacity (veh/h)	858	867	869	716	853
Control Delay (s)	7.5	7.2	7.1	6.8	5.9
Approach Delay (s)	7.5	7.2	7.1	6.7	
Approach LOS	A	A	A	A	

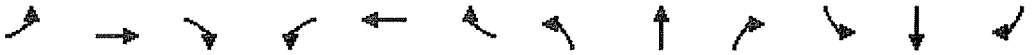
Intersection Summary				
Delay	7.2			
HCM Level of Service	A			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	73	0	5	24	7	2	6	13	10	25	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	79	0	5	26	8	2	7	14	11	27	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	85	39	23	38	5
Volume Left (vph)	5	5	2	11	0
Volume Right (vph)	0	8	14	0	5
Hadj (s)	0.05	-0.05	-0.32	0.18	-0.67
Departure Headway (s)	4.1	4.1	4.0	5.0	4.1
Degree Utilization, x	0.10	0.04	0.03	0.05	0.01
Capacity (veh/h)	850	860	861	696	838
Control Delay (s)	7.6	7.3	7.1	7.0	5.9
Approach Delay (s)	7.6	7.3	7.1	6.9	
Approach LOS	A	A	A	A	

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	62	0	7	22	4	3	8	14	3	34	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	0	8	24	4	3	9	15	3	37	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	73	36	27	40	5
Volume Left (vph)	5	8	3	3	0
Volume Right (vph)	0	4	15	0	5
Hadj (s)	0.05	0.00	-0.28	0.07	-0.67
Departure Headway (s)	4.2	4.1	4.0	4.8	4.1
Degree Utilization, x	0.08	0.04	0.03	0.05	0.01
Capacity (veh/h)	847	847	862	716	846
Control Delay (s)	7.5	7.3	7.1	6.9	5.9
Approach Delay (s)	7.5	7.3	7.1	6.8	
Approach LOS	A	A	A	A	

Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	5	77	0	7	26	6	3	8	17	9	34	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	84	0	8	28	7	3	9	18	10	37	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	89	42	30	47	5
Volume Left (vph)	5	8	3	10	0
Volume Right (vph)	0	7	18	0	5
Hadj (s)	0.05	-0.02	-0.31	0.14	-0.67
Departure Headway (s)	4.2	4.2	4.0	4.9	4.1
Degree Utilization, x	0.10	0.05	0.03	0.06	0.01
Capacity (veh/h)	839	842	850	697	832
Control Delay (s)	7.7	7.4	7.2	7.1	6.0
Approach Delay (s)	7.7	7.4	7.2	7.0	
Approach LOS	A	A	A	A	

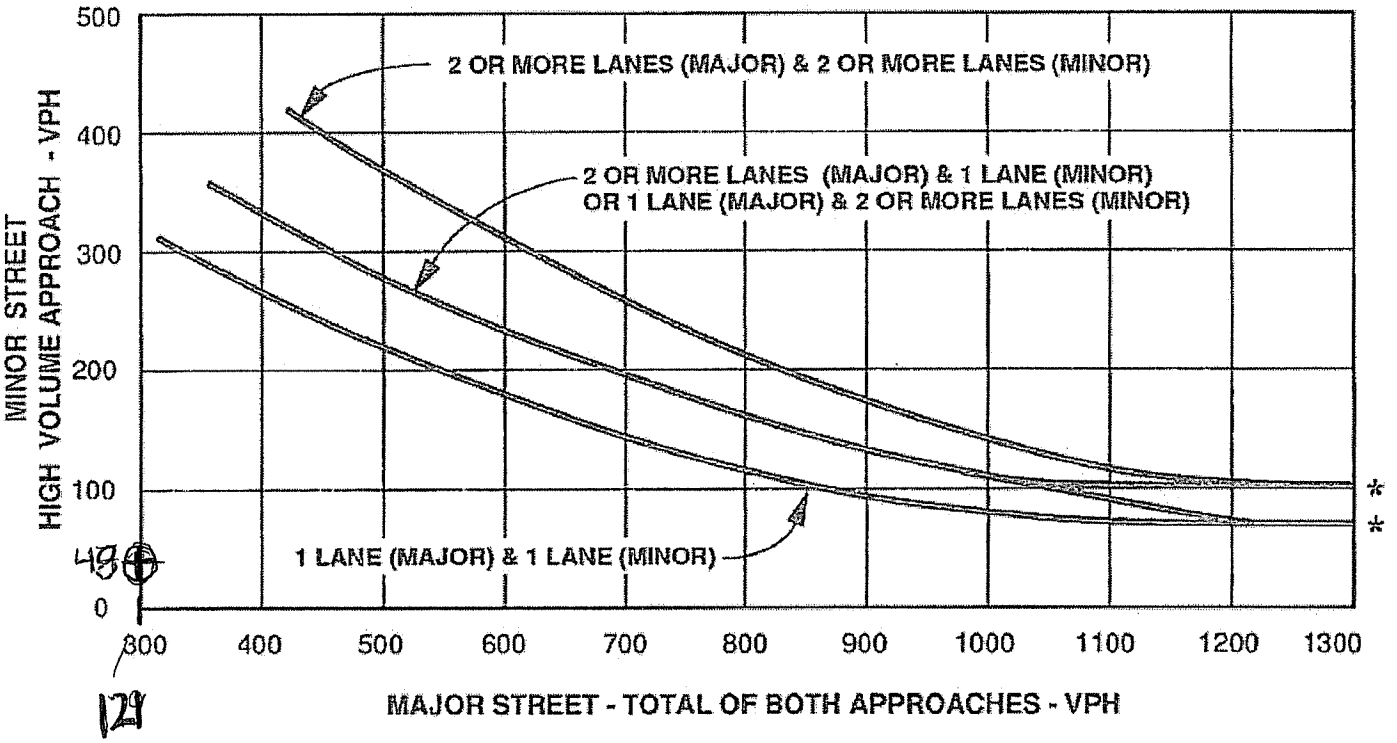
Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & Stine Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Stine Rd - PM Peak
Count Date: 10/23/2008

Exist Peak Hour Volumes

AWS		
>	WBL	14
1	WBT	24
<	WBR	14
>	EBL	9
1	EBT	34
<	EBR	1
>	NBL	0
1	NBT	21
<	NBR	17
>	SBL	5
1	SBT	12
1	SBR	5
TOTAL		156

Year 2035
Fut. Volumes w/o Proj

WBL	24
WBT	33
WBR	11
EBL	10
EBT	47
EBR	2
NBL	0
NBT	28
NBR	29
SBL	4
SBT	16
SBR	5
TOTAL	207

Year 2035 Fut. Vol
+ Project Traffic

WBL	27
WBT	43
WBR	15
EBL	10
EBT	49
EBR	2
NBL	0
NBT	28
NBR	30
SBL	6
SBT	16
SBR	5
TOTAL	229

Year 2020
Fut. Volumes w/o Proj

WBL	18
WBT	28
WBR	13
EBL	9
EBT	40
EBR	2
NBL	0
NBT	24
NBR	22
SBL	5
SBT	14
SBR	5
TOTAL	178

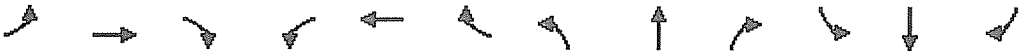
Year 2020 Fut. Vol
+ Project Traffic

WBL	21
WBT	38
WBR	17
EBL	9
EBT	42
EBR	2
NBL	0
NBT	24
NBR	23
SBL	7
SBT	14
SBR	5
TOTAL	200

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	3	1	2
WBT	10	5	5
WBR	4	2	2
EBL	0	0	0
EBT	2	1	1
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	1	1	0
SBL	2	1	1
SBT	0	0	0
SBR	0	0	0
TOTAL	22	11	11

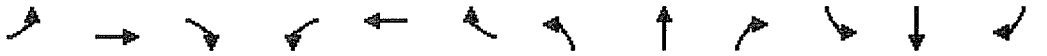
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Stine Rd - PM Peak						
	Count Date:	10/23/2008						
2006	ADT							
WB Approach (To)	0.55							
WB Approach (Away)	0.53							
EB Approach (To)	0.36							
EB Approach (Away)	0.37							
NB Approach (To)	0.33							
NB Approach (Away)	0.33							
SB Approach (To)	0.33							
SB Approach (Away)	0.33							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.6		WBL	2.02	WBT	1.47	WBR	0.80
WB Approach (Away)	0.5		1.97%	24	1.16%	33	-0.90%	11
EB Approach (To)	0.7		EBL	1.27	EBT	1.49	EBR	2.50
EB Approach (Away)	0.7		0.27%	10	1.21%	47	3.14%	2
NB Approach (To)	*1*		NBL	2.48	NBT	1.81	NBR	2.02
NB Approach (Away)	*1*		3.11%	0	1.05%	28	1.98%	29
SB Approach (To)	0.2		SBL	0.79	SBT	1.80	SBR	1.25
SB Approach (Away)	0.2		-0.96%	4	0.97%	16	0.17%	5
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.5		WBL	1.99	WBT	1.40	WBR	0.78
WB Approach (Away)	0.5		1.86%	23	0.99%	31	-0.95%	11
EB Approach (To)	0.7		EBL	1.23	EBT	1.40	EBR	2.44
EB Approach (Away)	0.7		0.23%	10	0.99%	44	3.04%	2
NB Approach (To)	*1*		NBL	2.44	NBT	1.82	NBR	1.99
NB Approach (Away)	*1*		3.04%	0	1.11%	28	1.87%	28
SB Approach (To)	0.2		SBL	0.78	SBT	1.82	SBR	1.23
SB Approach (Away)	0.2		-0.94%	4	1.11%	16	0.23%	5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	9	34	1	14	24	14	0	21	17	5	12	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	37	1	15	26	15	0	23	18	5	13	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	48	57	41	18	5
Volume Left (vph)	10	15	0	5	0
Volume Right (vph)	1	15	18	0	5
Hadj (s)	0.06	-0.07	-0.23	0.18	-0.67
Departure Headway (s)	4.2	4.0	4.0	4.9	4.1
Degree Utilization, x	0.06	0.06	0.05	0.03	0.01
Capacity (veh/h)	845	876	863	701	847
Control Delay (s)	7.4	7.3	7.2	6.9	5.9
Approach Delay (s)	7.4	7.3	7.2	6.6	
Approach LOS	A	A	A	A	

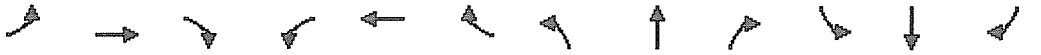
Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	9	40	2	18	28	13	0	24	22	5	14	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	43	2	20	30	14	0	26	24	5	15	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	55	64	50	21	5
Volume Left (vph)	10	20	0	5	0
Volume Right (vph)	2	14	24	0	5
Hadj (s)	0.05	-0.04	-0.25	0.17	-0.67
Departure Headway (s)	4.2	4.1	4.0	5.0	4.1
Degree Utilization, x	0.06	0.07	0.06	0.03	0.01
Capacity (veh/h)	840	860	856	695	835
Control Delay (s)	7.5	7.4	7.3	6.9	6.0
Approach Delay (s)	7.5	7.4	7.3	6.7	
Approach LOS	A	A	A	A	

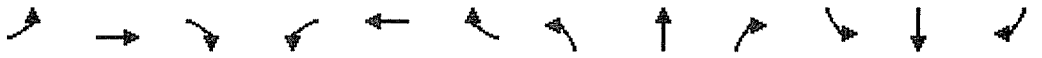
Intersection Summary				
Delay	7.3			
HCM Level of Service	A			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	9	42	2	21	38	17	0	24	23	7	14	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	46	2	23	41	18	0	26	25	8	15	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	58	83	51	23	5
Volume Left (vph)	10	23	0	8	0
Volume Right (vph)	2	18	25	0	5
Hadj (s)	0.05	-0.04	-0.26	0.20	-0.67
Departure Headway (s)	4.2	4.1	4.1	5.0	4.2
Degree Utilization, x	0.07	0.09	0.06	0.03	0.01
Capacity (veh/h)	833	858	844	682	823
Control Delay (s)	7.5	7.5	7.3	7.0	6.0
Approach Delay (s)	7.5	7.5	7.3	6.8	
Approach LOS	A	A	A	A	

Intersection Summary			
Delay	7.4		
HCM Level of Service	A		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	47	2	24	33	11	0	28	29	4	16	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	51	2	26	36	12	0	30	32	4	17	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	64	74	62	22	5
Volume Left (vph)	11	26	0	4	0
Volume Right (vph)	2	12	32	0	5
Hadj (s)	0.05	0.01	-0.27	0.13	-0.67
Departure Headway (s)	4.2	4.2	4.1	5.0	4.2
Degree Utilization, x	0.08	0.09	0.07	0.03	0.01
Capacity (veh/h)	829	840	848	690	821
Control Delay (s)	7.6	7.6	7.4	6.9	6.0
Approach Delay (s)	7.6	7.6	7.4	6.8	
Approach LOS	A	A	A	A	

Intersection Summary				
Delay	7.4			
HCM Level of Service	A			
Intersection Capacity Utilization	20.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	49	2	27	43	15	0	28	30	6	16	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	53	2	29	47	16	0	30	33	7	17	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total (vph)	66	92	63	24	5
Volume Left (vph)	11	29	0	7	0
Volume Right (vph)	2	16	33	0	5
Hadj (s)	0.05	-0.01	-0.28	0.17	-0.67
Departure Headway (s)	4.2	4.2	4.1	5.1	4.2
Degree Utilization, x	0.08	0.11	0.07	0.03	0.01
Capacity (veh/h)	822	841	834	675	808
Control Delay (s)	7.6	7.7	7.4	7.0	6.1
Approach Delay (s)	7.6	7.7	7.4	6.9	
Approach LOS	A	A	A	A	

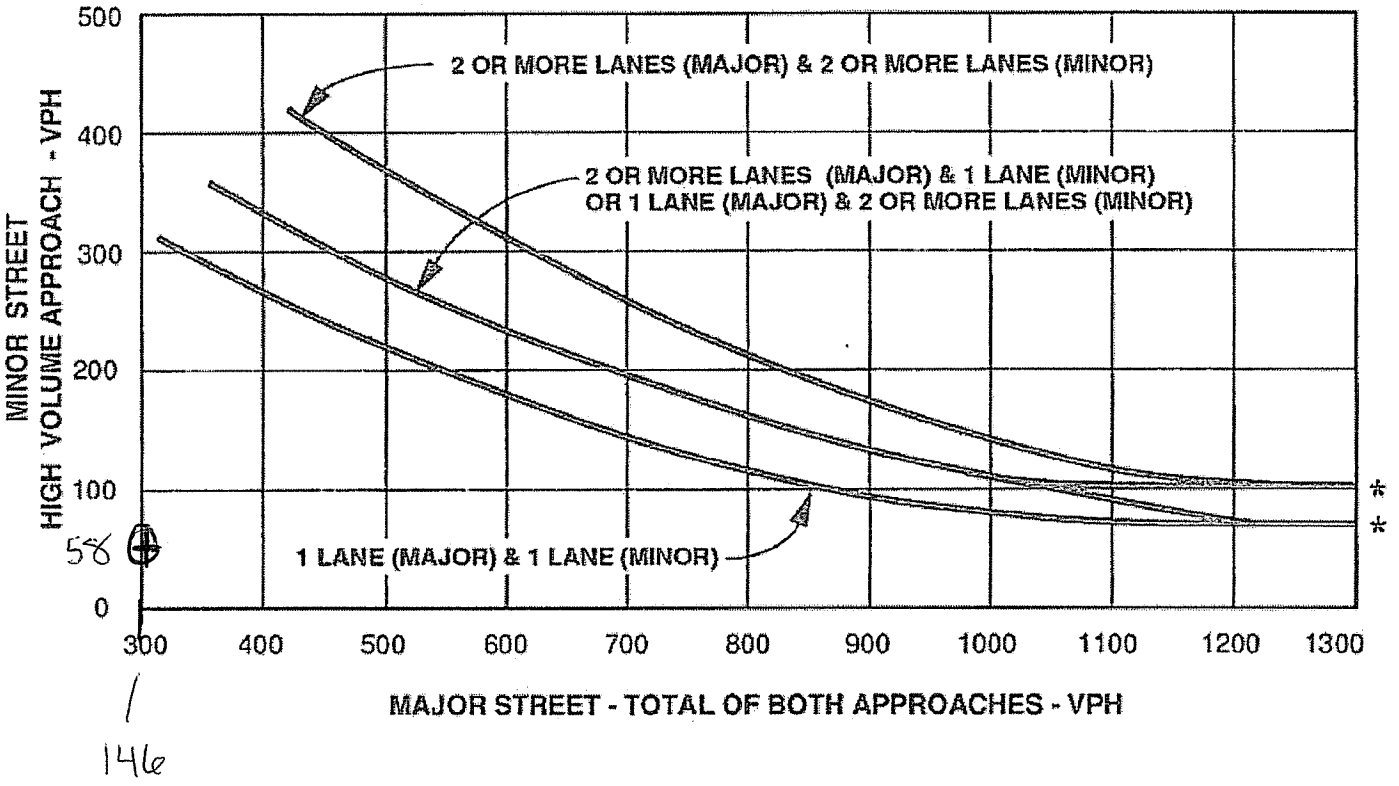
Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & Stine Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..... X

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More..... 1460	1..... 580 .....
2 or More.....	2 or More.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied X

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More..... 1460	1..... 580 .....
2 or More.....	2 or More.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied X

2 CONDITIONS 80%		2 CONDITIONS 80%	

No one condition satisfied, but following conditions fulfilled 80% or more..... 28 % (A) 41 % (B)

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Wible Rd - AM Peak
Count Date: 7/10/2007

Exist Peak Hour Volumes

AWS		
>	WBL	1
1	WBT	38
1	WBR	1
>	EBL	4
1	EBT	65
<	EBR	6
>	NBL	3
1	NBT	14
<	NBR	2
>	SBL	7
1	SBT	17
1	SBR	7
	TOTAL	165

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	31
WBR	2
EBL	8
EBT	52
EBR	12
NBL	6
NBT	59
NBR	4
SBL	12
SBT	67
SBR	13
TOTAL	267

Year 2035 Fut. Vol
+ Project Traffic

WBL	3
WBT	37
WBR	3
EBL	8
EBT	76
EBR	12
NBL	6
NBT	59
NBR	5
SBL	14
SBT	67
SBR	13
TOTAL	302

Year 2020
Fut. Volumes w/o Proj

WBL	1
WBT	35
WBR	1
EBL	6
EBT	59
EBR	9
NBL	4
NBT	35
NBR	3
SBL	9
SBT	40
SBR	10
TOTAL	212

Year 2020 Fut. Vol
+ Project Traffic

WBL	2
WBT	41
WBR	2
EBL	6
EBT	83
EBR	9
NBL	4
NBT	35
NBR	4
SBL	11
SBT	40
SBR	10
TOTAL	247

Project Generated Trips - Year 2035

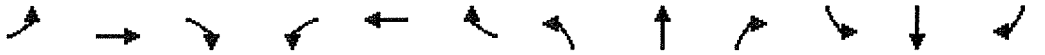
	Total	Indus.	Commer.
WBL	1	0	1
WBT	6	4	2
WBR	1	0	1
EBL	0	0	0
EBT	24	19	5
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	1	1	0
SBL	2	2	0
SBT	0	0	0
SBR	0	0	0
TOTAL	35	26	9

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Wible Rd - AM Peak						
	Count Date:	7/10/2007						
2007	ADT							
WB Approach (To)	0.58							
WB Approach (Away)	0.56							
EB Approach (To)	0.60							
EB Approach (Away)	0.63							
NB Approach (To)	0.26							
NB Approach (Away)	0.17							
SB Approach (To)	0.20							
SB Approach (Away)	0.30							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	0.5		WBL	2.46	WBT	0.82	WBR	2.42
WB Approach (Away)	0.4		2.17%	2	-0.70%	31	2.14%	2
EB Approach (To)	0.5		EBL	2.47	EBT	0.81	EBR	2.51
EB Approach (Away)	0.5		2.34%	8	-0.79%	52	2.37%	12
NB Approach (To)	1.1		NBL	2.61	NBT	4.21	NBR	2.54
NB Approach (Away)	0.7		2.43%	6	5.26%	59	2.14%	4
SB Approach (To)	0.8		SBL	2.27	SBT	3.97	SBR	2.33
SB Approach (Away)	1.2		1.89%	12	5.05%	67	2.18%	13
2035	ADT with Proj		2007	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	0.5		WBL	2.79	WBT	0.82	WBR	2.49
WB Approach (Away)	0.5		2.52%	2	-0.72%	31	2.27%	2
EB Approach (To)	0.5		EBL	2.49	EBT	0.82	EBR	2.79
EB Approach (Away)	0.5		2.26%	7	-0.72%	53	2.51%	12
NB Approach (To)	1.2		NBL	2.75	NBT	4.43	NBR	2.75
NB Approach (Away)	0.8		2.46%	6	5.45%	62	2.47%	4
SB Approach (To)	0.8		SBL	2.49	SBT	4.47	SBR	2.49
SB Approach (Away)	1.2		2.25%	13	5.48%	76	2.24%	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	65	6	1	38	1	3	14	2	7	17	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	71	7	1	41	1	3	15	2	8	18	8

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	82	42	1	21	26	8
Volume Left (vph)	4	1	0	3	8	0
Volume Right (vph)	7	0	1	2	0	8
Hadj (s)	0.00	0.05	-0.67	0.00	0.18	-0.67
Departure Headway (s)	4.7	4.7	4.0	4.8	5.0	4.2
Degree Utilization, x	0.11	0.06	0.00	0.03	0.04	0.01
Capacity (veh/h)	756	746	867	715	691	832
Control Delay (s)	8.2	6.8	5.8	8.0	7.0	6.0
Approach Delay (s)	8.2	6.8		8.0	6.8	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay	7.6			
HCM Level of Service	A			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	59	9	1	35	1	4	35	3	9	40	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	64	10	1	38	1	4	38	3	10	43	11

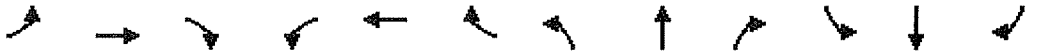
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	80	39	1	46	53	11
Volume Left (vph)	7	1	0	4	10	0
Volume Right (vph)	10	0	1	3	0	11
Hadj (s)	-0.02	0.05	-0.67	0.01	0.13	-0.67
Departure Headway (s)	4.8	4.9	4.2	4.9	5.0	4.2
Degree Utilization, x	0.11	0.05	0.00	0.06	0.07	0.01
Capacity (veh/h)	731	707	828	710	697	829
Control Delay (s)	8.4	7.0	6.0	8.2	7.2	6.0
Approach Delay (s)	8.4	6.9		8.2	7.0	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay	7.7			
HCM Level of Service	A			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	83	9	2	41	2	4	35	4	11	40	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	90	10	2	45	2	4	38	4	12	43	11

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	107	47	2	47	55	11
Volume Left (vph)	7	2	0	4	12	0
Volume Right (vph)	10	0	2	4	0	11
Hadj (s)	-0.01	0.06	-0.67	0.00	0.14	-0.67
Departure Headway (s)	4.8	4.9	4.2	5.0	5.1	4.3
Degree Utilization, x	0.14	0.06	0.00	0.06	0.08	0.01
Capacity (veh/h)	725	700	819	694	678	805
Control Delay (s)	8.6	7.1	6.0	8.3	7.3	6.1
Approach Delay (s)	8.6	7.0		8.3	7.1	
Approach LOS	A	A		A	A	

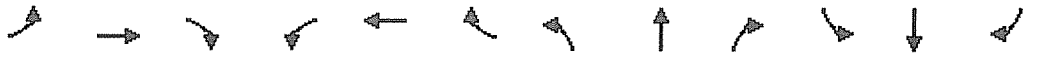
Intersection Summary			
Delay	7.9		
HCM Level of Service	A		
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	52	12	2	31	2	6	59	4	12	67	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	57	13	2	34	2	7	64	4	13	73	14

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	78	36	2	75	86	14
Volume Left (vph)	9	2	0	7	13	0
Volume Right (vph)	13	0	2	4	0	14
Hadj (s)	-0.04	0.06	-0.67	0.02	0.11	-0.67
Departure Headway (s)	4.9	5.1	4.3	4.9	5.0	4.2
Degree Utilization, x	0.11	0.05	0.00	0.10	0.12	0.02
Capacity (veh/h)	702	673	785	704	697	824
Control Delay (s)	8.5	7.1	6.2	8.5	7.4	6.1
Approach Delay (s)	8.5	7.1		8.5	7.2	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay	7.9			
HCM Level of Service	A			
Intersection Capacity Utilization	25.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↰	↱		↕			↰	↱
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	76	12	3	37	3	6	59	5	14	67	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	83	13	3	40	3	7	64	5	15	73	14

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	104	43	3	76	88	14
Volume Left (vph)	9	3	0	7	15	0
Volume Right (vph)	13	0	3	5	0	14
Hadj (s)	-0.02	0.07	-0.67	0.01	0.12	-0.67
Departure Headway (s)	5.0	5.1	4.4	5.0	5.1	4.3
Degree Utilization, x	0.14	0.06	0.00	0.11	0.12	0.02
Capacity (veh/h)	695	666	776	687	678	800
Control Delay (s)	8.8	7.3	6.2	8.6	7.6	6.2
Approach Delay (s)	8.8	7.2		8.6	7.4	
Approach LOS	A	A		A	A	

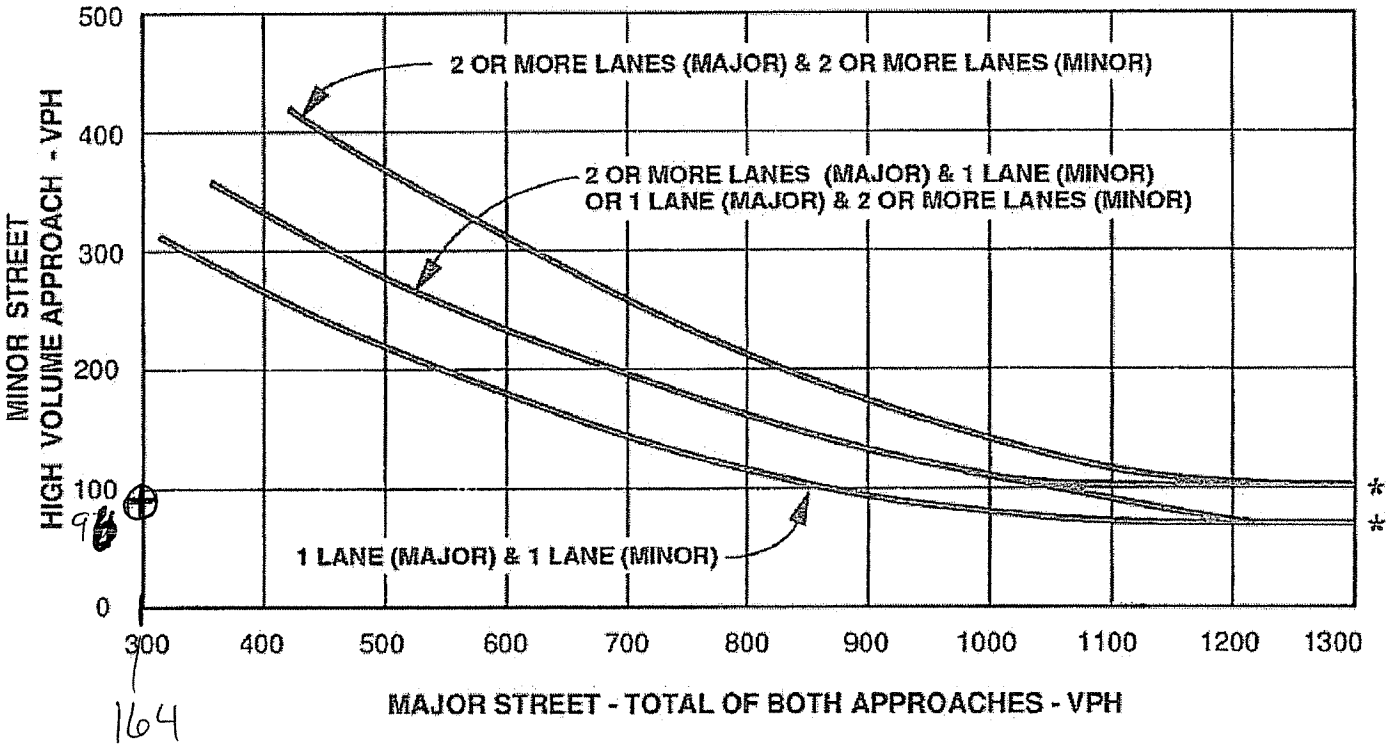
Intersection Summary			
Delay	8.1		
HCM Level of Service	A		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & Wible Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Wible Rd - PM Peak
Count Date: 6/28/2007

Exist Peak Hour Volumes

AWS		
>	WBL	3
1	WBT	37
1	WBR	10
>	EBL	11
1	EBT	27
<	EBR	1
>	NBL	2
1	NBT	35
<	NBR	5
>	SBL	8
1	SBT	17
1	SBR	7
	TOTAL	163

Year 2035
Fut. Volumes w/o Proj

WBL	5
WBT	41
WBR	15
EBL	19
EBT	29
EBR	2
NBL	4
NBT	92
NBR	8
SBL	11
SBT	42
SBR	12
TOTAL	280

Year 2035 Fut. Vol
+ Project Traffic

WBL	8
WBT	58
WBR	18
EBL	19
EBT	35
EBR	2
NBL	4
NBT	92
NBR	11
SBL	15
SBT	42
SBR	12
TOTAL	316

Year 2020
Fut. Volumes w/o Proj

WBL	4
WBT	39
WBR	12
EBL	15
EBT	28
EBR	1
NBL	3
NBT	61
NBR	7
SBL	10
SBT	29
SBR	9
TOTAL	217

Year 2020 Fut. Vol
+ Project Traffic

WBL	7
WBT	56
WBR	15
EBL	15
EBT	34
EBR	1
NBL	3
NBT	61
NBR	10
SBL	14
SBT	29
SBR	9
TOTAL	253

Project Generated Trips - Year 2035

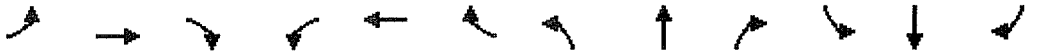
	Total	Indus.	Commer.
WBL	3	1	2
WBT	17	8	9
WBR	3	1	2
EBL	0	0	0
EBT	6	4	2
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	3	1	2
SBL	4	2	2
SBT	0	0	0
SBR	0	0	0
TOTAL	36	17	19

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Wible Rd - PM Peak						
	Count Date:	6/28/2007						
2007	ADT							
WB Approach (To)	0.46							
WB Approach (Away)	0.44							
EB Approach (To)	0.42							
EB Approach (Away)	0.43							
NB Approach (To)	0.38							
NB Approach (Away)	0.25							
SB Approach (To)	0.35							
SB Approach (Away)	0.53							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.5		WBL	1.90	WBT	1.13	WBR	1.64
WB Approach (Away)	0.4		1.86%	5	0.40%	41	1.49%	15
EB Approach (To)	0.5		EBL	1.78	EBT	1.09	EBR	2.03
EB Approach (Away)	0.5		1.91%	19	0.28%	29	2.29%	2
NB Approach (To)	1.1		NBL	2.12	NBT	2.64	NBR	1.95
NB Approach (Away)	0.7		2.40%	4	3.49%	92	1.86%	8
SB Approach (To)	0.8		SBL	1.55	SBT	2.49	SBR	1.72
SB Approach (Away)	1.2		1.28%	11	3.28%	42	1.82%	12
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	0.5		WBL	2.14	WBT	1.11	WBR	1.70
WB Approach (Away)	0.5		2.21%	6	0.37%	41	1.62%	16
EB Approach (To)	0.5		EBL	1.76	EBT	1.10	EBR	2.21
EB Approach (Away)	0.5		1.84%	18	0.34%	30	2.43%	2
NB Approach (To)	1.2		NBL	2.20	NBT	2.78	NBR	2.12
NB Approach (Away)	0.8		2.43%	4	3.68%	96	2.18%	9
SB Approach (To)	0.8		SBL	1.71	SBT	2.81	SBR	1.78
SB Approach (Away)	1.2		1.63%	13	3.72%	47	1.88%	12

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	11	27	1	3	37	100	2	35	5	8	17	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	29	1	3	40	109	2	38	5	9	18	8

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	42	43	109	46	27	8
Volume Left (vph)	12	3	0	2	9	0
Volume Right (vph)	1	0	109	5	0	8
Hadj (s)	0.08	0.07	-0.67	-0.03	0.19	-0.67
Departure Headway (s)	4.9	4.8	4.1	5.0	5.2	4.3
Degree Utilization, x	0.06	0.06	0.12	0.06	0.04	0.01
Capacity (veh/h)	712	734	858	695	661	791
Control Delay (s)	8.2	6.9	6.4	8.3	7.2	6.2
Approach Delay (s)	8.2	6.6		8.3	7.0	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay	7.2			
HCM Level of Service	A			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	28	1	4	39	12	3	61	7	10	29	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	30	1	4	42	13	3	66	8	11	32	10

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	48	47	13	77	42	10
Volume Left (vph)	16	4	0	3	11	0
Volume Right (vph)	1	0	13	8	0	10
Hadj (s)	0.09	0.08	-0.67	-0.02	0.16	-0.67
Departure Headway (s)	5.0	4.9	4.2	4.8	5.0	4.2
Degree Utilization, x	0.07	0.06	0.02	0.10	0.06	0.01
Capacity (veh/h)	700	698	822	724	693	831
Control Delay (s)	8.3	7.1	6.1	8.4	7.1	6.0
Approach Delay (s)	8.3	6.9		8.4	6.9	
Approach LOS	A	A		A	A	

Intersection Summary			
Delay	7.7		
HCM Level of Service	A		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	15	34	1	7	56	15	3	61	10	14	29	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	37	1	8	61	16	3	66	11	15	32	10

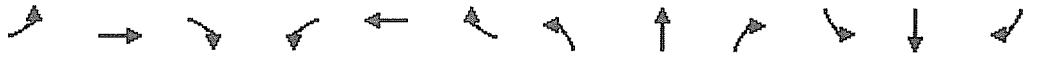
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	54	68	16	80	47	10
Volume Left (vph)	16	8	0	3	15	0
Volume Right (vph)	1	0	16	11	0	10
Hadj (s)	0.08	0.09	-0.67	-0.04	0.20	-0.67
Departure Headway (s)	5.0	5.0	4.2	4.9	5.1	4.3
Degree Utilization, x	0.08	0.09	0.02	0.11	0.07	0.01
Capacity (veh/h)	692	692	815	710	673	808
Control Delay (s)	8.4	7.3	6.1	8.5	7.3	6.1
Approach Delay (s)	8.4	7.1		8.5	7.1	
Approach LOS	A	A		A	A	

Intersection Summary			
Delay	7.8		
HCM Level of Service	A		
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	19	29	2	5	41	15	4	92	8	11	42	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	32	2	5	45	16	4	100	9	12	46	13

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	54	50	16	113	58	13
Volume Left (vph)	21	5	0	4	12	0
Volume Right (vph)	2	0	16	9	0	13
Hadj (s)	0.09	0.09	-0.67	0.00	0.14	-0.67
Departure Headway (s)	5.1	5.1	4.3	4.9	5.0	4.2
Degree Utilization, x	0.08	0.07	0.02	0.15	0.08	0.02
Capacity (veh/h)	674	671	785	713	684	813
Control Delay (s)	8.6	7.3	6.2	8.8	7.3	6.1
Approach Delay (s)	8.6	7.0		8.8	7.1	
Approach LOS	A	A		A	A	

Intersection Summary				
Delay	8.0			
HCM Level of Service	A			
Intersection Capacity Utilization	24.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	19	35	2	8	58	18	4	92	11	15	42	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	38	2	9	63	20	4	100	12	16	46	13

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	61	72	20	116	62	13
Volume Left (vph)	21	9	0	4	16	0
Volume Right (vph)	2	0	20	12	0	13
Hadj (s)	0.08	0.09	-0.67	-0.02	0.17	-0.67
Departure Headway (s)	5.2	5.1	4.4	5.0	5.2	4.3
Degree Utilization, x	0.09	0.10	0.02	0.16	0.09	0.02
Capacity (veh/h)	656	665	779	698	665	790
Control Delay (s)	8.7	7.5	6.3	8.9	7.5	6.2
Approach Delay (s)	8.7	7.3		8.9	7.3	
Approach LOS	A	A		A	A	

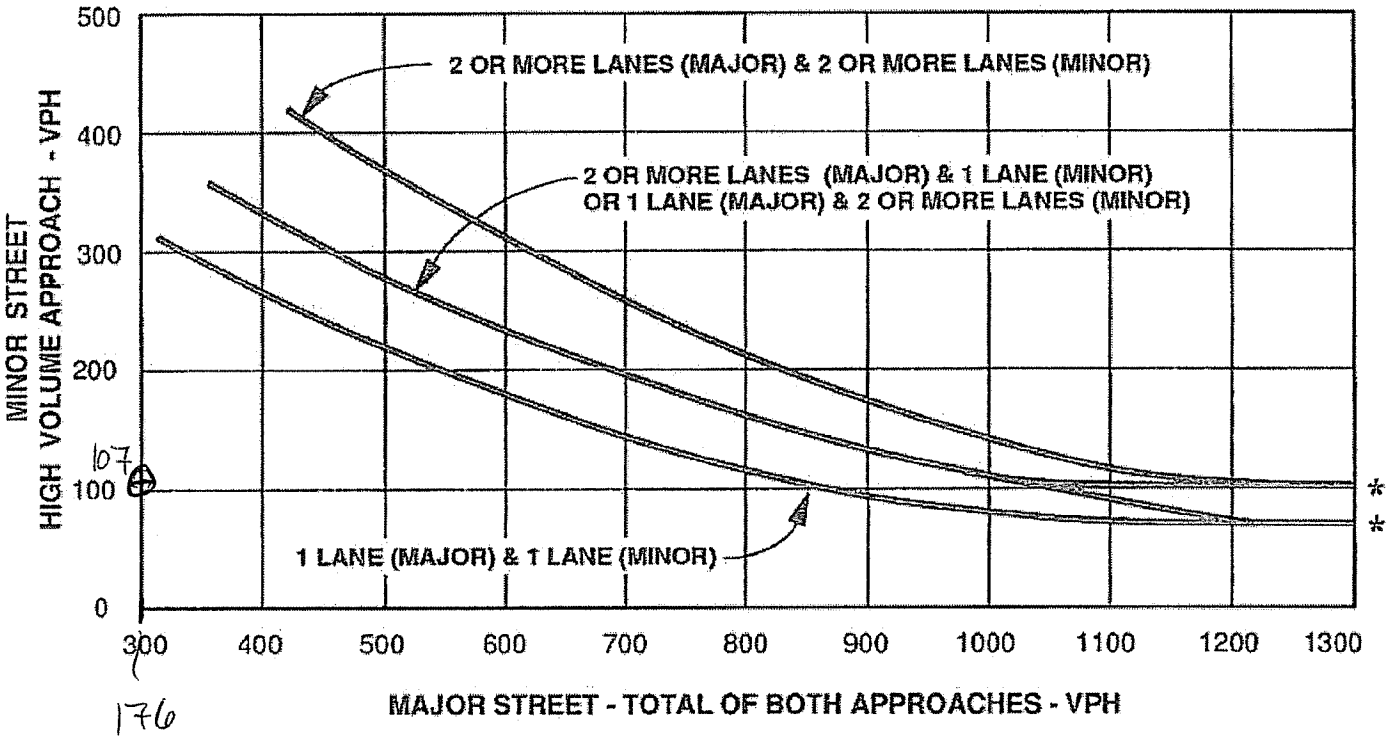
Intersection Summary			
Delay	8.1		
HCM Level of Service	A		
Intersection Capacity Utilization	25.5%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & Wible Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL...X...

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...1760...	2 or More...1070...
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...1760...	2 or More...1070...
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 37% (A) 56% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & South H St - AM Peak
Count Date: 9/3/2008

Exist Peak Hour Volumes

AWS		
>	WBL	28
1	WBT	40
1	WBR	11
>	EBL	0
1	EBT	61
1	EBR	6
>	NBL	1
1	NBT	6
1	NBR	25
>	SBL	11
1	SBT	9
1	SBR	1
TOTAL		199

Year 2035
Fut. Volumes w/o Proj

WBL	40
WBT	41
WBR	11
EBL	0
EBT	60
EBR	7
NBL	1
NBT	6
NBR	35
SBL	11
SBT	10
SBR	1
TOTAL	223

Year 2035 Fut. Vol
+ Project Traffic

WBL	41
WBT	49
WBR	12
EBL	0
EBT	87
EBR	7
NBL	1
NBT	6
NBR	42
SBL	16
SBT	10
SBR	1
TOTAL	272

Year 2020
Fut. Volumes w/o Proj

WBL	33
WBT	40
WBR	11
EBL	0
EBT	61
EBR	6
NBL	1
NBT	6
NBR	29
SBL	11
SBT	10
SBR	1
TOTAL	210

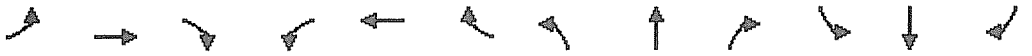
Year 2020 Fut. Vol
+ Project Traffic

WBL	34
WBT	48
WBR	12
EBL	0
EBT	88
EBR	6
NBL	1
NBT	6
NBR	36
SBL	16
SBT	10
SBR	1
TOTAL	259

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	1	0	1
WBT	8	4	4
WBR	1	0	1
EBL	0	0	0
EBT	27	22	5
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	7	2	5
SBL	5	4	1
SBT	0	0	0
SBR	0	0	0
TOTAL	49	32	17

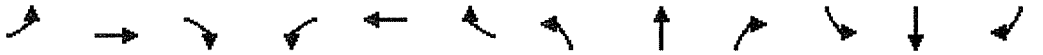
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & South H St - AM Peak						
	Count Date:	9/3/2008						
2008	ADT							
WB Approach (To)	0.94							
WB Approach (Away)	0.82							
EB Approach (To)	0.53							
EB Approach (Away)	0.56							
NB Approach (To)	0.35							
NB Approach (Away)	0.40							
SB Approach (To)	0.15							
SB Approach (Away)	0.23							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	1.2		WBL	1.44	WBT	1.05	WBR	1.01
WB Approach (Away)	1.0		1.34%	40	0.07%	41	-0.10%	11
EB Approach (To)	0.4		EBL	0.76	EBT	1.01	EBR	1.18
EB Approach (Away)	0.5		-1.04%	0	-0.06%	60	0.40%	7
NB Approach (To)	0.5		NBL	1.19	NBT	1.15	NBR	1.41
NB Approach (Away)	0.6		0.46%	1	0.29%	6	1.26%	35
SB Approach (To)	0.1		SBL	1.04	SBT	1.21	SBR	0.82
SB Approach (Away)	0.2		0.06%	11	0.52%	10	-0.74%	1
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	1.2		WBL	1.38	WBT	1.08	WBR	1.11
WB Approach (Away)	1.1		1.21%	39	0.20%	42	0.32%	12
EB Approach (To)	0.5		EBL	0.89	EBT	1.07	EBR	1.16
EB Approach (Away)	0.5		-0.45%	0	0.19%	64	0.44%	7
NB Approach (To)	0.5		NBL	1.16	NBT	1.19	NBR	1.37
NB Approach (Away)	0.6		0.42%	1	0.54%	7	1.19%	34
SB Approach (To)	0.1		SBL	1.12	SBT	1.21	SBR	0.91
SB Approach (Away)	0.2		0.40%	12	0.64%	11	-0.37%	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	61	6	28	40	11	1	6	25	11	9	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	7	30	43	12	1	7	27	12	10	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	66	7	74	12	8	27	22	1
Volume Left (vph)	0	0	30	0	1	0	12	0
Volume Right (vph)	0	7	0	12	0	27	0	1
Hadj (s)	0.03	-0.67	0.24	-0.67	0.11	-0.67	0.31	-0.67
Departure Headway (s)	4.7	4.0	4.9	4.0	5.0	4.2	5.2	4.2
Degree Utilization, x	0.09	0.01	0.10	0.01	0.01	0.03	0.03	0.00
Capacity (veh/h)	747	868	710	870	692	813	662	811
Control Delay (s)	7.0	5.9	7.3	5.9	6.9	6.2	7.2	6.0
Approach Delay (s)	6.9		7.1		6.3		7.1	
Approach LOS	A		A		A		A	

Intersection Summary				
Delay	6.9			
HCM Level of Service	A			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	61	6	33	40	11	1	6	29	11	10	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	7	36	43	12	1	7	32	12	11	1

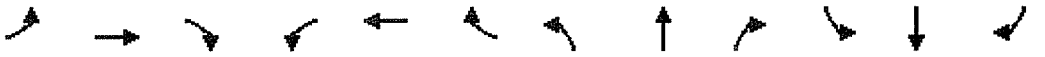
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	66	7	79	12	8	32	23	1
Volume Left (vph)	0	0	36	0	1	0	12	0
Volume Right (vph)	0	7	0	12	0	32	0	1
Hadj (s)	0.03	-0.67	0.26	-0.67	0.11	-0.67	0.30	-0.67
Departure Headway (s)	4.8	4.1	5.0	4.0	5.0	4.2	5.2	4.3
Degree Utilization, x	0.09	0.01	0.11	0.01	0.01	0.04	0.03	0.00
Capacity (veh/h)	744	863	705	867	690	810	660	807
Control Delay (s)	7.0	5.9	7.4	5.9	6.9	6.2	7.2	6.1
Approach Delay (s)	6.9		7.2		6.3		7.1	
Approach LOS	A		A		A		A	

Intersection Summary				
Delay	6.9			
HCM Level of Service	A			
Intersection Capacity Utilization	25.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	88	6	34	48	12	1	6	36	16	10	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	96	7	37	52	13	1	7	39	17	11	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	96	7	89	13	8	39	28	1
Volume Left (vph)	0	0	37	0	1	0	17	0
Volume Right (vph)	0	7	0	13	0	39	0	1
Hadj (s)	0.03	-0.67	0.24	-0.67	0.11	-0.67	0.34	-0.67
Departure Headway (s)	4.8	4.1	5.0	4.1	5.1	4.3	5.4	4.4
Degree Utilization, x	0.13	0.01	0.12	0.01	0.01	0.05	0.04	0.00
Capacity (veh/h)	736	851	698	852	671	786	638	782
Control Delay (s)	7.3	5.9	7.5	6.0	7.0	6.4	7.4	6.2
Approach Delay (s)	7.2		7.3		6.5		7.4	
Approach LOS	A		A		A		A	

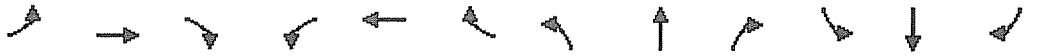
Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	60	7	40	41	11	1	6	35	11	10	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	65	8	43	45	12	1	7	38	12	11	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	65	8	88	12	8	38	23	1
Volume Left (vph)	0	0	43	0	1	0	12	0
Volume Right (vph)	0	8	0	12	0	38	0	1
Hadj (s)	0.03	-0.57	0.13	-0.57	0.06	-0.57	0.14	-0.57
Departure Headway (s)	4.1	3.2	4.2	3.2	4.3	3.2	4.4	3.2
Degree Utilization, x	0.07	0.01	0.10	0.01	0.01	0.03	0.03	0.00
Capacity (veh/h)	859	1121	845	1121	795	1121	785	1121
Control Delay (s)	7.4	6.2	7.6	6.2	7.4	6.3	7.5	6.2
Approach Delay (s)	7.3		7.5		6.5		7.4	
Approach LOS	A		A		A		A	

Intersection Summary				
Delay	7.2			
HCM Level of Service	A			
Intersection Capacity Utilization	25.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	87	7	41	49	12	1	6	42	16	10	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	95	8	45	53	13	1	7	46	17	11	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	95	8	98	13	8	46	28	1
Volume Left (vph)	0	0	45	0	1	0	17	0
Volume Right (vph)	0	8	0	13	0	46	0	1
Hadj (s)	0.03	-0.67	0.26	-0.67	0.11	-0.67	0.34	-0.67
Departure Headway (s)	4.8	4.1	5.0	4.1	5.1	4.4	5.4	4.4
Degree Utilization, x	0.13	0.01	0.14	0.01	0.01	0.06	0.04	0.00
Capacity (veh/h)	732	846	693	848	667	780	634	775
Control Delay (s)	7.3	6.0	7.6	6.0	7.0	6.4	7.4	6.2
Approach Delay (s)	7.2		7.4		6.5		7.4	
Approach LOS	A		A		A		A	

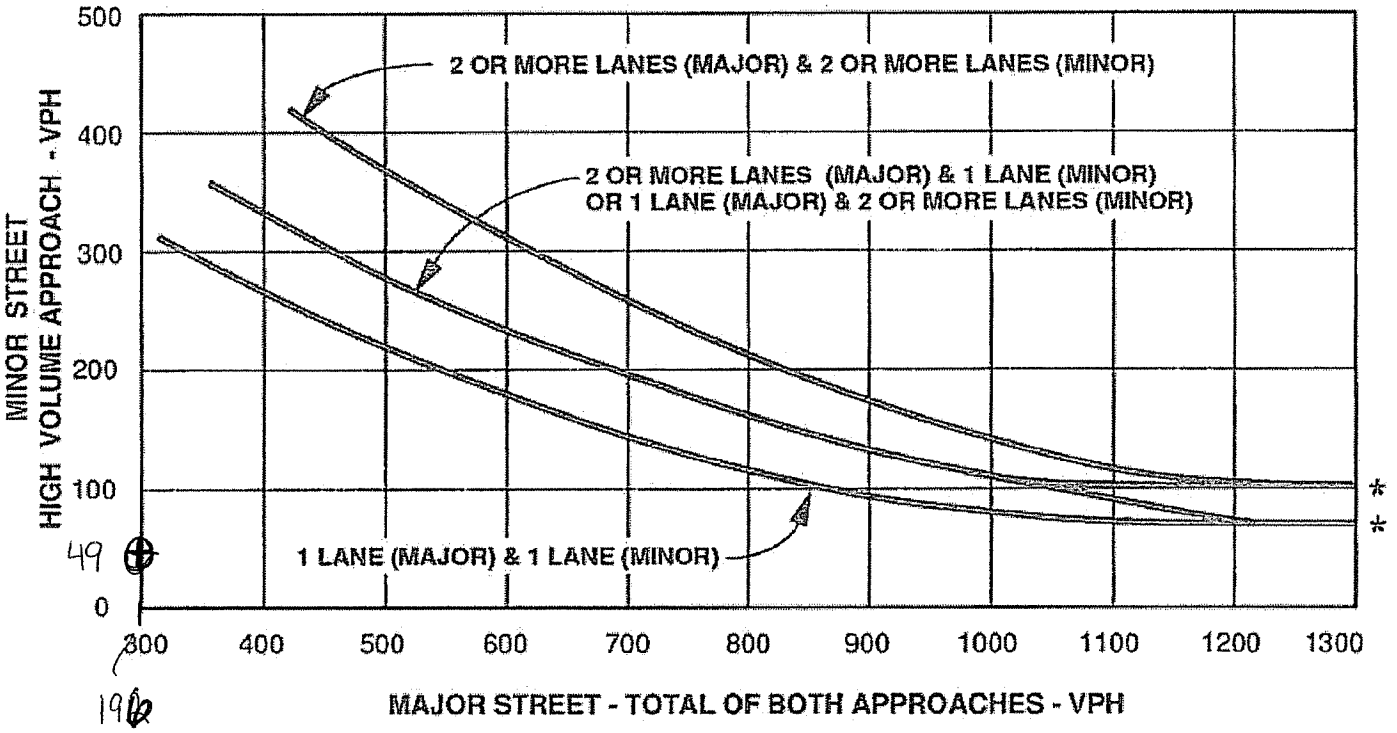
Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & South H St

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & South H St - PM Peak
Count Date: 9/3/2008

Exist Peak Hour Volumes

AWS		
>	WBL	5
1	WBT	54
1	WBR	11
>	EBL	3
1	EBT	52
1	EBR	4
>	NBL	2
1	NBT	6
1	NBR	8
>	SBL	13
1	SBT	9
1	SBR	1
	TOTAL	168

Year 2035
Fut. Volumes w/o Proj

WBL	12
WBT	59
WBR	11
EBL	2
EBT	55
EBR	6
NBL	3
NBT	9
NBR	18
SBL	14
SBT	15
SBR	1
TOTAL	206

Year 2035 Fut. Vol
+ Project Traffic

WBL	26
WBT	84
WBR	24
EBL	2
EBT	68
EBR	6
NBL	3
NBT	9
NBR	28
SBL	19
SBT	15
SBR	1
TOTAL	286

Year 2020
Fut. Volumes w/o Proj

WBL	8
WBT	56
WBR	11
EBL	3
EBT	53
EBR	5
NBL	3
NBT	7
NBR	13
SBL	13
SBT	11
SBR	1
TOTAL	185

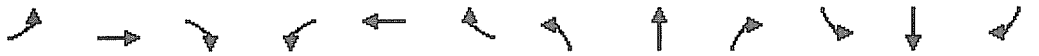
Year 2020 Fut. Vol
+ Project Traffic

WBL	22
WBT	81
WBR	24
EBL	3
EBT	66
EBR	5
NBL	3
NBT	7
NBR	23
SBL	18
SBT	11
SBR	1
TOTAL	265

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	14	6	8
WBT	25	12	13
WBR	13	6	7
EBL	0	0	0
EBT	13	7	6
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	10	2	8
SBL	5	2	3
SBT	0	0	0
SBR	0	0	0
TOTAL	80	35	45

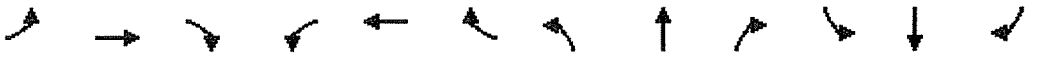
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & South H St - PM Peak						
	Count Date:	9/3/2008						
2008	ADT							
WB Approach (To)	0.77							
WB Approach (Away)	0.66							
EB Approach (To)	0.57							
EB Approach (Away)	0.59							
NB Approach (To)	0.16							
NB Approach (Away)	0.18							
SB Approach (To)	0.17							
SB Approach (Away)	0.26							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	1.2		WBL	2.55	WBT	1.17	WBR	1.11
WB Approach (Away)	1.0		3.25%	12	0.35%	59	0.05%	11
EB Approach (To)	0.4		EBL	0.69	EBT	1.13	EBR	2.13
EB Approach (Away)	0.5		-1.40%	2	0.21%	55	1.80%	6
NB Approach (To)	0.5		NBL	2.10	NBT	2.04	NBR	2.49
NB Approach (Away)	0.6		1.87%	3	1.57%	9	3.17%	18
SB Approach (To)	0.1		SBL	1.14	SBT	2.14	SBR	0.75
SB Approach (Away)	0.2		0.24%	14	1.83%	15	-1.07%	1
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	1.2		WBL	2.42	WBT	1.20	WBR	1.20
WB Approach (Away)	1.1		3.12%	11	0.48%	61	0.47%	12
EB Approach (To)	0.5		EBL	0.80	EBT	1.20	EBR	2.03
EB Approach (Away)	0.5		-0.81%	2	0.47%	59	1.83%	7
NB Approach (To)	0.5		NBL	2.00	NBT	2.00	NBR	2.40
NB Approach (Away)	0.6		1.82%	3	1.81%	10	3.10%	18
SB Approach (To)	0.1		SBL	1.22	SBT	2.05	SBR	0.83
SB Approach (Away)	0.2		0.58%	15	1.94%	15	-0.70%	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	52	4	5	54	11	2	6	8	13	9	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	57	4	5	59	12	2	7	9	14	10	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	60	4	64	12	9	9	24	1
Volume Left (vph)	3	0	5	0	2	0	14	0
Volume Right (vph)	0	4	0	12	0	9	0	1
Hadj (s)	0.06	-0.67	0.08	-0.67	0.16	-0.67	0.33	-0.67
Departure Headway (s)	4.7	4.0	4.7	4.0	5.0	4.2	5.2	4.2
Degree Utilization, x	0.08	0.00	0.08	0.01	0.01	0.01	0.03	0.00
Capacity (veh/h)	751	879	752	881	693	825	669	827
Control Delay (s)	6.9	5.8	7.0	5.8	6.9	6.0	7.2	6.0
Approach Delay (s)	6.8		6.8		6.4		7.1	
Approach LOS	A		A		A		A	

Intersection Summary			
Delay	6.8		
HCM Level of Service	A		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	53	5	8	56	11	3	7	13	13	11	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	58	5	9	61	12	3	8	14	14	12	1

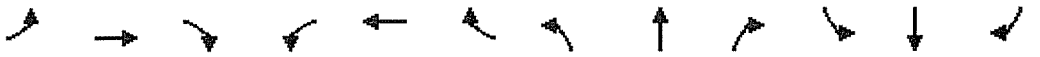
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	61	5	70	12	11	14	26	1
Volume Left (vph)	3	0	9	0	3	0	14	0
Volume Right (vph)	0	5	0	12	0	14	0	1
Hadj (s)	0.06	-0.67	0.10	-0.67	0.18	-0.67	0.30	-0.67
Departure Headway (s)	4.7	4.0	4.8	4.0	5.1	4.2	5.2	4.2
Degree Utilization, x	0.08	0.01	0.09	0.01	0.02	0.02	0.04	0.00
Capacity (veh/h)	746	871	744	874	686	820	668	821
Control Delay (s)	7.0	5.8	7.1	5.9	6.9	6.1	7.2	6.0
Approach Delay (s)	6.9		6.9		6.4		7.1	
Approach LOS	A		A		A		A	

Intersection Summary				
Delay	6.9			
HCM Level of Service	A			
Intersection Capacity Utilization	24.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	66	5	22	81	24	3	7	23	18	11	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	72	5	24	88	26	3	8	25	20	12	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	75	5	112	26	11	25	32	1
Volume Left (vph)	3	0	24	0	3	0	20	0
Volume Right (vph)	0	5	0	26	0	25	0	1
Hadj (s)	0.06	-0.67	0.14	-0.67	0.18	-0.67	0.34	-0.67
Departure Headway (s)	4.8	4.1	4.9	4.1	5.2	4.4	5.4	4.4
Degree Utilization, x	0.10	0.01	0.15	0.03	0.02	0.03	0.05	0.00
Capacity (veh/h)	731	849	718	860	657	778	635	778
Control Delay (s)	7.2	5.9	7.5	6.0	7.1	6.3	7.5	6.2
Approach Delay (s)	7.1		7.2		6.6		7.4	
Approach LOS	A		A		A		A	

Intersection Summary			
Delay	7.1		
HCM Level of Service	A		
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	55	6	12	59	11	3	9	18	14	15	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	60	7	13	64	12	3	10	20	15	16	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	62	7	77	12	13	20	32	1
Volume Left (vph)	2	0	13	0	3	0	15	0
Volume Right (vph)	0	7	0	12	0	20	0	1
Hadj (s)	0.05	-0.67	0.12	-0.67	0.16	-0.67	0.28	-0.67
Departure Headway (s)	4.8	4.1	4.8	4.0	5.1	4.2	5.2	4.2
Degree Utilization, x	0.08	0.01	0.10	0.01	0.02	0.02	0.05	0.00
Capacity (veh/h)	740	861	724	865	685	812	667	812
Control Delay (s)	7.0	5.9	7.2	5.9	7.0	6.1	7.2	6.0
Approach Delay (s)	6.9		7.0		6.5		7.2	
Approach LOS	A		A		A		A	

Intersection Summary				
Delay	6.9			
HCM Level of Service	A			
Intersection Capacity Utilization	25.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	68	6	26	84	24	3	9	28	19	15	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	74	7	28	91	26	3	10	30	21	16	1

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	76	7	120	26	13	30	37	1
Volume Left (vph)	2	0	28	0	3	0	21	0
Volume Right (vph)	0	7	0	26	0	30	0	1
Hadj (s)	0.05	-0.67	0.15	-0.67	0.16	-0.67	0.31	-0.67
Departure Headway (s)	4.9	4.1	4.9	4.1	5.2	4.4	5.4	4.4
Degree Utilization, x	0.10	0.01	0.16	0.03	0.02	0.04	0.06	0.00
Capacity (veh/h)	724	839	710	851	655	772	634	771
Control Delay (s)	7.2	6.0	7.7	6.0	7.1	6.4	7.5	6.2
Approach Delay (s)	7.1		7.4		6.6		7.5	
Approach LOS	A		A		A		A	

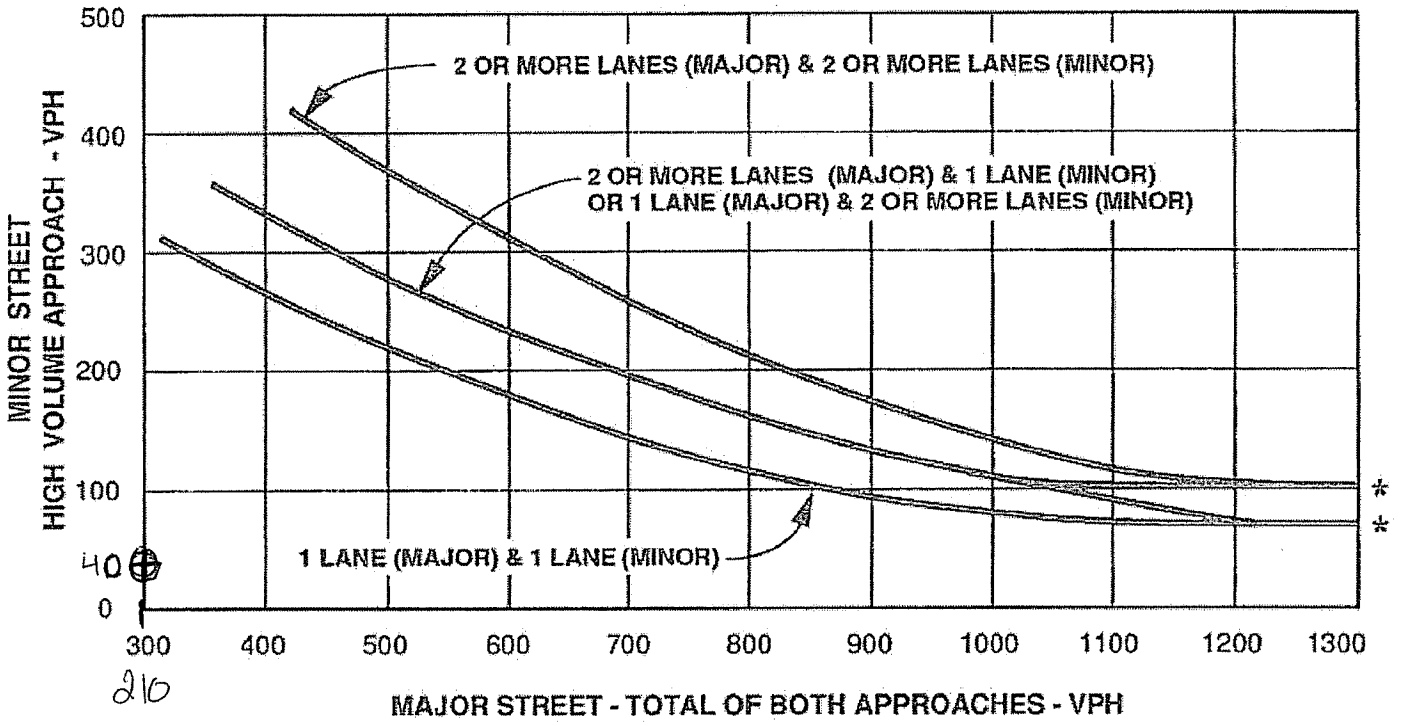
Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

Houghton Rd & South H St

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...2100...	2 or More...400...
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...2100...	2 or More...400...
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied __X__

No one condition satisfied, but following conditions fulfilled 80% or more..... 25% (A) 29% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & SR 99 Southbound Ramp/ Costajo St - AM Peak
Count Date: 9/19/2007

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	37
1	WBR	2
>	EBL	3
1	EBT	85
1	EBR	5
>	NBL	3
1	NBT	0
1	NBR	10
>	SBL	64
1	SBT	7
1	SBR	22
	TOTAL	239

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	79
WBR	8
EBL	9
EBT	147
EBR	8
NBL	5
NBT	0
NBR	19
SBL	183
SBT	19
SBR	53
TOTAL	531

Year 2035 Fut. Vol
+ Project Traffic

WBL	2
WBT	89
WBR	180
EBL	9
EBT	185
EBR	8
NBL	5
NBT	0
NBR	19
SBL	975
SBT	19
SBR	53
TOTAL	1543

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	56
WBR	5
EBL	6
EBT	113
EBR	6
NBL	4
NBT	0
NBR	14
SBL	119
SBT	12
SBR	36
TOTAL	373

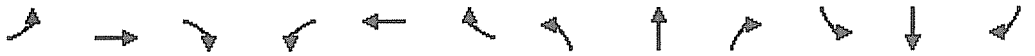
Year 2020 Fut. Vol
+ Project Traffic

WBL	2
WBT	66
WBR	177
EBL	6
EBT	151
EBR	6
NBL	4
NBT	0
NBR	14
SBL	911
SBT	12
SBR	36
TOTAL	1385

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	10	4	6
WBR	172	131	41
EBL	0	0	0
EBT	38	28	10
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	792	741	51
SBT	0	0	0
SBR	0	0	0
TOTAL	1012	904	108

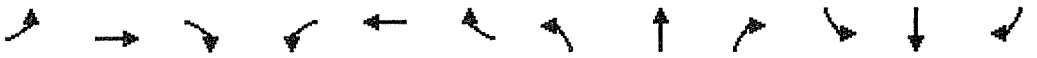
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & SR 99 Southbound Ramp/ Costajo St - AM Peak						
	Count Date:	9/19/2007						
2007	ADT							
WB Approach (To)	0.21							
WB Approach (Away)	1.78							
EB Approach (To)	0.72							
EB Approach (Away)	0.83							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	0.92							
SB Approach (Away)	0.06							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	0.7		WBL	2.45	WBT	2.28	WBR	4.34
WB Approach (Away)	3.7		3.14%	2	2.75%	79	5.27%	8
EB Approach (To)	1.0		EBL	3.50	EBT	1.76	EBR	1.61
EB Approach (Away)	1.2		3.83%	9	1.98%	147	1.71%	8
NB Approach (To)	*1.8*		NBL	1.63	NBT	3.69	NBR	1.94
NB Approach (Away)	*1.8*		1.75%	5	4.26%	0	2.41%	19
SB Approach (To)	3.6		SBL	2.99	SBT	2.85	SBR	2.68
SB Approach (Away)	0.3		3.85%	183	3.58%	19	3.19%	53
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	1.1		WBL	3.60	WBT	3.44	WBR	7.81
WB Approach (Away)	9.6		4.19%	3	3.83%	105	7.49%	15
EB Approach (To)	1.1		EBL	5.85	EBT	3.43	EBR	1.64
EB Approach (Away)	1.2		5.07%	12	3.83%	241	1.77%	8
NB Approach (To)	*1.8*		NBL	1.64	NBT	6.02	NBR	3.59
NB Approach (Away)	*1.8*		1.78%	5	5.43%	0	4.19%	31
SB Approach (To)	9.2		SBL	7.71	SBT	5.92	SBR	5.76
SB Approach (Away)	0.6		7.45%	471	5.39%	30	5.04%	86



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	85	5	1	37	2	3	0	10	64	7	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	92	5	1	40	2	3	0	11	70	8	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	42			98			169	143	92	152	147	40
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	42			98			169	143	92	152	147	40
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	91	99	98
cM capacity (veh/h)	1567			1495			769	746	965	804	743	1031

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	96	5	41	2	3	11	77	24
Volume Left	3	0	1	0	3	0	70	0
Volume Right	0	5	0	2	0	11	0	24
cSH	1567	1700	1495	1700	769	965	798	1031
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.02
Queue Length 95th (ft)	0	0	0	0	0	1	8	2
Control Delay (s)	0.3	0.0	0.2	0.0	9.7	8.8	10.0	8.6
Lane LOS	A		A		A	A	A	A
Approach Delay (s)	0.3		0.2		9.0		9.7	
Approach LOS					A		A	

Intersection Summary				
Average Delay	4.4	HCM Level of Service	A
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	113	6	2	56	5	4	0	14	119	12	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	123	7	2	61	5	4	0	15	129	13	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	66			129			247	207	123	216	208	61
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	66			129			247	207	123	216	208	61
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	98	82	98	96
cM capacity (veh/h)	1535			1456			667	686	928	725	685	1004

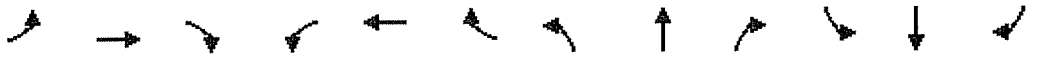
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	129	7	63	5	4	15	142	39
Volume Left	7	0	2	0	4	0	129	0
Volume Right	0	7	0	5	0	15	0	39
cSH	1535	1700	1456	1700	667	928	721	1004
Volume to Capacity	0.00	0.00	0.00	0.00	0.01	0.02	0.20	0.04
Queue Length 95th (ft)	0	0	0	0	0	1	18	3
Control Delay (s)	0.4	0.0	0.3	0.0	10.4	8.9	11.2	8.7
Lane LOS	A		A		B	A	B	A
Approach Delay (s)	0.4		0.2		9.3		10.7	
Approach LOS					A		B	

Intersection Summary				
Average Delay	5.4	HCM Level of Service		A
Intersection Capacity Utilization	31.4%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↰	↱		↰	↱		↰	↱
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	151	6	2	66	177	4	0	14	911	12	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	164	7	2	72	192	4	0	15	990	13	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	264			171			299	446	164	268	260	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	264			171			299	446	164	268	260	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	98	0	98	96
cM capacity (veh/h)	1300			1407			615	504	880	669	641	991

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	171	7	74	192	4	15	1003	39
Volume Left	7	0	2	0	4	0	990	0
Volume Right	0	7	0	192	0	15	0	39
cSH	1300	1700	1407	1700	615	880	669	991
Volume to Capacity	0.01	0.00	0.00	0.11	0.01	0.02	1.50	0.04
Queue Length 95th (ft)	0	0	0	0	1	1	1236	3
Control Delay (s)	0.3	0.0	0.2	0.0	10.9	9.2	250.8	8.8
Lane LOS	A		A		B	A	F	A
Approach Delay (s)	0.3		0.1		9.5		241.7	
Approach LOS					A		F	

Intersection Summary			
Average Delay	167.5	HCM Level of Service	F
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	151	6	2	66	177	4	0	14	911	12	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	164	7	2	72	192	4	0	15	990	13	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								1			1	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	264			171			299	446	164	268	260	72
vC1, stage 1 conf vol							177	177		76	76	
vC2, stage 2 conf vol							122	268		192	184	
vCu, unblocked vol	264			171			299	446	164	268	260	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	98	0	98	96
cM capacity (veh/h)	1300			1407			656	553	880	686	645	991

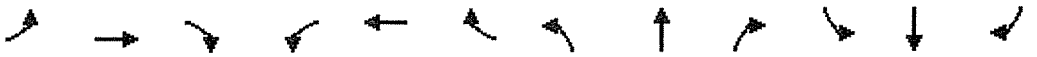
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	171	7	74	192	4	15	495	495	52
Volume Left	7	0	2	0	4	0	495	495	0
Volume Right	0	7	0	192	0	15	0	0	39
cSH	1300	1700	1407	1700	656	880	686	686	874
Volume to Capacity	0.01	0.00	0.00	0.11	0.01	0.02	0.72	0.72	0.06
Queue Length 95th (ft)	0	0	0	0	0	1	155	155	5
Control Delay (s)	0.3	0.0	0.2	0.0	10.5	9.2	22.6	22.6	9.4
Lane LOS	A		A		B	A	C	C	A
Approach Delay (s)	0.3		0.1		9.5		22.0		
Approach LOS					A		C		

Intersection Summary			
Average Delay	15.4	HCM Level of Service	C
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	9	147	8	2	79	8	5	0	19	183	19	53
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	160	9	2	86	9	5	0	21	199	21	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								1			1	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	95			168			338	278	160	290	278	86
vC1, stage 1 conf vol							179	179		90	90	
vC2, stage 2 conf vol							158	99		200	188	
vCu, unblocked vol	95			168			338	278	160	290	278	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	98	70	97	94
cM capacity (veh/h)	1499			1409			616	636	885	668	635	973

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	170	9	88	9	5	21	99	99	78
Volume Left	10	0	2	0	5	0	99	99	0
Volume Right	0	9	0	9	0	21	0	0	58
cSH	1499	1700	1409	1700	616	885	668	668	853
Volume to Capacity	0.01	0.01	0.00	0.01	0.01	0.02	0.15	0.15	0.09
Queue Length 95th (ft)	0	0	0	0	1	2	13	13	8
Control Delay (s)	0.5	0.0	0.2	0.0	10.9	9.2	11.3	11.3	9.6
Lane LOS	A		A		B	A	B	B	A
Approach Delay (s)	0.5		0.2		9.5		10.9		
Approach LOS					A		B		

Intersection Summary				
Average Delay	5.8	HCM Level of Service	A
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	9	185	8	2	89	180	5	0	19	975	19	53
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	201	9	2	97	196	5	0	21	1060	21	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								1			1	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	292			210			390	517	201	342	330	97
vC1, stage 1 conf vol							221	221		101	101	
vC2, stage 2 conf vol							169	297		241	229	
vCu, unblocked vol	292			210			390	517	201	342	330	97
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	100	98	0	97	94
cM capacity (veh/h)	1269			1361			585	520	840	630	605	960

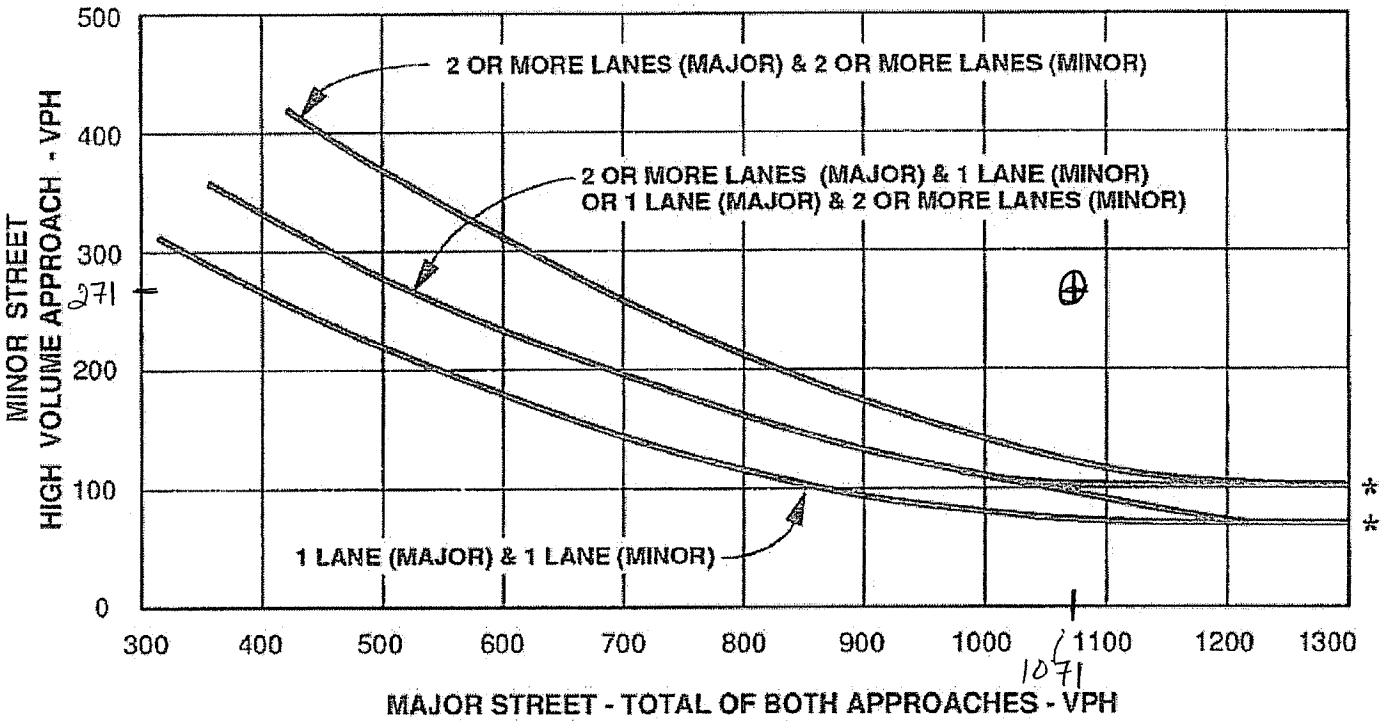
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	211	9	99	196	5	21	530	530	78
Volume Left	10	0	2	0	5	0	530	530	0
Volume Right	0	9	0	196	0	21	0	0	58
cSH	1269	1700	1361	1700	585	840	630	630	831
Volume to Capacity	0.01	0.01	0.00	0.12	0.01	0.02	0.84	0.84	0.09
Queue Length 95th (ft)	1	0	0	0	1	2	229	229	8
Control Delay (s)	0.4	0.0	0.2	0.0	11.2	9.4	33.6	33.6	9.8
Lane LOS	A		A		B	A	D	D	A
Approach Delay (s)	0.4		0.1		9.8		31.9		
Approach LOS					A		D		

Intersection Summary			
Average Delay	21.9	HCM Level of Service	C
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

Houghton Rd & State Route 99 Southbound Off Ramp
2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & SR 99 Southbound Ramp/ Costajo St - PM Peak
Count Date: 8/9/2007

Exist Peak Hour Volumes

U		
>	WBL	4
1	WBT	54
1	WBR	5
>	EBL	1
1	EBT	77
1	EBR	2
>	NBL	0
1	NBT	0
1	NBR	25
>	SBL	72
1	SBT	14
1	SBR	28
	TOTAL	282

Year 2035
Fut. Volumes w/o Proj

WBL	9
WBT	103
WBR	18
EBL	3
EBT	119
EBR	3
NBL	0
NBT	0
NBR	44
SBL	170
SBT	34
SBR	59
TOTAL	561

Year 2035 Fut. Vol
+ Project Traffic

WBL	9
WBT	155
WBR	858
EBL	3
EBT	147
EBR	3
NBL	0
NBT	0
NBR	44
SBL	544
SBT	34
SBR	59
TOTAL	1855

Year 2020
Fut. Volumes w/o Proj

WBL	6
WBT	77
WBR	11
EBL	2
EBT	97
EBR	3
NBL	0
NBT	0
NBR	34
SBL	117
SBT	23
SBR	42
TOTAL	411

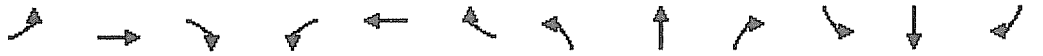
Year 2020 Fut. Vol
+ Project Traffic

WBL	6
WBT	129
WBR	851
EBL	2
EBT	125
EBR	3
NBL	0
NBT	0
NBR	34
SBL	491
SBT	23
SBR	42
TOTAL	1705

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	52	24	28
WBR	840	603	237
EBL	0	0	0
EBT	28	12	16
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	374	121	253
SBT	0	0	0
SBR	0	0	0
TOTAL	1294	760	534

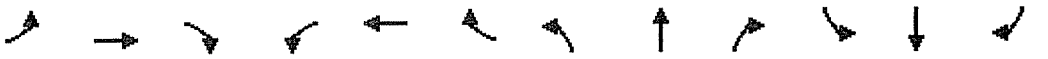
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & SR 99 Southbound Ramp/ Costajo St - PM Peak						
	Count Date:	8/9/2007						
2007	ADT							
WB Approach (To)	0.25							
WB Approach (Away)	2.12							
EB Approach (To)	0.75							
EB Approach (Away)	0.87							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	1.13							
SB Approach (Away)	0.07							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	0.7		WBL	2.20	WBT	1.99	WBR	3.69
WB Approach (Away)	3.7		2.81%	9	2.33%	103	4.63%	18
EB Approach (To)	1.0		EBL	3.08	EBT	1.56	EBR	1.58
EB Approach (Away)	1.2		3.45%	3	1.58%	119	1.63%	3
NB Approach (To)	*1.8*		NBL	1.59	NBT	3.29	NBR	1.78
NB Approach (Away)	*1.8*		1.66%	0	3.95%	0	2.08%	44
SB Approach (To)	3.6		SBL	2.46	SBT	2.49	SBR	2.28
SB Approach (Away)	0.3		3.13%	170	3.18%	34	2.70%	59
2035	ADT with Proj		2007	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	1.1		WBL	3.16	WBT	2.97	WBR	6.65
WB Approach (Away)	9.6		3.84%	11	3.40%	137	6.83%	32
EB Approach (To)	1.1		EBL	5.09	EBT	2.97	EBR	1.61
EB Approach (Away)	1.2		4.67%	4	3.40%	196	1.69%	3
NB Approach (To)	*1.8*		NBL	1.61	NBT	5.29	NBR	3.16
NB Approach (Away)	*1.8*		1.69%	0	5.11%	0	3.84%	72
SB Approach (To)	9.2		SBL	6.34	SBT	4.98	SBR	4.79
SB Approach (Away)	0.6		6.68%	438	4.97%	54	4.53%	96



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	77	2	4	54	5	0	0	25	72	14	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	84	2	4	59	5	0	0	27	78	15	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	64			86			191	159	84	180	155	59
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	64			86			191	159	84	180	155	59
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	97	90	98	97
cM capacity (veh/h)	1538			1510			731	731	976	757	734	1007

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	85	2	63	5	0	27	93	30
Volume Left	1	0	4	0	0	0	78	0
Volume Right	0	2	0	5	0	27	0	30
cSH	1538	1700	1510	1700	1700	976	753	1007
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.03	0.12	0.03
Queue Length 95th (ft)	0	0	0	0	0	2	11	2
Control Delay (s)	0.1	0.0	0.5	0.0	0.0	8.8	10.5	8.7
Lane LOS	A		A		A	A	B	A
Approach Delay (s)	0.1		0.5		8.8		10.0	
Approach LOS					A		B	

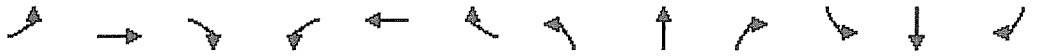
Intersection Summary			
Average Delay	5.0	HCM Level of Service	A
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	97	3	6	77	11	0	0	34	117	23	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	105	3	7	84	12	0	0	37	127	25	46
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	96			109			265	218	105	243	210	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96			109			265	218	105	243	210	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	96	81	96	95
cM capacity (veh/h)	1498			1482			635	676	949	680	683	976

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	108	3	90	12	0	37	152	46
Volume Left	2	0	7	0	0	0	127	0
Volume Right	0	3	0	12	0	37	0	46
cSH	1498	1700	1482	1700	1700	949	680	976
Volume to Capacity	0.00	0.00	0.00	0.01	0.00	0.04	0.22	0.05
Queue Length 95th (ft)	0	0	0	0	0	3	21	4
Control Delay (s)	0.2	0.0	0.6	0.0	0.0	8.9	11.8	8.9
Lane LOS	A		A		A	A	B	A
Approach Delay (s)	0.2		0.5		8.9		11.1	
Approach LOS					A		B	

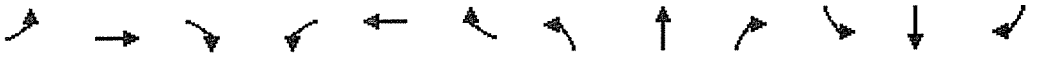
Intersection Summary				
Average Delay	5.8	HCM Level of Service	A
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	125	3	6	129	851	0	0	34	491	23	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	136	3	7	140	925	0	0	37	534	25	46
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1065			139			352	1218	136	330	297	140
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1065			139			352	1218	136	330	297	140
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	96	10	96	95
cM capacity (veh/h)	654			1444			552	179	913	594	610	908

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	138	3	147	925	0	37	559	46
Volume Left	2	0	7	0	0	0	534	0
Volume Right	0	3	0	925	0	37	0	46
cSH	654	1700	1444	1700	1700	913	595	908
Volume to Capacity	0.00	0.00	0.00	0.54	0.00	0.04	0.94	0.05
Queue Length 95th (ft)	0	0	0	0	0	3	310	4
Control Delay (s)	0.2	0.0	0.4	0.0	0.0	9.1	49.8	9.2
Lane LOS	A		A		A	A	E	A
Approach Delay (s)	0.2		0.1		9.1		46.7	
Approach LOS					A		E	

Intersection Summary				
Average Delay	15.5	HCM Level of Service	C
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	119	3	9	103	18	0	0	44	170	34	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	129	3	10	112	20	0	0	48	185	37	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					808							
pX, platoon unblocked												
vC, conflicting volume	132			133			350	287	129	315	271	112
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			133			350	287	129	315	271	112
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	95	69	94	93
cM capacity (veh/h)	1454			1452			535	617	920	600	630	941

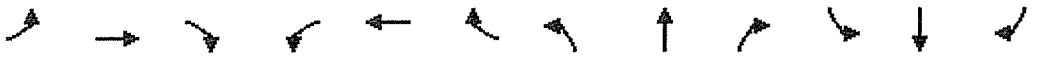
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	133	3	122	20	0	48	222	64
Volume Left	3	0	10	0	0	0	185	0
Volume Right	0	3	0	20	0	48	0	64
cSH	1454	1700	1452	1700	1700	920	605	941
Volume to Capacity	0.00	0.00	0.01	0.01	0.00	0.05	0.37	0.07
Queue Length 95th (ft)	0	0	1	0	0	4	42	5
Control Delay (s)	0.2	0.0	0.7	0.0	0.0	9.1	14.4	9.1
Lane LOS	A		A		A	A	B	A
Approach Delay (s)	0.2		0.6		9.1		13.2	
Approach LOS					A		B	

Intersection Summary				
Average Delay	7.1	HCM Level of Service	A
Intersection Capacity Utilization	31.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	147	3	9	155	858	0	0	44	544	34	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	160	3	10	168	933	0	0	48	591	37	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)					808							
pX, platoon unblocked												
vC, conflicting volume	1101			163			437	1287	160	402	358	168
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1101			163			437	1287	160	402	358	168
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	95	0	93	93
cM capacity (veh/h)	634			1416			462	162	885	524	562	876

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	163	3	178	933	0	48	628	64
Volume Left	3	0	10	0	0	0	591	0
Volume Right	0	3	0	933	0	48	0	64
cSH	634	1700	1416	1700	1700	885	526	876
Volume to Capacity	0.01	0.00	0.01	0.55	0.00	0.05	1.20	0.07
Queue Length 95th (ft)	0	0	1	0	0	4	576	6
Control Delay (s)	0.3	0.0	0.5	0.0	0.0	9.3	130.6	9.4
Lane LOS	A		A		A	A	F	A
Approach Delay (s)	0.3		0.1		9.3		119.4	
Approach LOS					A		F	

Intersection Summary			
Average Delay	41.3	HCM Level of Service	E
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	147	3	9	155	858	0	0	44	544	34	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	160	3	10	168	933	0	0	48	591	37	64
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								1			1	
Upstream signal (ft)					808							
pX, platoon unblocked												
vC, conflicting volume	1101			163			437	1287	160	402	358	168
vC1, stage 1 conf vol							166	166		188	188	
vC2, stage 2 conf vol							271	1121		214	170	
vCu, unblocked vol	1101			163			437	1287	160	402	358	168
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	95	0	94	93
cM capacity (veh/h)	634			1416			532	236	885	588	595	876

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	163	3	178	933	0	48	591	101
Volume Left	3	0	10	0	0	0	591	0
Volume Right	0	3	0	933	0	48	0	64
cSH	634	1700	1416	1700	1700	885	588	747
Volume to Capacity	0.01	0.00	0.01	0.55	0.00	0.05	1.01	0.14
Queue Length 95th (ft)	0	0	1	0	0	4	378	12
Control Delay (s)	0.3	0.0	0.5	0.0	0.0	9.3	65.2	10.6
Lane LOS	A		A		A	A	F	B
Approach Delay (s)	0.3		0.1		9.3		57.2	
Approach LOS					A		F	

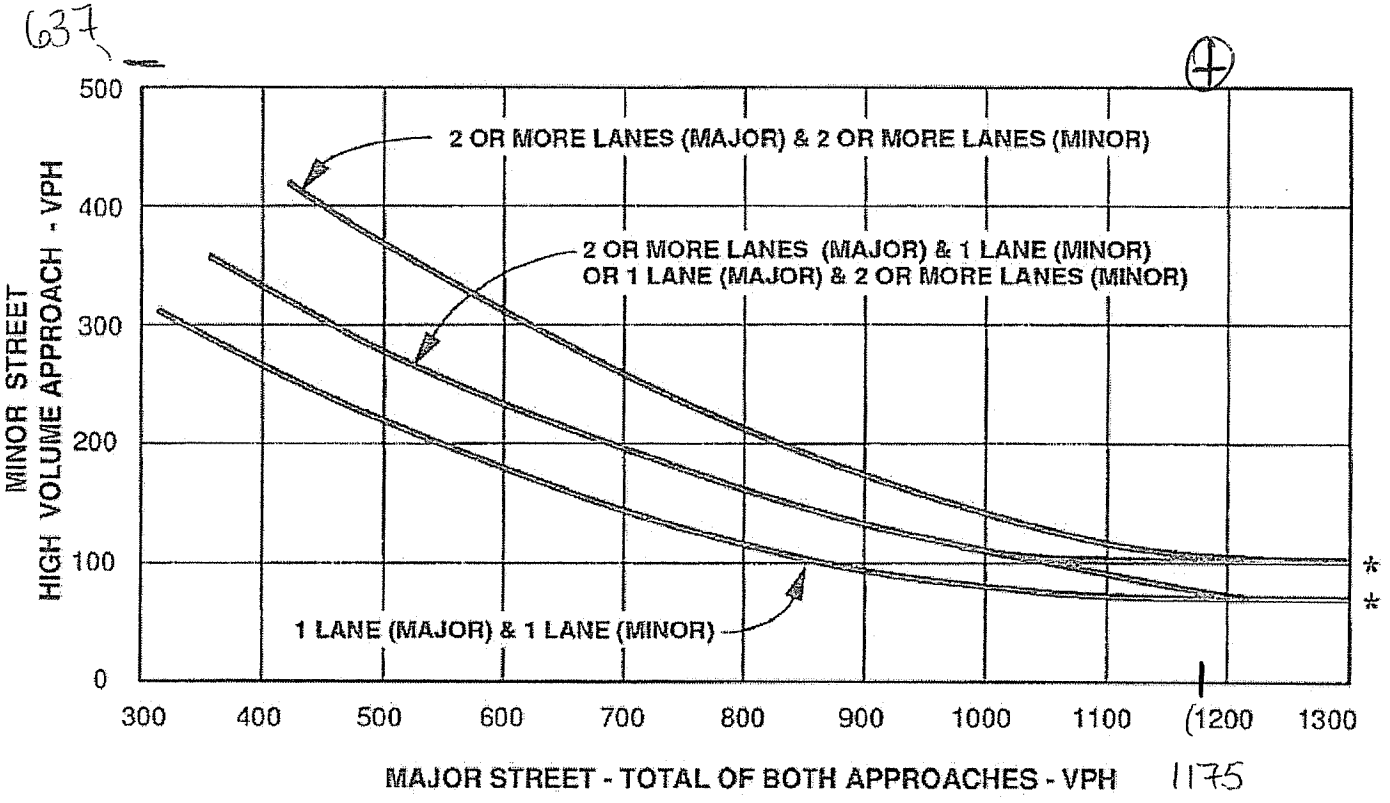
Intersection Summary			
Average Delay	19.9	HCM Level of Service	C
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

Houghton Rd & SR 99 SB Ramp/Costajo St

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...11750.....	2 or More...6370....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...11750.....	2 or More...6370.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & SR 99 NB On/Off Ramp - AM Peak
Count Date: 9/20/2007

Exist Peak Hour Volumes

U		
>	WBL	42
1	WBT	61
0	WBR	0
0	EBL	0
1	EBT	117
1	EBR	35
1	NBL	1
0	NBT	0
1	NBR	6
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	262

Year 2035
Fut. Volumes w/o Proj

WBL	112
WBT	137
WBR	0
EBL	0
EBT	220
EBR	77
NBL	3
NBT	0
NBR	20
SBL	0
SBT	0
SBR	0
TOTAL	571

Year 2035 Fut. Vol
+ Project Traffic

WBL	309
WBT	318
WBR	0
EBL	0
EBT	1050
EBR	77
NBL	3
NBT	0
NBR	579
SBL	0
SBT	0
SBR	0
TOTAL	2338

Year 2020
Fut. Volumes w/o Proj

WBL	74
WBT	96
WBR	0
EBL	0
EBT	165
EBR	54
NBL	2
NBT	0
NBR	13
SBL	0
SBT	0
SBR	0
TOTAL	404

Year 2020 Fut. Vol
+ Project Traffic

WBL	271
WBT	277
WBR	0
EBL	0
EBT	995
EBR	54
NBL	2
NBT	0
NBR	572
SBL	0
SBT	0
SBR	0
TOTAL	2171

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	197	156	41
WBT	181	134	47
WBR	0	0	0
EBL	0	0	0
EBT	830	769	61
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	559	491	68
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	1767	1550	217

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & SR 99 NB On/Off Ramp - AM Peak						
	Count Date:	9/20/2007						
2006	ADT							
WB Approach (To)	1.39							
WB Approach (Away)	1.43							
EB Approach (To)	2.39							
EB Approach (Away)	0.28							
NB Approach (To)	0.07							
NB Approach (Away)	0.98							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2030	ADT w/o Proj		2007	TO	2030	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.3		WBL	2.84	WBT	2.34	WBR	1.68
WB Approach (Away)	3.5		4.42%	112	3.63%	137	1.83%	0
EB Approach (To)	3.7		EBL	1.28	EBT	1.98	EBR	2.44
EB Approach (Away)	0.7		0.94%	0	2.82%	220	3.52%	77
NB Approach (To)	0.4		NBL	3.78	NBT	3.11	NBR	3.82
NB Approach (Away)	3.3		5.39%	3	3.59%	0	5.47%	20
SB Approach (To)	*1*		SBL	1.71	SBT	2.16	SBR	1.66
SB Approach (Away)	*1*		1.88%	0	2.59%	0	1.80%	0
2030	ADT with Proj		2007	TO	2030	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	9.4		WBL	7.89	WBT	5.41	WBR	3.89
WB Approach (Away)	9.7		9.00%	300	7.19%	297	4.18%	0
EB Approach (To)	9.6		EBL	2.50	EBT	5.39	EBR	6.51
EB Approach (Away)	1.1		3.00%	0	7.17%	567	7.82%	195
NB Approach (To)	0.6		NBL	6.63	NBT	5.11	NBR	7.99
NB Approach (Away)	8.8		7.90%	6	4.88%	0	9.05%	43
SB Approach (To)	*1*		SBL	3.88	SBT	5.00	SBR	2.52
SB Approach (Away)	*1*		4.17%	0	4.83%	0	3.02%	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	117	35	42	61	1	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	127	38	46	66	1	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			165		285	127
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			165		285	127
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	99
cM capacity (veh/h)			1413		683	923

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	127	38	112	1	7
Volume Left	0	0	46	1	0
Volume Right	0	38	0	0	7
cSH	1700	1700	1413	683	923
Volume to Capacity	0.07	0.02	0.03	0.00	0.01
Queue Length 95th (ft)	0	0	3	0	1
Control Delay (s)	0.0	0.0	3.3	10.3	8.9
Lane LOS			A	B	A
Approach Delay (s)	0.0		3.3	9.1	
Approach LOS				A	

Intersection Summary			
Average Delay	1.5	HCM Level of Service	A
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	165	54	74	96	2	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	179	59	80	104	2	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			238		445	179
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			238		445	179
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		100	98
cM capacity (veh/h)			1329		536	863

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	179	59	185	2	14
Volume Left	0	0	80	2	0
Volume Right	0	59	0	0	14
cSH	1700	1700	1329	536	863
Volume to Capacity	0.11	0.03	0.06	0.00	0.02
Queue Length 95th (ft)	0	0	5	0	1
Control Delay (s)	0.0	0.0	3.7	11.7	9.2
Lane LOS			A	B	A
Approach Delay (s)	0.0		3.7	9.6	
Approach LOS				A	

Intersection Summary			
Average Delay	1.9	HCM Level of Service	A
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	995	54	271	277	2	572
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1082	59	295	301	2	622
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1140		1972	1082
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1140		1972	1082
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			52		94	0
cM capacity (veh/h)			613		36	265

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	1082	59	596	2	622
Volume Left	0	0	295	2	0
Volume Right	0	59	0	0	622
cSH	1700	1700	613	36	265
Volume to Capacity	0.64	0.03	0.48	0.06	2.35
Queue Length 95th (ft)	0	0	65	5	1234
Control Delay (s)	0.0	0.0	12.8	112.6	649.0
Lane LOS			B	F	F
Approach Delay (s)	0.0		12.8	647.1	
Approach LOS				F	

Intersection Summary			
Average Delay	174.3	HCM Level of Service	F
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	995	54	271	277	2	572
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1082	59	295	301	2	622

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total (vph)	541	541	59	295	301	2	622
Volume Left (vph)	0	0	0	295	0	2	0
Volume Right (vph)	0	0	59	0	0	0	622
Hadj (s)	0.03	0.03	-0.67	0.53	0.03	0.23	-0.57
Departure Headway (s)	5.2	5.2	3.2	6.2	5.7	6.8	3.2
Degree Utilization, x	0.78	0.78	0.05	0.51	0.48	0.00	0.55
Capacity (veh/h)	681	680	1121	553	609	503	1117
Control Delay (s)	22.8	22.8	5.2	14.3	12.7	9.9	10.1
Approach Delay (s)	21.9			13.5		10.1	
Approach LOS	C			B		B	

Intersection Summary			
Delay	16.6		
HCM Level of Service	C		
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

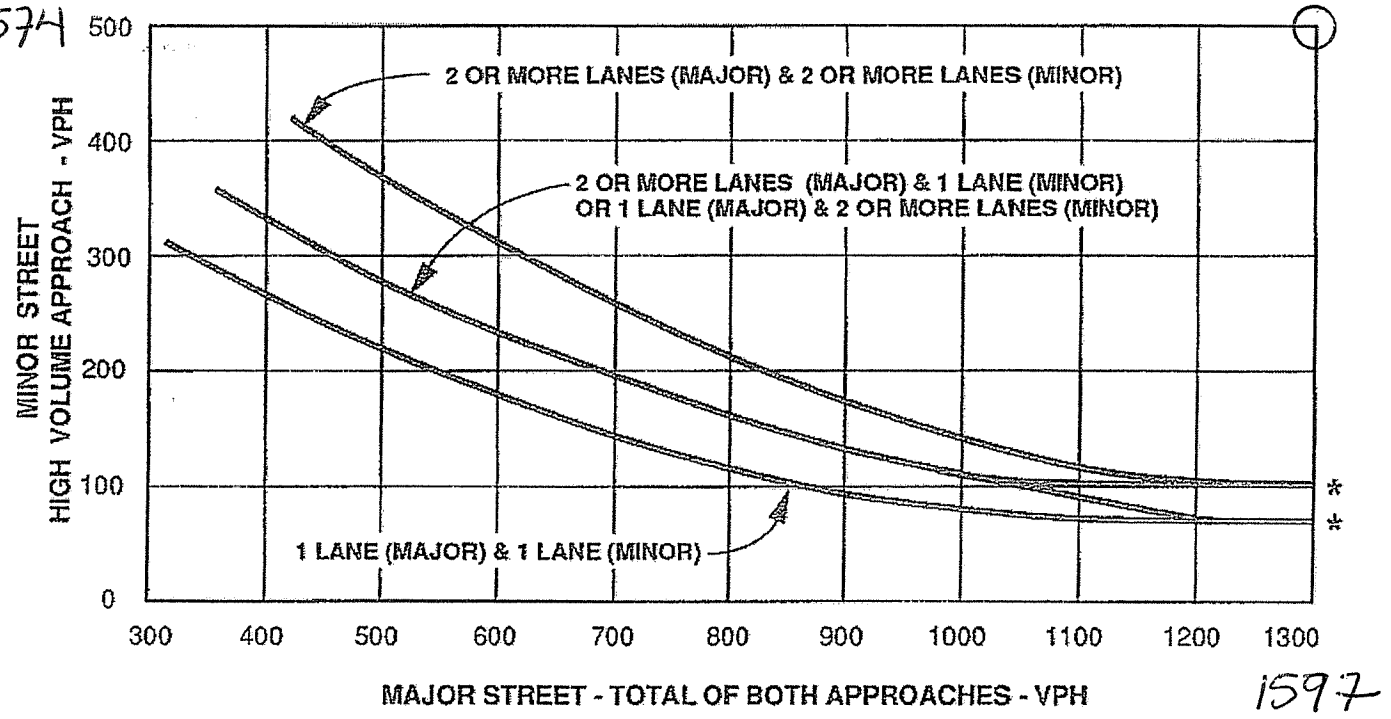
Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

HOUGHTON RD + SR 99 NB ON/OFF RAMP

2020 WITH PROJECT

574



1597

* 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 APPROACHING WITH ONE LANE.

WARRANT SATISFIED

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	220	77	112	137	3	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	84	122	149	3	22

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total (vph)	120	120	84	122	149	3	22
Volume Left (vph)	0	0	0	122	0	3	0
Volume Right (vph)	0	0	84	0	0	0	22
Hadj (s)	0.03	0.03	-0.67	0.53	0.03	0.23	-0.57
Departure Headway (s)	4.8	4.8	3.2	5.2	4.7	5.2	3.2
Degree Utilization, x	0.16	0.16	0.07	0.18	0.20	0.00	0.02
Capacity (veh/h)	744	744	1121	679	750	634	1121
Control Delay (s)	7.4	7.4	5.3	8.1	7.7	8.2	6.3
Approach Delay (s)	6.9			7.9		6.5	
Approach LOS	A			A		A	

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	1050	77	309	318	3	579
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1141	84	336	346	3	629

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2
Volume Total (vph)	571	571	84	336	346	3	629
Volume Left (vph)	0	0	0	336	0	3	0
Volume Right (vph)	0	0	84	0	0	0	629
Hadj (s)	0.03	0.03	-0.67	0.53	0.03	0.23	-0.57
Departure Headway (s)	5.4	5.4	3.2	6.4	5.9	7.0	3.2
Degree Utilization, x	0.85	0.85	0.07	0.60	0.56	0.01	0.56
Capacity (veh/h)	664	664	1121	544	596	498	1117
Control Delay (s)	29.7	29.7	5.3	17.1	15.0	10.0	10.2
Approach Delay (s)	28.0			16.1		10.2	
Approach LOS	D			C		B	

Intersection Summary			
Delay	20.4		
HCM Level of Service	C		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & SR 99 NB On/Off Ramp - PM Peak
Count Date: 8/8/2007

Exist Peak Hour Volumes

U		
>	WBL	84
1	WBT	51
0	WBR	0
0	EBL	0
1	EBT	109
1	EBR	45
1	NBL	4
0	NBT	0
1	NBR	6
0	SBL	0
0	SBT	0
0	SBR	0
TOTAL		299

Year 2035
Fut. Volumes w/o Proj

WBL	217
WBT	143
WBR	0
EBL	0
EBT	254
EBR	101
NBL	14
NBT	0
NBR	20
SBL	0
SBT	0
SBR	0
TOTAL	748

Year 2035 Fut. Vol
+ Project Traffic

WBL	1486
WBT	1035
WBR	0
EBL	0
EBT	655
EBR	101
NBL	14
NBT	0
NBR	404
SBL	0
SBT	0
SBR	0
TOTAL	3694

Year 2020
Fut. Volumes w/o Proj

WBL	146
WBT	94
WBR	0
EBL	0
EBT	176
EBR	71
NBL	9
NBT	0
NBR	12
SBL	0
SBT	0
SBR	0
TOTAL	507

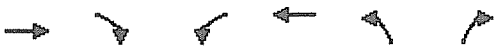
Year 2020 Fut. Vol
+ Project Traffic

WBL	1415
WBT	986
WBR	0
EBL	0
EBT	577
EBR	71
NBL	9
NBT	0
NBR	396
SBL	0
SBT	0
SBR	0
TOTAL	3453

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	1269	948	321
WBT	892	627	265
WBR	0	0	0
EBL	0	0	0
EBT	401	133	268
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	384	121	263
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	2946	1829	1117

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & SR 99 NB On/Off Ramp - PM Peak						
	Count Date:	8/8/2007						
2007	ADT							
WB Approach (To)	1.23							
WB Approach (Away)	1.27							
EB Approach (To)	1.87							
EB Approach (Away)	0.22							
NB Approach (To)	0.09							
NB Approach (Away)	1.30							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2030	ADT w/o Proj		2007	TO	2030	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.3		WBL	2.59	WBT	2.81	WBR	1.83
WB Approach (Away)	3.5		4.23%	217	4.61%	143	2.19%	0
EB Approach (To)	3.7		EBL	1.49	EBT	2.35	EBR	2.25
EB Approach (Away)	0.7		1.52%	0	3.75%	254	3.57%	101
NB Approach (To)	0.4		NBL	3.51	NBT	2.53	NBR	3.39
NB Approach (Away)	3.3		5.58%	14	3.16%	0	5.39%	20
SB Approach (To)	*1*		SBL	1.86	SBT	1.75	SBR	1.98
SB Approach (Away)	*1*		2.23%	0	2.05%	0	2.42%	0
2030	ADT with Proj		2007	TO	2030	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	9.4		WBL	7.22	WBT	6.40	WBR	4.33
WB Approach (Away)	9.7		9.01%	606	8.35%	320	4.65%	0
EB Approach (To)	9.6		EBL	3.06	EBT	6.37	EBR	5.96
EB Approach (Away)	1.1		3.70%	0	8.33%	682	8.06%	266
NB Approach (To)	0.6		NBL	6.16	NBT	4.08	NBR	7.39
NB Approach (Away)	8.8		8.19%	24	4.49%	0	9.12%	44
SB Approach (To)	*1*		SBL	4.31	SBT	3.90	SBR	3.07
SB Approach (Away)	*1*		4.63%	0	4.36%	0	3.71%	0



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	109	45	84	51	4	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	118	49	91	55	4	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			167		357	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			167		357	118
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		99	99
cM capacity (veh/h)			1410		600	933

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	118	49	147	4	7
Volume Left	0	0	91	4	0
Volume Right	0	49	0	0	7
cSH	1700	1700	1410	600	933
Volume to Capacity	0.07	0.03	0.06	0.01	0.01
Queue Length 95th (ft)	0	0	5	1	1
Control Delay (s)	0.0	0.0	5.0	11.0	8.9
Lane LOS			A	B	A
Approach Delay (s)	0.0		5.0	9.7	
Approach LOS				A	

Intersection Summary			
Average Delay	2.6	HCM Level of Service	A
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	176	71	146	94	9	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	191	77	159	102	10	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			268		611	191
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			268		611	191
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		98	98
cM capacity (veh/h)			1295		401	850

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	191	77	261	10	13
Volume Left	0	0	159	10	0
Volume Right	0	77	0	0	13
cSH	1700	1700	1295	401	850
Volume to Capacity	0.11	0.05	0.12	0.02	0.02
Queue Length 95th (ft)	0	0	10	2	1
Control Delay (s)	0.0	0.0	5.4	14.2	9.3
Lane LOS			A	B	A
Approach Delay (s)	0.0		5.4	11.4	
Approach LOS				B	

Intersection Summary			
Average Delay	3.0	HCM Level of Service	A
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	577	71	1415	986	9	396
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	627	77	1538	1072	10	430
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			704		4775	627
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			704		4775	627
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	11
cM capacity (veh/h)			893		0	483

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	627	77	2610	10	430
Volume Left	0	0	1538	10	0
Volume Right	0	77	0	0	430
cSH	1700	1700	893	0	483
Volume to Capacity	0.37	0.05	1.72	Err	0.89
Queue Length 95th (ft)	0	0	2180	Err	245
Control Delay (s)	0.0	0.0	583.3	Err	47.7
Lane LOS			F	F	E
Approach Delay (s)	0.0		583.3	Err	
Approach LOS				F	

Intersection Summary			
Average Delay	Err	HCM Level of Service	F
Intersection Capacity Utilization	173.9%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	577	71	1415	986	9	396
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	627	77	1538	1072	10	430

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total (vph)	627	77	1538	1072	10	430
Volume Left (vph)	0	0	1538	0	10	0
Volume Right (vph)	0	77	0	0	0	430
Hadj (s)	0.03	-0.57	0.53	0.03	0.23	-0.57
Departure Headway (s)	4.9	3.2	5.5	5.0	7.0	3.2
Degree Utilization, x	0.85	0.07	2.36	1.50	0.02	0.38
Capacity (veh/h)	733	1121	654	721	492	1114
Control Delay (s)	28.6	6.4	630.8	245.1	10.2	8.2
Approach Delay (s)	26.1		472.4		8.2	
Approach LOS	D		F		A	

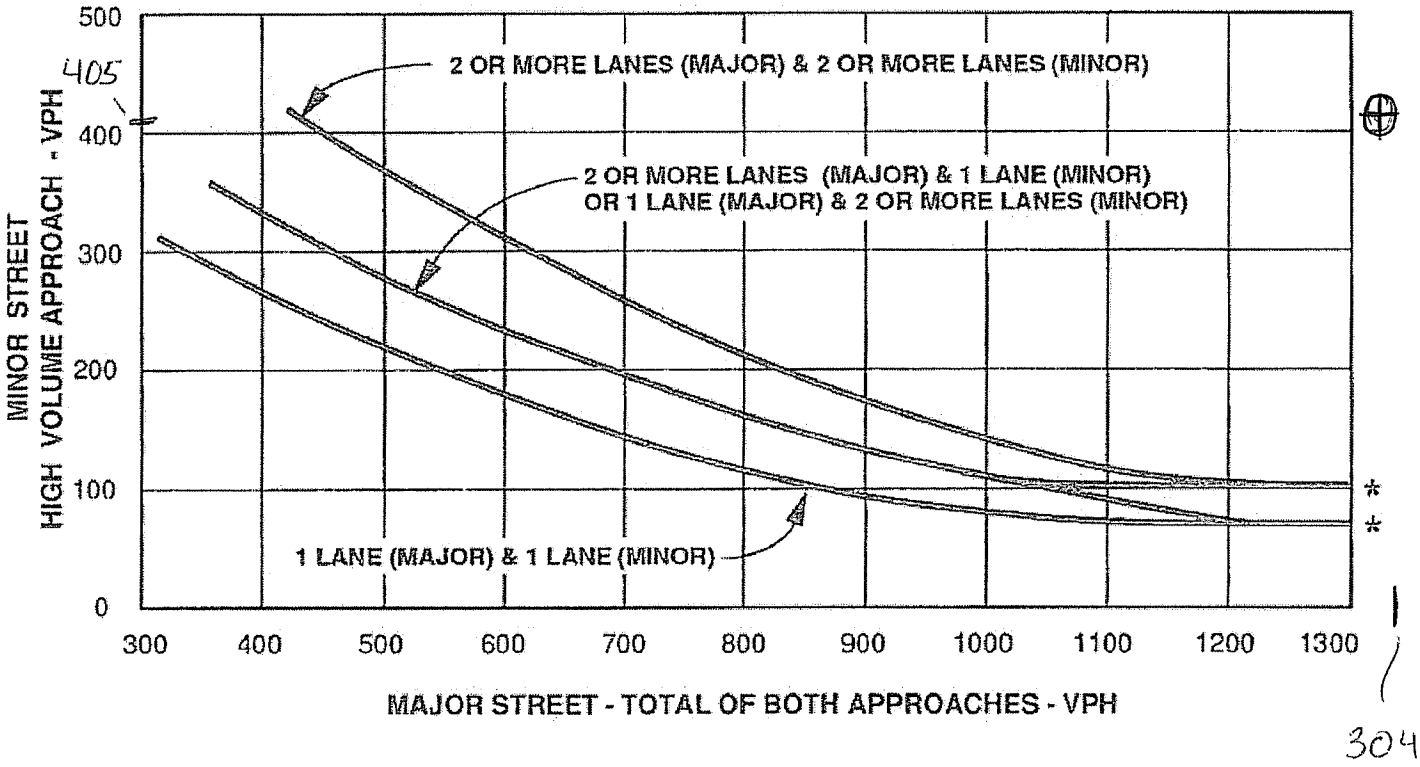
Intersection Summary			
Delay	334.3		
HCM Level of Service	F		
Intersection Capacity Utilization	122.1%	ICU Level of Service	H
Analysis Period (min)	15		

Houghton Rd & SR 99 Northbound Off/On Ramp

2020 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

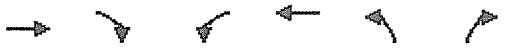
URBAN..... RURAL X	Minimum Requirements EADT	
CONDITION A - Minimum Vehicular Volume	Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
Satisfied X Not Satisfied _____		
Number of lanes for moving traffic on each approach	Urban / Rural	Urban / Rural
Major Street / Minor Street		
1 / 1	8,000 / 5,600	2,400 / 1,680
2 or More / 1	9,600 / 6,720	2,400 / 1,680
2 or More / 2 or More	9,600 / 6,720	3,200 / 2,240
1 / 2 or More	8,000 / 5,600	3,200 / 2,240
CONDITION B - Interruption of Continuous Traffic	Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
Satisfied X Not Satisfied _____		
Number of lanes for moving traffic on each approach	Urban / Rural	Urban / Rural
Major Street / Minor Street		
1 / 1	12,000 / 8,400	1,200 / 850
2 or More / 1	14,400 / 10,080	1,200 / 850
2 or More / 2 or More	14,400 / 10,080	1,600 / 1,120
1 / 2 or More	12,000 / 8,400	1,600 / 1,120
Combination of CONDITIONS A + B		
Satisfied _____ Not Satisfied _____	2 CONDITIONS 80%	2 CONDITIONS 80%
No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	3433	1863	1770	1583
Volume (vph)	577	71	1415	986	9	396
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	627	77	1538	1072	10	430
RTOR Reduction (vph)	0	59	0	0	0	379
Lane Group Flow (vph)	627	18	1538	1072	10	51
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	16.2	16.2	39.8	60.0	8.5	8.5
Effective Green, g (s)	18.2	18.2	39.8	62.0	9.5	9.5
Actuated g/C Ratio	0.23	0.23	0.50	0.78	0.12	0.12
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	810	362	1719	1453	212	189
v/s Ratio Prot	0.18		c0.45	c0.58	0.01	
v/s Ratio Perm		0.01				c0.03
v/c Ratio	0.77	0.05	0.89	0.74	0.05	0.27
Uniform Delay, d1	28.7	23.9	18.0	4.5	31.0	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.6	0.1	6.5	2.0	0.1	0.8
Delay (s)	33.4	24.0	24.4	6.5	31.1	32.6
Level of Service	C	C	C	A	C	C
Approach Delay (s)	32.3			17.1	32.6	
Approach LOS	C			B	C	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰↰	↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	3433	1863	1770	1583
Volume (vph)	254	101	217	143	14	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	110	236	155	15	22
RTOR Reduction (vph)	0	85	0	0	0	16
Lane Group Flow (vph)	276	25	236	155	15	6
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	6.7	6.7	6.3	17.0	10.3	10.3
Effective Green, g (s)	8.7	8.7	6.3	19.0	11.3	11.3
Actuated g/C Ratio	0.23	0.23	0.16	0.50	0.30	0.30
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	804	360	565	924	522	467
v/s Ratio Prot	c0.08		c0.07	0.08	c0.01	
v/s Ratio Perm		0.02				0.00
v/c Ratio	0.34	0.07	0.42	0.17	0.03	0.01
Uniform Delay, d1	12.4	11.6	14.4	5.3	9.6	9.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.1	0.5	0.1	0.0	0.0
Delay (s)	12.7	11.7	14.9	5.4	9.6	9.6
Level of Service	B	B	B	A	A	A
Approach Delay (s)	12.4			11.1	9.6	
Approach LOS	B			B	A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	38.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3539	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3539	1583	3433	1863	1770	1583
Volume (vph)	655	101	1486	1035	14	404
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	712	110	1615	1125	15	439
RTOR Reduction (vph)	0	83	0	0	0	388
Lane Group Flow (vph)	712	27	1615	1125	15	51
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	18.5	18.5	40.1	62.6	8.5	8.5
Effective Green, g (s)	20.5	20.5	40.1	64.6	9.5	9.5
Actuated g/C Ratio	0.25	0.25	0.49	0.79	0.12	0.12
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	884	395	1677	1466	205	183
v/s Ratio Prot	0.20		c0.47	c0.60	0.01	
v/s Ratio Perm		0.02				c0.03
v/c Ratio	0.81	0.07	0.96	0.77	0.07	0.28
Uniform Delay, d1	28.9	23.5	20.3	4.7	32.4	33.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.4	0.1	14.1	2.5	0.2	0.8
Delay (s)	34.3	23.6	34.4	7.2	32.5	34.0
Level of Service	C	C	C	A	C	C
Approach Delay (s)	32.9			23.2	33.9	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Project Entrance # 4 - AM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U	Future Intersection	
0	WBL	0
1	WBT	98
0	WBR	0
0	EBL	0
1	EBT	131
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	229

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	242
WBR	0
EBL	0
EBT	297
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	539

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	605
WBR	11
EBL	0
EBT	1719
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	37
TOTAL	2372

Year 2020

U	Fut. Volumes w/o Proj	
0	WBL	0
1	WBT	161
<	WBR	0
0	EBL	0
1	EBT	204
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
1	SBR	0
	TOTAL	366

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	524
WBR	11
EBL	0
EBT	1626
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	37
TOTAL	2199

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	363	291	72
WBR	11	0	11
EBL	0	0	0
EBT	1422	1260	162
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	37	0	37
TOTAL	1833	1551	282

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1626	524	11	0	37
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1767	570	12	0	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	582				2343	576
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	582				2343	576
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	993				40	517

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1767	582	40
Volume Left	0	0	0
Volume Right	0	12	40
cSH	1700	1700	517
Volume to Capacity	1.04	0.34	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	12.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	12.5
Approach LOS			B

Intersection Summary		
Average Delay	0.2	HCM Level of Service A
Intersection Capacity Utilization	88.9%	ICU Level of Service E
Analysis Period (min)	15	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↱
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1719	605	11	0	37
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1868	658	12	0	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			263			
pX, platoon unblocked	0.82				0.82	0.82
vC, conflicting volume	670				2532	664
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	599				2859	592
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	90
cM capacity (veh/h)	806				15	417

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1868	670	40
Volume Left	0	0	0
Volume Right	0	12	40
cSH	1700	1700	417
Volume to Capacity	1.10	0.39	0.10
Queue Length 95th (ft)	0	0	8
Control Delay (s)	0.0	0.0	14.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.5
Approach LOS			B

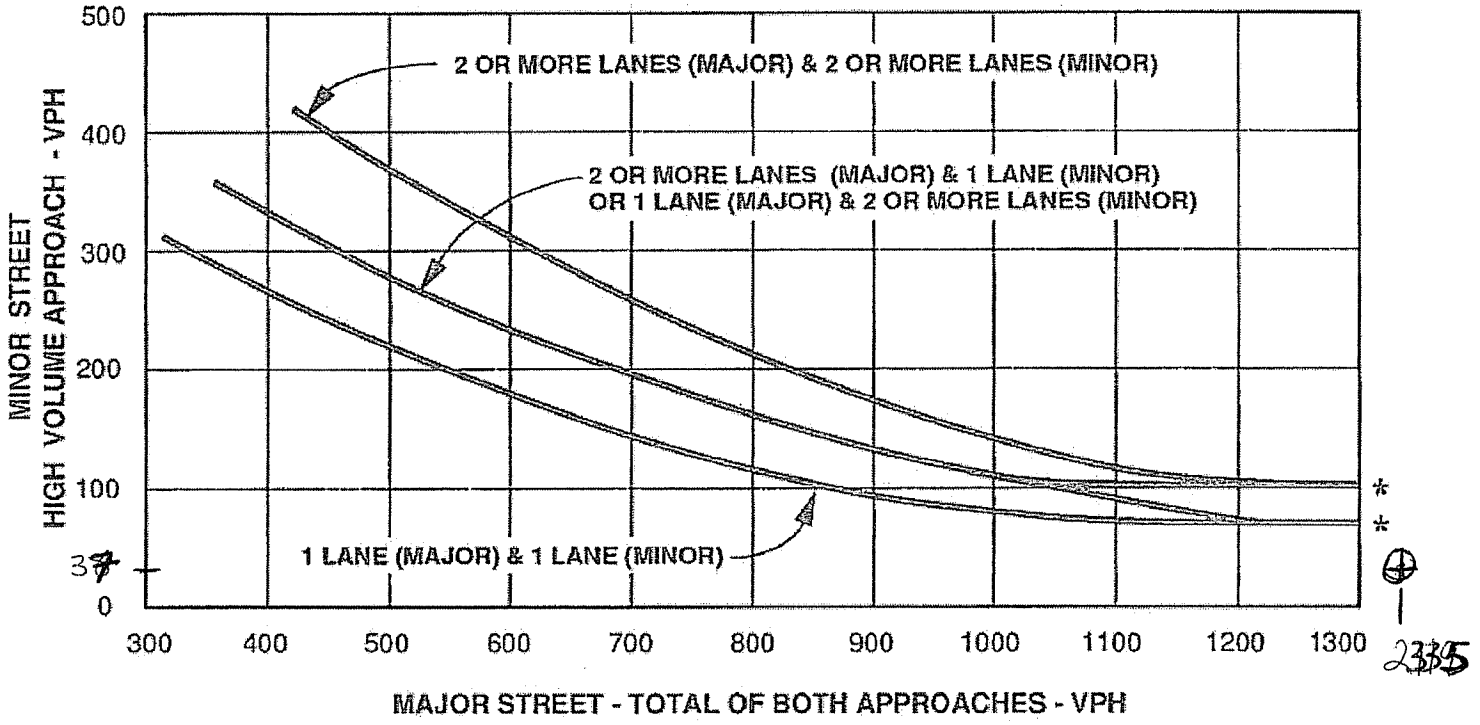
Intersection Summary			
Average Delay	0.2	HCM Level of Service	A
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

Houghton Rd & Project Entrance #4

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Project Entrance # 4 - PM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U	Future Intersection	
0	WBL	0
1	WBT	133
0	WBR	0
0	EBL	0
1	EBT	115
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	248

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	344
WBR	0
EBL	0
EBT	285
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	629

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	2404
WBR	5
EBL	0
EBT	1210
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	248
TOTAL	3867

Year 2020

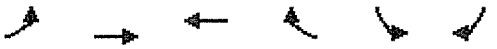
U	Fut. Volumes w/o Proj	
0	WBL	0
1	WBT	226
<	WBR	0
0	EBL	0
1	EBT	190
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
1	SBR	0
	TOTAL	416

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	2286
WBR	5
EBL	0
EBT	1115
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	248
TOTAL	3654

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	2060	1575	485
WBR	5	0	5
EBL	0	0	0
EBT	925	254	671
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	248	0	248
TOTAL	3238	1829	1409



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1115	2286	5	0	248
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1212	2485	5	0	270
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2490				3699	2488
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2490				3699	2488
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	184				5	38

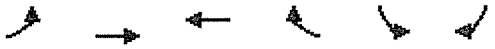
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1212	2490	270
Volume Left	0	0	0
Volume Right	0	5	270
cSH	1700	1700	38
Volume to Capacity	0.71	1.46	7.16
Queue Length 95th (ft)	0	0	Err
Control Delay (s)	0.0	0.0	Err
Lane LOS			F
Approach Delay (s)	0.0	0.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	678.6	HCM Level of Service	F
Intersection Capacity Utilization	142.6%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1115	2286	5	0	248
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1212	2485	5	0	270
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		304	273			
pX, platoon unblocked	0.75				0.83	0.75
vC, conflicting volume	2490				3093	1245
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2652				2721	995
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	117				14	183

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	606	606	1657	834	135	135
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	5	135	135
cSH	1700	1700	1700	1700	183	183
Volume to Capacity	0.36	0.36	0.97	0.49	0.74	0.74
Queue Length 95th (ft)	0	0	0	0	118	118
Control Delay (s)	0.0	0.0	0.0	0.0	65.8	65.8
Lane LOS					F	F
Approach Delay (s)	0.0		0.0		65.8	
Approach LOS					F	

Intersection Summary			
Average Delay	4.5	HCM Level of Service	A
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1210	2404	5	0	248
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1315	2613	5	0	270
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		304	273			
pX, platoon unblocked	0.72				0.81	0.72
vC, conflicting volume	2618				3273	1309
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2864				2876	1034
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	92				10	164

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	658	658	1742	876	135	135
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	5	135	135
cSH	1700	1700	1700	1700	164	164
Volume to Capacity	0.39	0.39	1.02	0.52	0.82	0.82
Queue Length 95th (ft)	0	0	0	0	138	138
Control Delay (s)	0.0	0.0	0.0	0.0	85.7	85.7
Lane LOS					F	F
Approach Delay (s)	0.0		0.0		85.7	
Approach LOS					F	

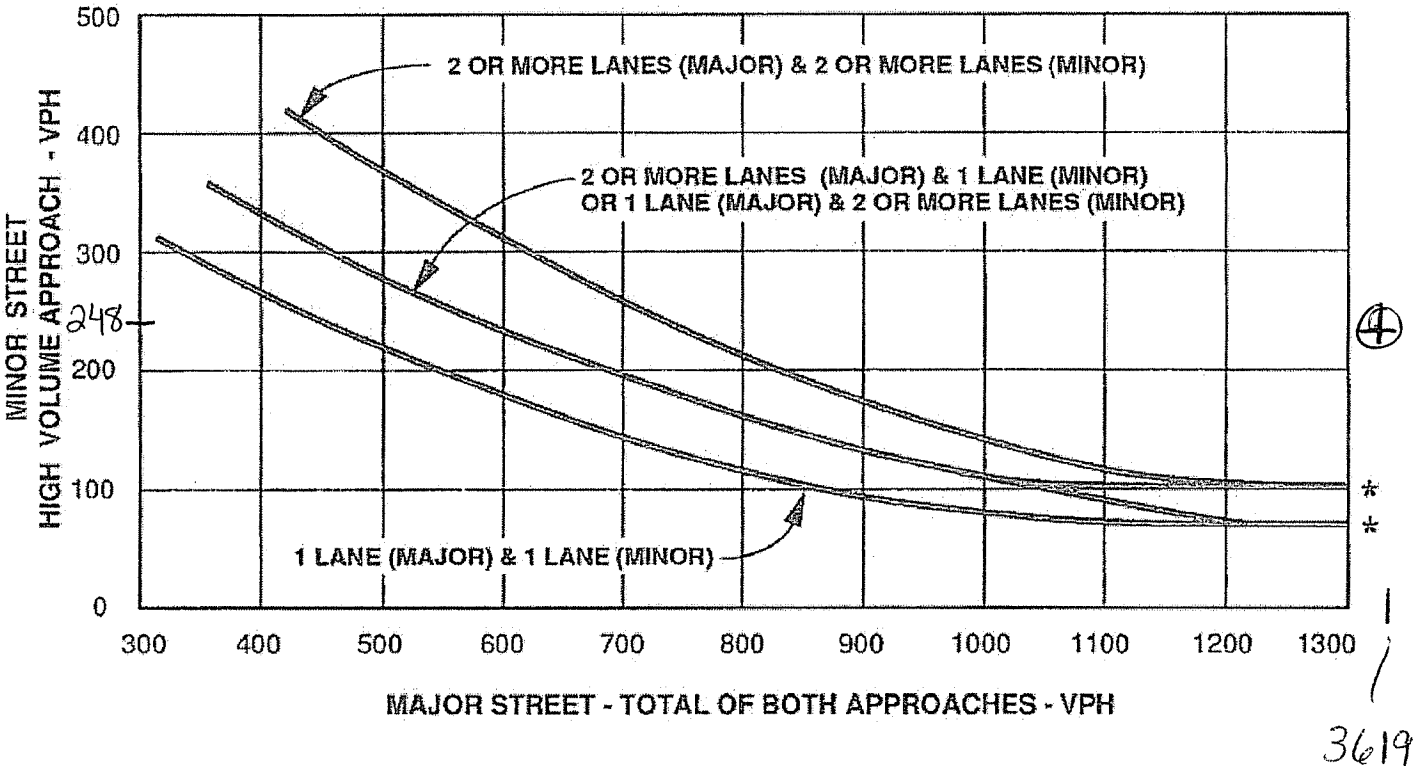
Intersection Summary			
Average Delay	5.5	HCM Level of Service	A
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

Houghton Rd & Project Entrance #4

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



3619

*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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL...X...

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...36,190.....	2 or More...2480.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...36,190.....	2 or More...2480.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____

Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Chevalier Rd - AM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U		
>	WBL	0
1	WBT	93
<	WBR	0
>	EBL	0
1	EBT	138
<	EBR	0
>	NBL	0
1	NBT	0
1	NBR	0
>	SBL	0
1	SBT	0
<	SBR	0
	TOTAL	231

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	234
WBR	0
EBL	0
EBT	354
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	588

Year 2035 Fut. Vol
+ Project Traffic

WBL	7
WBT	331
WBR	55
EBL	1283
EBT	460
EBR	0
NBL	6
NBT	23
NBR	5
SBL	11
SBT	4
SBR	221
TOTAL	2406

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	155
WBR	0
EBL	0
EBT	233
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	389

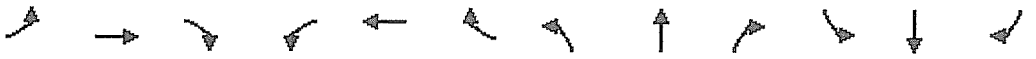
Year 2020 Fut. Vol
+ Project Traffic

WBL	7
WBT	252
WBR	55
EBL	1283
EBT	339
EBR	0
NBL	6
NBT	23
NBR	5
SBL	11
SBT	4
SBR	221
TOTAL	2207

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	7	2	5
WBT	97	62	35
WBR	55	53	2
EBL	1283	1188	95
EBT	106	72	34
EBR	0	0	0
NBL	6	0	6
NBT	23	13	10
NBR	5	2	3
SBL	11	5	6
SBT	4	1	3
SBR	221	196	25
TOTAL	1818	1594	224

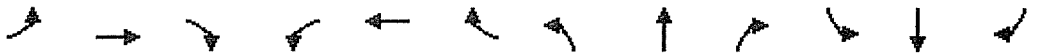
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Chevalier Rd - AM Peak						
	Count Date:	9/4/2008						
2006	ADT							
WB Approach (To)	1.21							
WB Approach (Away)	1.24							
EB Approach (To)	1.25							
EB Approach (Away)	1.20							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.2		WBL	2.23	WBT	2.70	WBR	1.83
WB Approach (Away)	3.4		2.76%	0	3.50%	234	1.73%	0
EB Approach (To)	3.5		EBL	1.88	EBT	2.75	EBR	2.28
EB Approach (Away)	3.3		1.79%	0	3.57%	354	2.82%	0
NB Approach (To)	*1.8*		NBL	2.27	NBT	1.40	NBR	2.27
NB Approach (Away)	*1.8*		2.80%	0	1.03%	0	2.81%	0
SB Approach (To)	*1*		SBL	1.87	SBT	1.40	SBR	1.87
SB Approach (Away)	*1*		1.78%	0	1.03%	0	1.77%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	5.8		WBL	3.29	WBT	6.31	WBR	4.32
WB Approach (Away)	5.8		3.81%	0	6.48%	502	5.18%	0
EB Approach (To)	9.7		EBL	5.80	EBT	6.22	EBR	4.77
EB Approach (Away)	9.4		6.07%	0	6.43%	734	4.71%	0
NB Approach (To)	*1.8*		NBL	4.82	NBT	2.83	NBR	3.25
NB Approach (Away)	*1.8*		4.73%	0	3.43%	0	3.78%	0
SB Approach (To)	3.6		SBL	4.17	SBT	2.72	SBR	5.74
SB Approach (Away)	3.9		5.04%	0	3.32%	0	5.99%	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↰	↱		↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	138	0	0	93	0	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	150	0	0	101	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	101			150			251	251	150	251	251	101
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	101			150			251	251	150	251	251	101
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1491			1431			702	652	896	702	652	954

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	150	101	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1491	1431	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS			A	A	A
Approach Delay (s)	0.0	0.0	0.0		0.0
Approach LOS			A		A

Intersection Summary			
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	10.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	233	0	0	155	0	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	253	0	0	168	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	168			253			422	422	253	422	422	168
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			253			422	422	253	422	422	168
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1409			1312			542	523	785	542	523	876

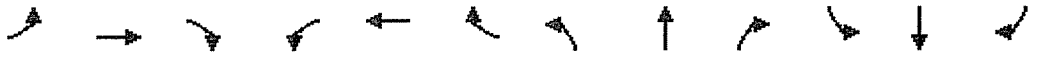
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	253	168	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1409	1312	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS			A	A	A
Approach Delay (s)	0.0	0.0	0.0		0.0
Approach LOS			A		A

Intersection Summary				
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↰	↱		↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1283	339	0	7	252	55	6	23	5	11	4	221
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1395	368	0	8	274	60	7	25	5	12	4	240
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	334			368			3719	3507	368	3495	3477	304
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	334			368			3719	3507	368	3495	3477	304
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			99			0	0	99	0	0	67
cM capacity (veh/h)	1226			1190			0	0	677	0	0	736

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	1763	341	32	5	257
Volume Left	1395	8	7	0	12
Volume Right	0	60	0	5	240
cSH	1226	1190	0	677	0
Volume to Capacity	1.14	0.01	Err	0.01	Err
Queue Length 95th (ft)	894	0	Err	1	Err
Control Delay (s)	93.7	0.2	Err	10.4	Err
Lane LOS	F	A	F	B	F
Approach Delay (s)	93.7	0.2	Err		Err
Approach LOS			F		F

Intersection Summary			
Average Delay	Err	HCM Level of Service	F
Intersection Capacity Utilization	137.0%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1283	339	0	7	252	55	6	23	5	11	4	221
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1395	368	0	8	274	60	7	25	5	12	4	240

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	1395	368	8	274	60	32	5	16	240
Volume Left (vph)	1395	0	8	0	0	7	0	12	0
Volume Right (vph)	0	0	0	0	60	0	5	0	240
Hadj (s)	0.53	0.03	0.53	0.03	-0.67	0.08	-0.57	0.18	-0.57
Departure Headway (s)	5.5	5.0	6.3	5.8	3.2	6.4	3.2	6.5	3.2
Degree Utilization, x	2.11	0.51	0.01	0.44	0.05	0.06	0.00	0.03	0.21
Capacity (veh/h)	671	718	554	612	1121	541	1121	526	1122
Control Delay (s)	518.7	11.7	8.2	12.1	5.2	9.8	6.2	9.7	7.1
Approach Delay (s)	412.8		10.8			9.2		7.2	
Approach LOS	F		B			A		A	

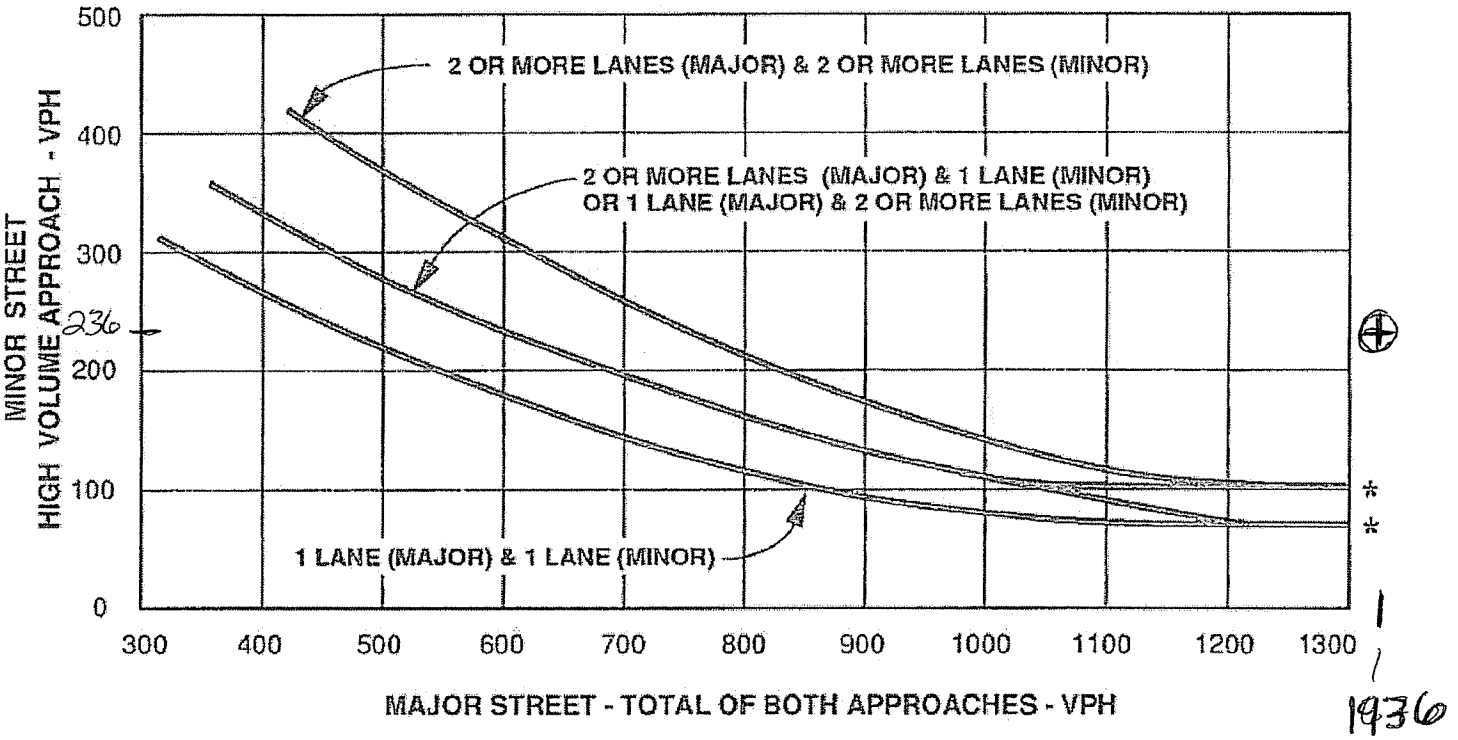
Intersection Summary			
Delay	305.9		
HCM Level of Service	F		
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		

Houghton Rd & Chevalier Rd

2020 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	3433	1863		1770	1863	1583		1843	1583		1795	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	3433	1863		1770	1863	1583		1843	1583		1795	1583
Volume (vph)	1283	339	0	7	252	55	6	23	5	11	4	221
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1395	368	0	8	274	60	7	25	5	12	4	240
RTOR Reduction (vph)	0	0	0	0	0	47	0	0	5	0	0	218
Lane Group Flow (vph)	1395	368	0	8	274	13	0	32	0	0	16	22
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	42.1	60.3		0.7	18.9	18.9		7.1	7.1		7.9	7.9
Effective Green, g (s)	42.1	62.3		0.7	20.9	20.9		8.1	8.1		8.9	8.9
Actuated g/C Ratio	0.44	0.65		0.01	0.22	0.22		0.08	0.08		0.09	0.09
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	1506	1209		13	406	345		156	134		166	147
v/s Ratio Prot	c0.41	0.20		0.00	c0.15			c0.02			0.01	
v/s Ratio Perm						0.01			0.00			c0.01
v/c Ratio	0.93	0.30		0.62	0.67	0.04		0.21	0.00		0.10	0.15
Uniform Delay, d1	25.5	7.4		47.5	34.4	29.6		41.0	40.3		39.9	40.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	10.1	0.1		64.0	4.4	0.0		0.7	0.0		0.3	0.5
Delay (s)	35.5	7.5		111.6	38.8	29.7		41.6	40.3		40.1	40.6
Level of Service	D	A		F	D	C		D	D		D	D
Approach Delay (s)		29.7			38.9			41.4			40.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		1.00			1.00							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		1863			1863							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		1863			1863							
Volume (vph)	0	354	0	0	234	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	385	0	0	254	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	385	0	0	254	0	0	0	0	0	0	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			6
Actuated Green, G (s)		14.3			14.3							
Effective Green, g (s)		16.3			16.3							
Actuated g/C Ratio		0.39			0.39							
Clearance Time (s)		6.0			6.0							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		735			735							
v/s Ratio Prot		c0.21			0.14							
v/s Ratio Perm												
v/c Ratio		0.52			0.35							
Uniform Delay, d1		9.5			8.8							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.7			0.3							
Delay (s)		10.2			9.0							
Level of Service		B			A							
Approach Delay (s)		10.2			9.0			0.0			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	41.3	Sum of lost time (s)	25.0
Intersection Capacity Utilization	22.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	3433	1863		1770	1863	1583		1843	1583		1795	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	3433	1863		1770	1863	1583		1843	1583		1795	1583
Volume (vph)	1283	460	0	7	331	55	6	23	5	11	4	221
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1395	500	0	8	360	60	7	25	5	12	4	240
RTOR Reduction (vph)	0	0	0	0	0	45	0	0	5	0	0	220
Lane Group Flow (vph)	1395	500	0	8	360	15	0	32	0	0	16	20
Turn Type	Prot			Prot		Perm	Split		Perm	Split		Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	47.1	70.1		1.3	24.3	24.3		7.3	7.3		8.1	8.1
Effective Green, g (s)	47.1	72.1		1.3	26.3	26.3		8.3	8.3		9.1	9.1
Actuated g/C Ratio	0.44	0.68		0.01	0.25	0.25		0.08	0.08		0.09	0.09
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	1514	1258		22	459	390		143	123		153	135
v/s Ratio Prot	c0.41	0.27		0.00	c0.19			c0.02			0.01	
v/s Ratio Perm						0.01			0.00			c0.01
v/c Ratio	0.92	0.40		0.36	0.78	0.04		0.22	0.00		0.10	0.15
Uniform Delay, d1	28.1	7.7		52.3	37.6	30.6		46.2	45.4		45.1	45.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	9.6	0.2		9.9	8.5	0.0		0.8	0.0		0.3	0.5
Delay (s)	37.7	7.9		62.3	46.1	30.7		47.0	45.4		45.4	45.8
Level of Service	D	A		E	D	C		D	D		D	D
Approach Delay (s)		29.8			44.3			46.8			45.8	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	106.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Chevalier Rd - PM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U		
>	WBL	0
1	WBT	131
<	WBR	0
>	EBL	0
1	EBT	114
<	EBR	0
>	NBL	0
1	NBT	0
1	NBR	0
>	SBL	0
1	SBT	0
<	SBR	0
TOTAL		245

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	328
WBR	0
EBL	0
EBT	295
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	622

Year 2035 Fut. Vol
+ Project Traffic

WBL	19
WBT	999
WBR	65
EBL	556
EBT	525
EBR	0
NBL	4
NBT	12
NBR	5
SBL	65
SBT	16
SBR	1292
TOTAL	3557

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	218
WBR	0
EBL	0
EBT	194
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	411

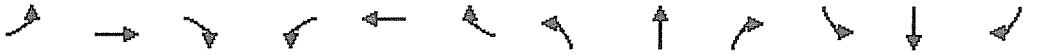
Year 2020 Fut. Vol
+ Project Traffic

WBL	19
WBT	889
WBR	65
EBL	556
EBT	424
EBR	0
NBL	4
NBT	12
NBR	5
SBL	65
SBT	16
SBR	1292
TOTAL	3346

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	19	4	15
WBT	671	398	273
WBR	65	59	6
EBL	556	219	337
EBT	230	35	195
EBR	0	0	0
NBL	4	0	4
NBT	12	6	6
NBR	5	2	3
SBL	65	49	16
SBT	16	8	8
SBR	1292	1177	115
TOTAL	2935	1957	978

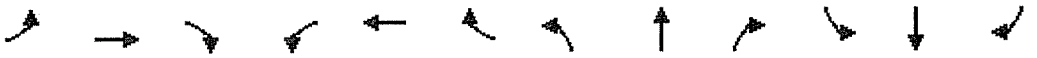
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd & Chevalier Rd - PM Peak						
	Count Date:	9/4/2008						
2006	ADT							
WB Approach (To)	1.22							
WB Approach (Away)	1.23							
EB Approach (To)	1.24							
EB Approach (Away)	1.21							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.2		WBL	2.22	WBT	2.68	WBR	1.82
WB Approach (Away)	3.4		2.75%	0	3.47%	328	1.72%	0
EB Approach (To)	3.5		EBL	1.89	EBT	2.78	EBR	2.29
EB Approach (Away)	3.3		1.81%	0	3.60%	295	2.84%	0
NB Approach (To)	*1.8*		NBL	2.25	NBT	1.40	NBR	2.28
NB Approach (Away)	*1.8*		2.79%	0	1.03%	0	2.83%	0
SB Approach (To)	*1*		SBL	1.88	SBT	1.40	SBR	1.85
SB Approach (Away)	*1*		1.80%	0	1.03%	0	1.76%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	5.8		WBL	3.27	WBT	6.26	WBR	4.30
WB Approach (Away)	5.8		3.80%	0	6.45%	702	5.16%	0
EB Approach (To)	9.7		EBL	5.83	EBT	6.27	EBR	4.80
EB Approach (Away)	9.4		6.09%	0	6.46%	611	4.72%	0
NB Approach (To)	*1.8*		NBL	4.79	NBT	2.83	NBR	3.27
NB Approach (Away)	*1.8*		4.71%	0	3.43%	0	3.80%	0
SB Approach (To)	3.6		SBL	4.18	SBT	2.72	SBR	5.71
SB Approach (Away)	3.9		5.06%	0	3.32%	0	5.97%	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕	↱		↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	114	0	0	131	0	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	124	0	0	142	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	142			124			266	266	124	266	266	142
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	142			124			266	266	124	266	266	142
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1440			1463			686	639	927	686	639	905

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	124	142	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1440	1463	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS			A	A	A
Approach Delay (s)	0.0	0.0	0.0		0.0
Approach LOS			A		A

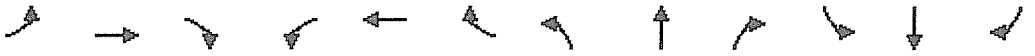
Intersection Summary			
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	10.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↰	↱		↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	194	0	0	218	0	0	0	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	211	0	0	237	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	237			211			448	448	211	448	448	237
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	237			211			448	448	211	448	448	237
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	1330			1360			521	506	829	521	506	802

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	211	237	0	0	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1330	1360	1700	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS			A	A	A
Approach Delay (s)	0.0	0.0	0.0		0.0
Approach LOS			A		A

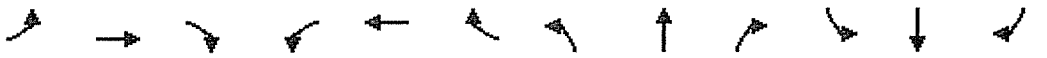
Intersection Summary			
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	556	424	0	19	889	65	4	12	5	65	16	1292
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	604	461	0	21	966	71	4	13	5	71	17	1404
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1037			461			4126	2748	461	2719	2712	1002
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1037			461			4126	2748	461	2719	2712	1002
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	10			98			0	0	99	0	0	0
cM capacity (veh/h)	670			1100			0	2	601	0	2	294

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total	1065	1058	17	5	1492
Volume Left	604	21	4	0	71
Volume Right	0	71	0	5	1404
cSH	670	1100	0	601	0
Volume to Capacity	0.90	0.02	Err	0.01	Err
Queue Length 95th (ft)	287	1	Err	1	Err
Control Delay (s)	44.0	0.6	Err	11.0	Err
Lane LOS	E	A	F	B	F
Approach Delay (s)	44.0	0.6	Err		Err
Approach LOS			F		F

Intersection Summary			
Average Delay	Err	HCM Level of Service	F
Intersection Capacity Utilization	205.9%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	556	424	0	19	889	65	4	12	5	65	16	1292
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	604	461	0	21	966	71	4	13	5	71	17	1404

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total (vph)	604	461	21	966	71	17	5	88	702	702
Volume Left (vph)	604	0	21	0	0	4	0	71	0	0
Volume Right (vph)	0	0	0	0	71	0	5	0	702	702
Hadj (s)	0.53	0.03	0.53	0.03	-0.67	0.08	-0.57	0.19	-0.57	-0.57
Departure Headway (s)	6.1	5.6	6.8	6.3	3.2	7.5	3.2	7.2	3.2	3.2
Degree Utilization, x	1.02	0.72	0.04	1.68	0.06	0.04	0.00	0.18	0.62	0.62
Capacity (veh/h)	604	633	516	580	1121	465	1121	491	1118	1118
Control Delay (s)	65.9	20.2	8.8	328.4	5.2	10.7	6.2	11.8	11.4	11.4
Approach Delay (s)	46.1		300.6			9.7		11.4		
Approach LOS	E		F			A		B		

Intersection Summary				
Delay	105.6			
HCM Level of Service	F			
Intersection Capacity Utilization	105.3%	ICU Level of Service	G	
Analysis Period (min)	15			

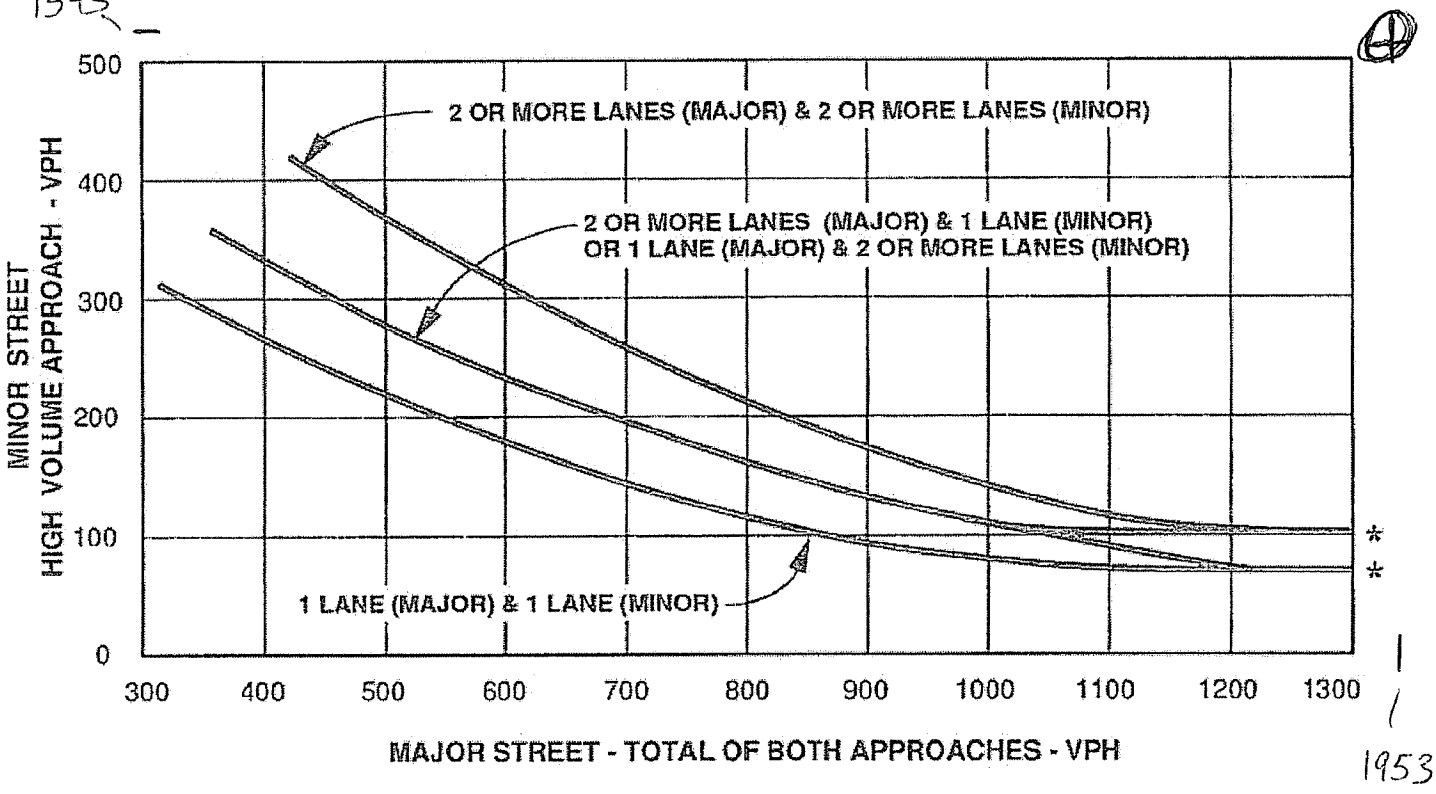
Houghton Rd + Chevalier Rd

2020 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

1373



1953

*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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL X

CONDITION A - Minimum Vehicular Volume

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 19530	2 or More 13730
1	2 or More

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied X Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1	1
2 or More	1
2 or More 19530	2 or More 13730
1	2 or More

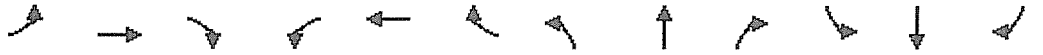
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____

2 CONDITIONS 80%	2 CONDITIONS 80%



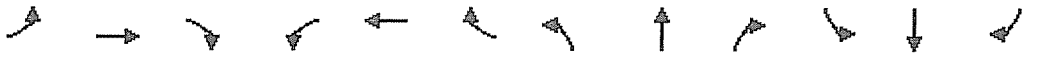
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00		1.00	1.00		1.00	0.88
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863		1770	3539	1583		1841	1583		1791	2787
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863		1770	3539	1583		1841	1583		1791	2787
Volume (vph)	556	424	0	19	889	65	4	12	5	65	16	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	604	461	0	21	966	71	4	13	5	71	17	1404
RTOR Reduction (vph)	0	0	0	0	0	39	0	0	5	0	0	310
Lane Group Flow (vph)	604	461	0	21	966	32	0	17	0	0	88	1094
Turn Type	Prot			Prot		Perm	Split		Perm	Split		pm+ov
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6			8			4
Actuated Green, G (s)	43.9	77.7		1.7	35.5	35.5		2.7	2.7		8.8	52.7
Effective Green, g (s)	43.9	79.7		1.7	37.5	37.5		3.7	3.7		9.8	53.7
Actuated g/C Ratio	0.40	0.72		0.02	0.34	0.34		0.03	0.03		0.09	0.48
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		5.0	5.0		5.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	701	1339		27	1197	535		61	53		158	1350
v/s Ratio Prot	c0.34	0.25		0.01	c0.27			c0.01			0.05	c0.32
v/s Ratio Perm						0.02			0.00			0.07
v/c Ratio	0.86	0.34		0.78	0.81	0.06		0.28	0.00		0.56	0.81
Uniform Delay, d1	30.7	5.8		54.4	33.4	24.8		52.3	51.8		48.5	24.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	10.6	0.2		81.9	4.1	0.0		2.5	0.0		4.2	3.8
Delay (s)	41.3	6.0		136.3	37.5	24.8		54.8	51.8		52.7	28.1
Level of Service	D	A		F	D	C		D	D		D	C
Approach Delay (s)		26.0			38.6			54.1			29.5	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0							
Lane Util. Factor		1.00			0.95							
Frt		1.00			1.00							
Flt Protected		1.00			1.00							
Satd. Flow (prot)		1863			3539							
Flt Permitted		1.00			1.00							
Satd. Flow (perm)		1863			3539							
Volume (vph)	0	295	0	0	328	0	0	0	0	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	321	0	0	357	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	321	0	0	357	0	0	0	0	0	0	0
Turn Type	Prot			Prot		Perm	Split		Perm	Split		pm+ov
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6			8			4
Actuated Green, G (s)		120.0			120.0							
Effective Green, g (s)		120.0			120.0							
Actuated g/C Ratio		1.00			1.00							
Clearance Time (s)		6.0			6.0							
Vehicle Extension (s)		3.0			3.0							
Lane Grp Cap (vph)		1863			3539							
v/s Ratio Prot		c0.17			0.10							
v/s Ratio Perm												
v/c Ratio		0.17			0.10							
Uniform Delay, d1		0.0			0.0							
Progression Factor		1.00			1.00							
Incremental Delay, d2		0.0			0.0							
Delay (s)		0.0			0.0							
Level of Service		A			A							
Approach Delay (s)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	0.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00		1.00	1.00		1.00	0.88
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863		1770	3539	1583		1841	1583		1791	2787
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863		1770	3539	1583		1841	1583		1791	2787
Volume (vph)	556	525	0	19	999	65	4	12	5	65	16	1292
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	604	571	0	21	1086	71	4	13	5	71	17	1404
RTOR Reduction (vph)	0	0	0	0	0	34	0	0	5	0	0	309
Lane Group Flow (vph)	604	571	0	21	1086	37	0	17	0	0	88	1095
Turn Type	Prot			Prot		Perm	Split		Perm	Split		pm+ov
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6			8			4
Actuated Green, G (s)	42.6	79.9		1.8	39.1	39.1		2.8	2.8		9.0	51.6
Effective Green, g (s)	42.6	81.9		1.8	41.1	41.1		3.8	3.8		10.0	52.6
Actuated g/C Ratio	0.38	0.72		0.02	0.36	0.36		0.03	0.03		0.09	0.46
Clearance Time (s)	4.0	6.0		4.0	6.0	6.0		5.0	5.0		5.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	664	1344		28	1282	573		62	53		158	1292
v/s Ratio Prot	c0.34	0.31		0.01	c0.31			c0.01			0.05	c0.32
v/s Ratio Perm						0.02			0.00			0.07
v/c Ratio	0.91	0.42		0.75	0.85	0.06		0.27	0.00		0.56	0.85
Uniform Delay, d1	33.6	6.3		55.6	33.3	23.6		53.5	53.0		49.6	26.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	16.3	0.2		71.8	5.4	0.0		2.4	0.0		4.2	5.3
Delay (s)	50.0	6.6		127.4	38.7	23.7		55.9	53.0		53.8	32.2
Level of Service	D	A		F	D	C		E	D		D	C
Approach Delay (s)		28.9			39.4			55.3			33.5	
Approach LOS		C			D			E			C	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	113.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Project Entrance # 3 - AM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U		Future Intersection
0	WBL	0
1	WBT	87
0	WBR	0
0	EBL	0
1	EBT	145
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	232

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	211
WBR	0
EBL	0
EBT	352
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	0
TOTAL	563

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	351
WBR	4
EBL	18
EBT	468
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	28
TOTAL	869

Year 2020

U	**Fut. Volumes w/o Proj**	
0	WBL	0
1	WBT	142
<	WBR	0
>	EBL	0
1	EBT	236
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
1	SBR	0
	TOTAL	378

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	282
WBR	4
EBL	18
EBT	352
EBR	0
NBL	0
NBT	0
NBR	0
SBL	0
SBT	0
SBR	28
TOTAL	684

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	140	117	23
WBR	4	0	4
EBL	18	0	18
EBT	116	79	37
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	28	0	28
TOTAL	306	196	110

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	352	282	4	0	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	383	307	4	0	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	311				730	309
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	311				730	309
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	96
cM capacity (veh/h)	1250				383	731

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	402	311	30
Volume Left	20	0	0
Volume Right	0	4	30
cSH	1250	1700	731
Volume to Capacity	0.02	0.18	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	0.5	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	0.7	HCM Level of Service	A
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	468	351	4	0	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	509	382	4	0	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	386				932	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	386				932	384
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	95
cM capacity (veh/h)	1173				291	664

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	528	386	30
Volume Left	20	0	0
Volume Right	0	4	30
cSH	1173	1700	664
Volume to Capacity	0.02	0.23	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.5	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.5	0.0	10.7
Approach LOS			B

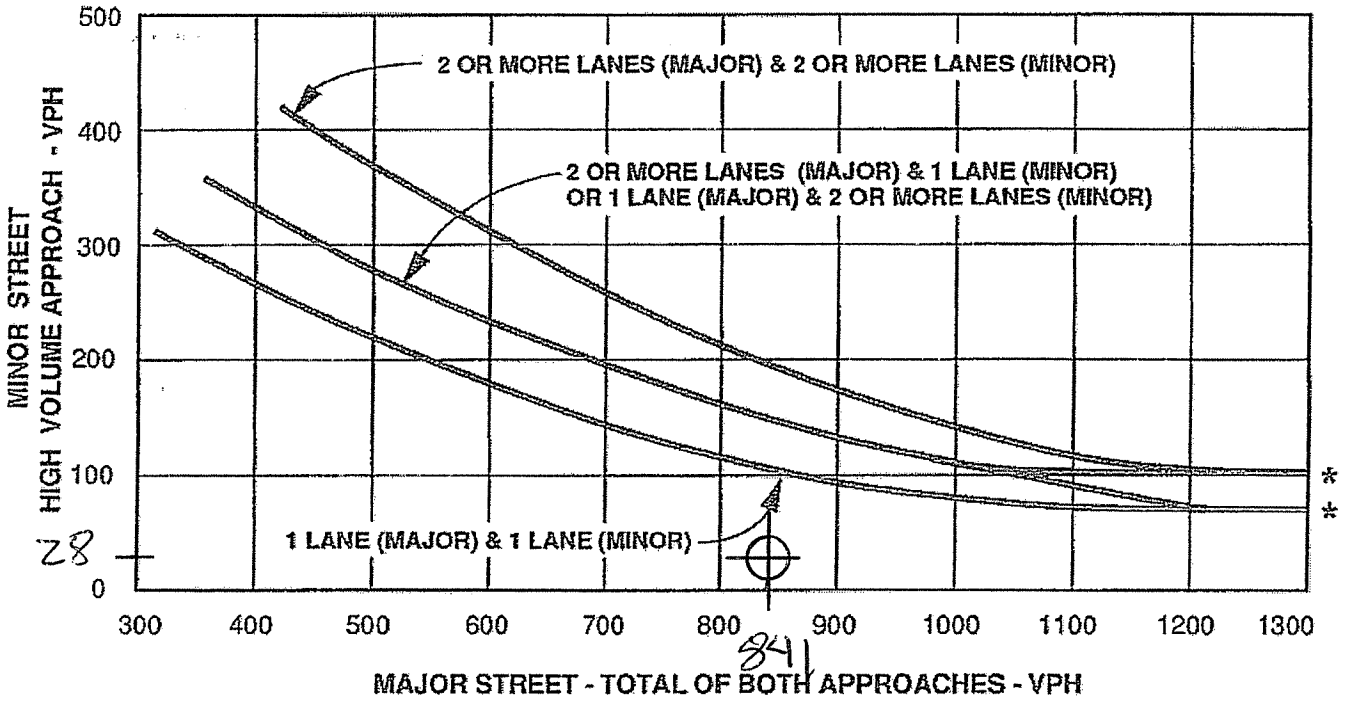
Intersection Summary			
Average Delay	0.6	HCM Level of Service	A
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

HOUGHTON RD + PROJECT ENT #3
2035 WITH PROJECT AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT NOT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd & Project Entrance # 3 - PM Peak
Count Date: *9/4/2008*

Exist Peak Hour Volumes

U	Future Intersection	
0	WBL	0
1	WBT	129
0	WBR	0
0	EBL	0
1	EBT	112
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	241

Year 2035
Fut. Volumes w/o Proj

	WBL	0
	WBT	317
	WBR	0
	EBL	0
	EBT	307
	EBR	0
	NBL	0
	NBT	0
	NBR	0
	SBL	0
	SBT	0
	SBR	0
	TOTAL	624

Year 2035 Fut. Vol
+ Project Traffic

	WBL	0
	WBT	930
	WBR	13
	EBL	107
	EBT	554
	EBR	0
	NBL	0
	NBT	0
	NBR	0
	SBL	0
	SBT	0
	SBR	216
	TOTAL	1820

Year 2020

U	Fut. Volumes w/o Proj	
0	WBL	0
1	WBT	212
<	WBR	0
>	EBL	0
1	EBT	198
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
0	SBL	0
0	SBT	0
1	SBR	0
	TOTAL	410

Year 2020 Fut. Vol
+ Project Traffic

	WBL	0
	WBT	825
	WBR	13
	EBL	107
	EBT	445
	EBR	0
	NBL	0
	NBT	0
	NBR	0
	SBL	0
	SBT	0
	SBR	216
	TOTAL	1606

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	613	461	152
WBR	13	0	13
EBL	107	0	107
EBT	247	86	161
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	216	0	216
TOTAL	1196	547	649

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	107	445	825	13	0	216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	484	897	14	0	235
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	911				1620	904
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	911				1620	904
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	84				100	30
cM capacity (veh/h)	748				96	335

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	600	911	235
Volume Left	116	0	0
Volume Right	0	14	235
cSH	748	1700	335
Volume to Capacity	0.16	0.54	0.70
Queue Length 95th (ft)	14	0	125
Control Delay (s)	3.9	0.0	37.3
Lane LOS	A		E
Approach Delay (s)	3.9	0.0	37.3
Approach LOS			E

Intersection Summary			
Average Delay	6.4	HCM Level of Service	A
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	107	554	930	13	0	216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	602	1011	14	0	235
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1025				1853	1018
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1025				1853	1018
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				100	19
cM capacity (veh/h)	677				67	288

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	718	1025	235
Volume Left	116	0	0
Volume Right	0	14	235
cSH	677	1700	288
Volume to Capacity	0.17	0.60	0.81
Queue Length 95th (ft)	15	0	166
Control Delay (s)	4.4	0.0	55.3
Lane LOS	A		F
Approach Delay (s)	4.4	0.0	55.3
Approach LOS			F

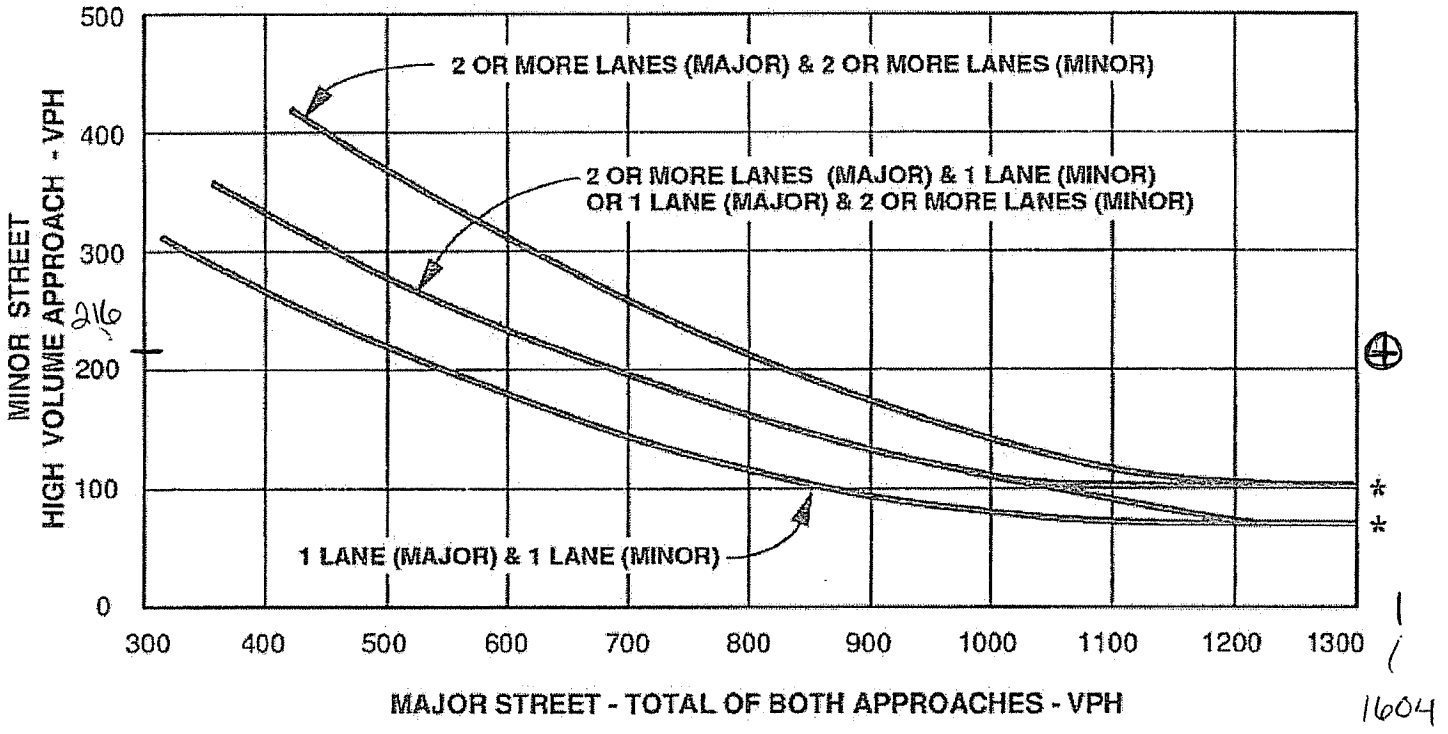
Intersection Summary			
Average Delay	8.2	HCM Level of Service	A
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

Houghton Rd + Project Entrance #3

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....	Minimum Requirements EADT				
CONDITION A - Minimum Vehicular Volume	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied ___X___ Not Satisfied _____	Urban	Rural	Urban	Rural
Number of lanes for moving traffic on each approach				
Major Street 1.....16040..... Minor Street 1.....2160.....	8,000	5,600	2,400	1,680
2 or More..... 1.....	9,600	6,720	2,400	1,680
2 or More..... 2 or More.....	9,600	6,720	3,200	2,240
1..... 2 or More.....	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied ___X___ Not Satisfied _____				
Number of lanes for moving traffic on each approach				
Major Street 1.....16040..... Minor Street 1.....2160.....	Urban	Rural	Urban	Rural
2 or More..... 1.....	12,000	8,400	1,200	850
2 or More..... 2 or More.....	14,400	10,080	1,200	850
1..... 2 or More.....	14,400	10,080	1,600	1,120
	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B	2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied _____ Not Satisfied _____				
No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____				

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd/ Buena Vista Blvd & South Union Ave - AM Peak
Count Date: 9/4/2008

Exist Peak Hour Volumes

AWS		
>	WBL	12
1	WBT	57
1	WBR	17
>	EBL	17
1	EBT	119
1	EBR	17
1	NBL	14
2	NBT	40
1	NBR	3
1	SBL	29
2	SBT	40
1	SBR	11
	TOTAL	376

Year 2035
Fut. Volumes w/o Proj

WBL	34
WBT	119
WBR	40
EBL	43
EBT	255
EBR	52
NBL	41
NBT	130
NBR	8
SBL	69
SBT	134
SBR	27
TOTAL	951

Year 2035 Fut. Vol
+ Project Traffic

WBL	34
WBT	156
WBR	52
EBL	143
EBT	258
EBR	58
NBL	62
NBT	138
NBR	8
SBL	77
SBT	148
SBR	108
TOTAL	1241

Year 2020
Fut. Volumes w/o Proj

WBL	22
WBT	84
WBR	27
EBL	28
EBT	179
EBR	32
NBL	26
NBT	80
NBR	5
SBL	46
SBT	81
SBR	18
TOTAL	629

Year 2020 Fut. Vol
+ Project Traffic

WBL	22
WBT	121
WBR	39
EBL	128
EBT	182
EBR	38
NBL	47
NBT	88
NBR	5
SBL	54
SBT	95
SBR	99
TOTAL	919

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	37	34	3
WBR	12	7	5
EBL	100	75	25
EBT	3	1	2
EBR	6	4	2
NBL	21	19	2
NBT	8	4	4
NBR	0	0	0
SBL	8	2	6
SBT	14	7	7
SBR	81	64	17
TOTAL	290	217	73

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Houghton Rd/ Buena Vista Blvd & South Union Ave - AM Peak						
	Count Date:	9/4/2008						
2008	ADT							
WB Approach (To)	1.50							
WB Approach (Away)	1.47							
EB Approach (To)	1.47							
EB Approach (Away)	1.47							
NB Approach (To)	0.78							
NB Approach (Away)	0.80							
SB Approach (To)	0.96							
SB Approach (Away)	0.96							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.0		WBL	2.99	WBT	2.08	WBR	2.38
WB Approach (Away)	2.9		3.94%	34	2.77%	119	3.23%	40
EB Approach (To)	3.4		EBL	2.54	EBT	2.15	EBR	3.15
EB Approach (Away)	3.2		3.52%	43	2.88%	255	4.23%	52
NB Approach (To)	3.0		NBL	3.00	NBT	3.30	NBR	2.91
NB Approach (Away)	3.2		4.04%	41	4.50%	130	3.86%	8
SB Approach (To)	2.7		SBL	2.39	SBT	3.40	SBR	2.49
SB Approach (Away)	2.7		3.26%	69	4.60%	134	3.43%	27
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	3.0		WBL	3.00	WBT	2.15	WBR	2.42
WB Approach (Away)	3.0		3.98%	34	2.88%	122	3.30%	41
EB Approach (To)	3.3		EBL	2.54	EBT	2.15	EBR	3.12
EB Approach (Away)	3.3		3.51%	43	2.88%	255	4.18%	51
NB Approach (To)	3.1		NBL	3.12	NBT	3.39	NBR	3.00
NB Approach (Away)	3.2		4.19%	42	4.60%	134	3.98%	9
SB Approach (To)	2.7		SBL	2.42	SBT	3.40	SBR	2.54
SB Approach (Away)	2.7		3.30%	69	4.61%	134	3.51%	28

Intersection has too many lanes per leg.

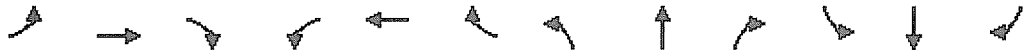
HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	17	119	17	12	57	17	14	40	3	29	40	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	129	18	13	62	18	15	43	3	32	43	12

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	148	18	75	18	15	43	3	32	43	12
Volume Left (vph)	18	0	13	0	15	0	0	32	0	0
Volume Right (vph)	0	18	0	18	0	0	3	0	0	12
Hadj (s)	0.06	-0.57	0.07	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	4.4	3.2	4.5	3.2	5.6	5.1	3.2	5.6	5.1	3.2
Degree Utilization, x	0.18	0.02	0.09	0.02	0.02	0.06	0.00	0.05	0.06	0.01
Capacity (veh/h)	790	1121	769	1121	607	664	1121	610	667	1121
Control Delay (s)	8.3	6.3	7.9	6.3	7.6	7.3	5.0	7.7	7.3	5.0
Approach Delay (s)	8.1		7.6		7.2			7.1		
Approach LOS	A		A		A			A		

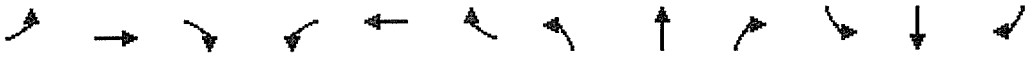
Intersection Summary				
Delay	7.7			
HCM Level of Service	A			
Intersection Capacity Utilization	28.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	28	179	32	22	84	27	26	80	5	46	81	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	195	35	24	91	29	28	87	5	50	88	20

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	225	35	115	29	28	87	5	50	88	20
Volume Left (vph)	30	0	24	0	28	0	0	50	0	0
Volume Right (vph)	0	35	0	29	0	0	5	0	0	20
Hadj (s)	0.06	-0.57	0.08	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	4.8	3.2	5.0	3.2	6.1	5.6	3.2	6.1	5.6	3.2
Degree Utilization, x	0.30	0.03	0.16	0.03	0.05	0.13	0.00	0.08	0.14	0.02
Capacity (veh/h)	716	1121	683	1121	555	602	1121	559	607	1121
Control Delay (s)	9.8	6.3	8.9	6.3	8.2	8.3	5.0	8.4	8.2	5.1
Approach Delay (s)	9.4		8.4		8.1			7.9		
Approach LOS	A		A		A			A		

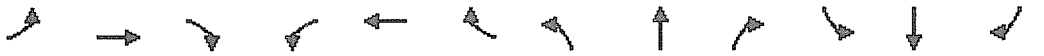
Intersection Summary			
Delay	8.6		
HCM Level of Service	A		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	128	182	38	22	121	39	47	88	5	54	95	99
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	198	41	24	132	42	51	96	5	59	103	108

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	337	41	155	42	51	96	5	59	103	108
Volume Left (vph)	139	0	24	0	51	0	0	59	0	0
Volume Right (vph)	0	41	0	42	0	0	5	0	0	108
Hadj (s)	0.12	-0.57	0.06	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	5.2	3.2	5.4	3.2	6.7	6.2	3.2	6.6	6.1	3.2
Degree Utilization, x	0.48	0.04	0.23	0.04	0.09	0.16	0.00	0.11	0.18	0.10
Capacity (veh/h)	672	1121	624	1121	499	537	1121	502	541	1121
Control Delay (s)	12.9	6.3	10.0	6.3	9.2	9.2	5.0	9.2	9.2	5.3
Approach Delay (s)	12.2		9.2		9.0			7.7		
Approach LOS	B		A		A			A		

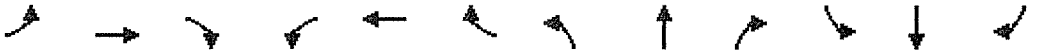
Intersection Summary			
Delay	9.9		
HCM Level of Service	A		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	43	255	52	34	119	40	41	130	8	69	134	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	277	57	37	129	43	45	141	9	75	146	29

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	324	57	166	43	45	141	9	75	146	29
Volume Left (vph)	47	0	37	0	45	0	0	75	0	0
Volume Right (vph)	0	57	0	43	0	0	9	0	0	29
Hadj (s)	0.06	-0.57	0.08	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	5.4	3.2	5.7	3.2	6.8	6.3	3.2	6.8	6.3	3.2
Degree Utilization, x	0.49	0.05	0.26	0.04	0.08	0.25	0.01	0.14	0.25	0.03
Capacity (veh/h)	623	1121	571	1121	486	524	1121	494	532	1121
Control Delay (s)	13.5	6.4	10.8	6.3	9.3	10.2	5.0	9.7	10.2	5.1
Approach Delay (s)	12.5		9.8		9.8			9.4		
Approach LOS	B		A		A			A		

Intersection Summary			
Delay	10.7		
HCM Level of Service	B		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	143	258	58	34	156	52	62	138	8	77	148	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	155	280	63	37	170	57	67	150	9	84	161	117

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	436	63	207	57	67	150	9	84	161	117
Volume Left (vph)	155	0	37	0	67	0	0	84	0	0
Volume Right (vph)	0	63	0	57	0	0	9	0	0	117
Hadj (s)	0.11	-0.57	0.07	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	5.9	3.2	6.3	3.2	7.6	7.1	3.2	7.5	7.0	3.2
Degree Utilization, x	0.71	0.06	0.36	0.05	0.14	0.30	0.01	0.18	0.31	0.10
Capacity (veh/h)	589	1121	517	1121	424	453	1121	430	470	1121
Control Delay (s)	22.2	6.4	12.9	6.4	10.7	11.8	5.0	10.9	12.0	5.4
Approach Delay (s)	20.2		11.5		11.2			9.6		
Approach LOS	C		B		B			A		

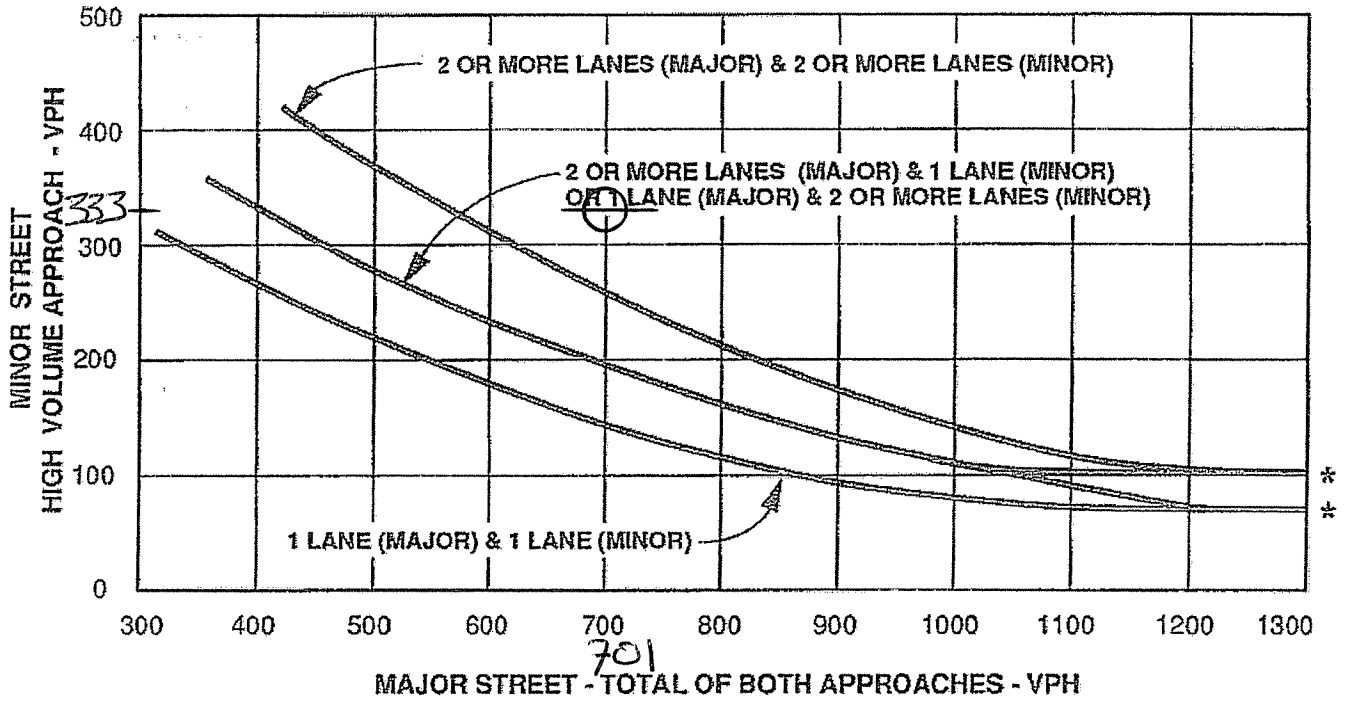
Intersection Summary				
Delay	14.2			
HCM Level of Service	B			
Intersection Capacity Utilization	56.4%	ICU Level of Service	B	
Analysis Period (min)	15			

Manual on Uniform Traffic Control Devices
2003 Edition with Revision No. 1 Incorporated, dated November 2004

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h OR ABOVE 40 mph ON MAJOR STREET)

HOUGHTON/BUENAVISTA BLVD + SOUTH UNION AVE
2035 WITH PROJECT - AM PEAK



* 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 APPROACHING WITH ONE LANE.

WARRANT SATISFIED

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Houghton Rd/ Buena Vista Blvd & South Union Ave - PM Peak
Count Date: 9/4/2008

Exist Peak Hour Volumes

AWS		
>	WBL	7
1	WBT	100
1	WBR	34
>	EBL	17
1	EBT	88
1	EBR	9
1	NBL	12
2	NBT	109
1	NBR	13
1	SBL	30
2	SBT	66
1	SBR	15
	TOTAL	500

Year 2035
Fut. Volumes w/o Proj

WBL	18
WBT	240
WBR	70
EBL	40
EBT	218
EBR	26
NBL	33
NBT	256
NBR	32
SBL	62
SBT	159
SBR	34
TOTAL	1188

Year 2035 Fut. Vol
+ Project Traffic

WBL	18
WBT	342
WBR	80
EBL	227
EBT	237
EBR	35
NBL	47
NBT	269
NBR	32
SBL	110
SBT	198
SBR	511
TOTAL	2106

Year 2020
Fut. Volumes w/o Proj

WBL	12
WBT	162
WBR	50
EBL	27
EBT	145
EBR	16
NBL	21
NBT	174
NBR	21
SBL	44
SBT	107
SBR	24
TOTAL	803

Year 2020 Fut. Vol
+ Project Traffic

WBL	12
WBT	264
WBR	60
EBL	214
EBT	164
EBR	25
NBL	35
NBT	187
NBR	21
SBL	92
SBT	146
SBR	501
TOTAL	1721

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	102	50	52
WBR	10	0	10
EBL	187	75	112
EBT	19	9	10
EBR	9	2	7
NBL	14	10	4
NBT	13	5	8
NBR	0	0	0
SBL	48	24	24
SBT	39	18	21
SBR	477	401	76
TOTAL	918	594	324

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Houghton Rd/ Buena Vista Blvd & South Union Ave - PM Peak					
	Count Date:	9/4/2008					
2008	ADT						
WB Approach (To)	1.37						
WB Approach (Away)	1.35						
EB Approach (To)	1.20						
EB Approach (Away)	1.21						
NB Approach (To)	1.07						
NB Approach (Away)	1.09						
SB Approach (To)	1.36						
SB Approach (Away)	1.35						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	3.0		WBL	2.55	WBT	2.41	WBR 2.07
WB Approach (Away)	2.9		3.51%	18	3.31%	240	2.75% 70
EB Approach (To)	3.4		EBL	2.40	EBT	2.50	EBR 2.88
EB Approach (Away)	3.2		3.26%	40	3.44%	218	4.02% 26
NB Approach (To)	3.0		NBL	2.72	NBT	2.38	NBR 2.48
NB Approach (Away)	3.2		3.80%	33	3.23%	256	3.41% 32
SB Approach (To)	2.7		SBL	2.07	SBT	2.45	SBR 2.31
SB Approach (Away)	2.7		2.75%	62	3.33%	159	3.14% 34
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	3.0		WBL	2.57	WBT	2.49	WBR 2.11
WB Approach (Away)	3.0		3.55%	18	3.43%	247	2.82% 72
EB Approach (To)	3.3		EBL	2.38	EBT	2.49	EBR 2.84
EB Approach (Away)	3.3		3.24%	40	3.44%	218	3.97% 26
NB Approach (To)	3.1		NBL	2.83	NBT	2.45	NBR 2.55
NB Approach (Away)	3.2		3.94%	34	3.33%	262	3.52% 33
SB Approach (To)	2.7		SBL	2.10	SBT	2.45	SBR 2.37
SB Approach (Away)	2.7		2.80%	63	3.33%	159	3.22% 35

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.
Channelized right turn lanes are not counted.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	17	88	9	7	100	34	12	109	13	30	66	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	96	10	8	109	37	13	118	14	33	72	16

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	114	10	116	37	13	118	14	33	72	16
Volume Left (vph)	18	0	8	0	13	0	0	33	0	0
Volume Right (vph)	0	10	0	37	0	0	14	0	0	16
Hadj (s)	0.11	-0.67	0.07	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	5.4	4.6	5.3	4.6	5.8	5.3	3.2	5.9	5.4	3.2
Degree Utilization, x	0.17	0.01	0.17	0.05	0.02	0.18	0.01	0.05	0.11	0.01
Capacity (veh/h)	638	737	644	743	585	640	1121	582	634	1121
Control Delay (s)	8.3	6.5	8.2	6.6	7.8	8.3	5.0	8.0	7.8	5.0
Approach Delay (s)	8.2		7.8		7.9			7.5		
Approach LOS	A		A		A			A		

Intersection Summary				
Delay	7.9			
HCM Level of Service	A			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	145	16	12	162	50	21	174	21	44	107	24
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	158	17	13	176	54	23	189	23	48	116	26

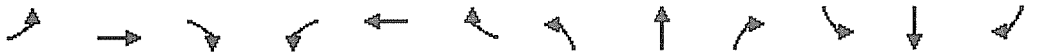
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	187	17	189	54	23	189	23	48	116	26
Volume Left (vph)	29	0	13	0	23	0	0	48	0	0
Volume Right (vph)	0	17	0	54	0	0	23	0	0	26
Hadj (s)	0.11	-0.67	0.07	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	6.0	5.2	5.9	5.2	6.5	6.0	3.2	6.6	6.1	3.2
Degree Utilization, x	0.31	0.03	0.31	0.08	0.04	0.31	0.02	0.09	0.20	0.02
Capacity (veh/h)	570	644	577	652	523	568	1121	515	556	1121
Control Delay (s)	10.5	7.2	10.4	7.4	8.6	10.5	5.1	9.0	9.3	5.1
Approach Delay (s)	10.2		9.7		9.8			8.7		
Approach LOS	B		A		A			A		

Intersection Summary			
Delay	9.6		
HCM Level of Service	A		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	214	164	25	12	264	60	35	187	21	92	146	501
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	233	178	27	13	287	65	38	203	23	100	159	545

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	411	27	300	65	38	203	23	100	159	545
Volume Left (vph)	233	0	13	0	38	0	0	100	0	0
Volume Right (vph)	0	27	0	65	0	0	23	0	0	545
Hadj (s)	0.32	-0.67	0.06	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	7.2	6.2	7.1	6.4	8.1	7.6	3.2	8.0	7.5	3.2
Degree Utilization, x	0.82	0.05	0.59	0.12	0.09	0.43	0.02	0.22	0.33	0.48
Capacity (veh/h)	493	557	491	536	418	438	1121	410	436	1116
Control Delay (s)	33.6	8.3	18.6	9.0	10.6	14.9	5.1	12.1	13.0	8.0
Approach Delay (s)	32.0		16.8		13.4			9.5		
Approach LOS	D		C		B			A		

Intersection Summary				
Delay	16.8			
HCM Level of Service	C			
Intersection Capacity Utilization	63.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	40	218	26	18	240	70	33	256	32	62	159	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	237	28	20	261	76	36	278	35	67	173	37

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	280	28	280	76	36	278	35	67	173	37
Volume Left (vph)	43	0	20	0	36	0	0	67	0	0
Volume Right (vph)	0	28	0	76	0	0	35	0	0	37
Hadj (s)	0.11	-0.67	0.07	-0.67	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	7.0	6.2	6.9	6.2	7.5	7.0	3.2	7.7	7.2	3.2
Degree Utilization, x	0.55	0.05	0.54	0.13	0.07	0.54	0.03	0.14	0.34	0.03
Capacity (veh/h)	487	541	498	548	453	483	1121	439	471	1121
Control Delay (s)	17.0	8.4	16.5	8.9	9.9	16.8	5.1	10.8	12.7	5.1
Approach Delay (s)	16.2		14.9		14.9			11.2		
Approach LOS	C		B		B			B		

Intersection Summary				
Delay	14.4			
HCM Level of Service	B			
Intersection Capacity Utilization	57.6%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	227	237	35	18	342	80	47	269	32	110	198	511
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	247	258	38	20	372	87	51	292	35	120	215	555

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	504	38	391	87	51	292	35	120	215	555
Volume Left (vph)	247	0	20	0	51	0	0	120	0	0
Volume Right (vph)	0	38	0	87	0	0	35	0	0	555
Hadj (s)	0.13	-0.57	0.04	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	8.0	3.2	8.0	3.2	9.2	8.7	3.2	9.4	8.9	3.2
Degree Utilization, x	1.12	0.03	0.87	0.08	0.13	0.71	0.03	0.31	0.53	0.49
Capacity (veh/h)	452	1121	435	1121	377	397	1121	360	383	1116
Control Delay (s)	107.3	6.3	44.8	6.5	12.4	29.3	5.1	15.4	20.3	8.1
Approach Delay (s)	100.2		37.8		24.8			12.0		
Approach LOS	F		E		C			B		

Intersection Summary			
Delay	40.4		
HCM Level of Service	E		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	227	237	35	18	342	80	47	269	32	110	198	511
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	247	258	38	20	372	87	51	292	35	120	215	555

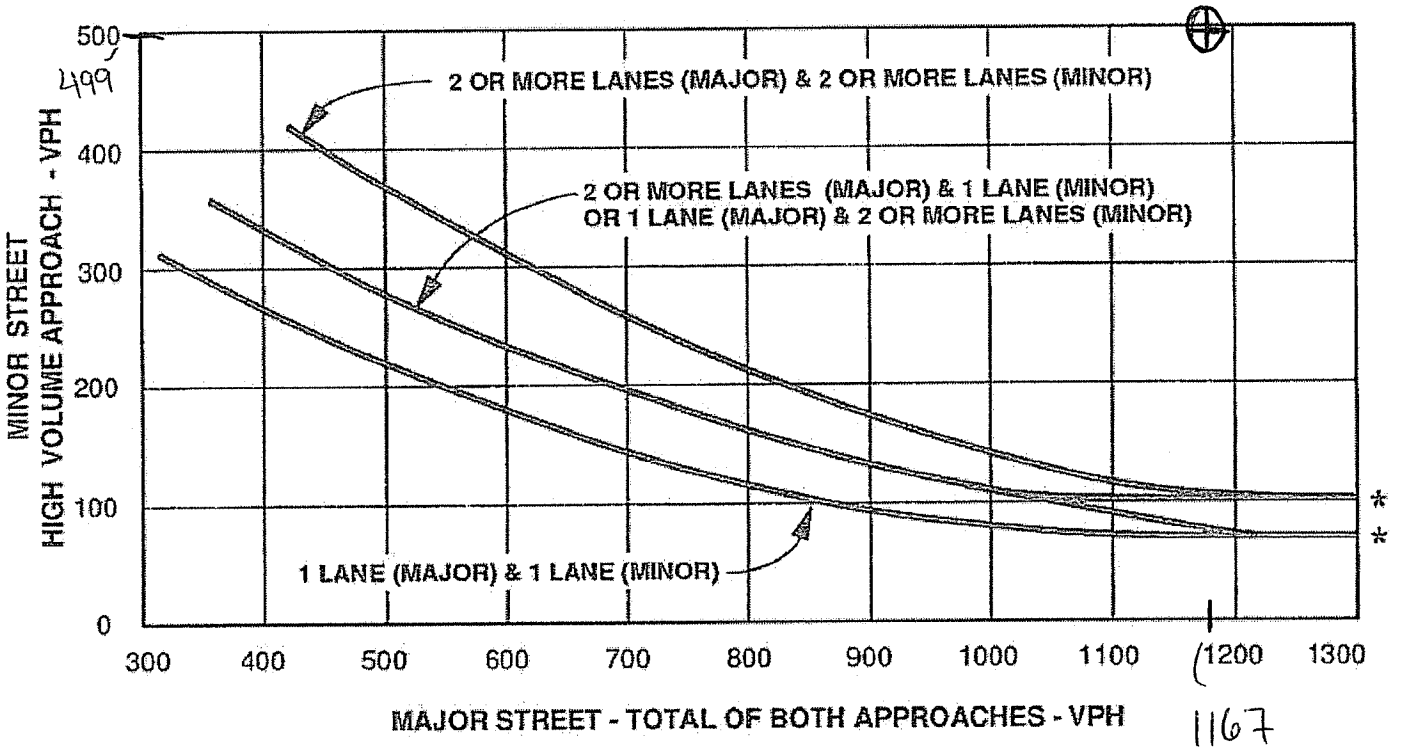
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total (vph)	247	258	38	391	87	51	292	35	120	215	555
Volume Left (vph)	247	0	0	20	0	51	0	0	120	0	0
Volume Right (vph)	0	0	38	0	87	0	0	35	0	0	555
Hadj (s)	0.53	0.03	-0.67	0.04	-0.57	0.53	0.03	-0.67	0.53	0.03	-0.67
Departure Headway (s)	8.8	8.3	3.2	8.2	3.2	9.2	8.7	3.2	9.3	8.8	3.2
Degree Utilization, x	0.61	0.60	0.03	0.89	0.08	0.13	0.71	0.03	0.31	0.53	0.49
Capacity (veh/h)	392	414	1121	428	1121	373	397	1121	359	383	1116
Control Delay (s)	23.3	21.6	5.1	48.3	6.5	12.4	28.7	5.1	15.2	20.0	8.1
Approach Delay (s)	21.2			40.7		24.4			11.9		
Approach LOS	C			E		C			B		

Intersection Summary			
Delay	22.2		
HCM Level of Service	C		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

Houghton Rd/Buena Vista Blvd & South Union Ave
2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL...X...

CONDITION A - Minimum Vehicular Volume

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...11670...	2 or More...4990...
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied ___X___ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...11670...	2 or More...4990...
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... A _____ B _____

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Buena Vista Blvd & Cottonwood Rd - AM Peak
Count Date: 9/9/2008

Exist Peak Hour Volumes

U		
0	WBL	0
1	WBT	73
<	WBR	10
>	EBL	6
1	EBT	164
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
>	SBL	10
0	SBT	0
<	SBR	5
	TOTAL	268

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	137
WBR	12
EBL	7
EBT	311
EBR	0
NBL	0
NBT	0
NBR	0
SBL	12
SBT	0
SBR	6
TOTAL	486

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	171
WBR	12
EBL	9
EBT	319
EBR	0
NBL	0
NBT	0
NBR	0
SBL	13
SBT	0
SBR	21
TOTAL	546

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	101
WBR	11
EBL	7
EBT	229
EBR	0
NBL	0
NBT	0
NBR	0
SBL	11
SBT	0
SBR	5
TOTAL	364

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	135
WBR	11
EBL	9
EBT	237
EBR	0
NBL	0
NBT	0
NBR	0
SBL	12
SBT	0
SBR	20
TOTAL	424

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	34	28	6
WBR	0	0	0
EBL	2	1	1
EBT	8	2	6
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	1	0	1
SBT	0	0	0
SBR	15	13	2
TOTAL	60	44	16

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Buena Vista Blvd & Cottonwood Rd - AM Peak						
	Count Date:	9/9/2008						
2008	ADT							
WB Approach (To)	1.62							
WB Approach (Away)	1.60							
EB Approach (To)	1.53							
EB Approach (Away)	1.57							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	0.21							
SB Approach (Away)	0.18							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.0		WBL	1.84	WBT	1.88	WBR	1.34
WB Approach (Away)	3.0		2.29%	0	2.38%	137	0.78%	12
EB Approach (To)	2.9		EBL	1.36	EBT	1.90	EBR	1.85
EB Approach (Away)	3.0		0.82%	7	2.42%	311	2.33%	0
NB Approach (To)	*1.8*		NBL	1.84	NBT	1.30	NBR	1.84
NB Approach (Away)	*1.8*		2.30%	0	0.71%	0	2.30%	0
SB Approach (To)	0.2		SBL	1.32	SBT	1.28	SBR	1.32
SB Approach (Away)	0.1		0.68%	12	0.59%	0	0.68%	6
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	3.1		WBL	1.86	WBT	1.93	WBR	1.36
WB Approach (Away)	3.1		2.34%	0	2.48%	141	0.80%	12
EB Approach (To)	3.0		EBL	1.37	EBT	1.93	EBR	1.87
EB Approach (Away)	3.0		0.81%	7	2.49%	317	2.36%	0
NB Approach (To)	*1.8*		NBL	1.87	NBT	1.29	NBR	1.86
NB Approach (Away)	*1.8*		2.35%	0	0.67%	0	2.34%	0
SB Approach (To)	0.2		SBL	1.36	SBT	1.30	SBR	1.37
SB Approach (Away)	0.1		0.83%	12	0.70%	0	0.84%	6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	6	164	73	10	10	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	178	79	11	11	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	90				276	85
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90				276	85
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	99
cM capacity (veh/h)	1505				710	974

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	185	90	16
Volume Left	7	0	11
Volume Right	0	11	5
cSH	1505	1700	781
Volume to Capacity	0.00	0.05	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.3	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	0.7	HCM Level of Service	A
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	7	229	101	11	11	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	249	110	12	12	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	122				380	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				380	116
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	99
cM capacity (veh/h)	1466				619	937

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	257	122	17
Volume Left	8	0	12
Volume Right	0	12	5
cSH	1466	1700	692
Volume to Capacity	0.01	0.07	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.3	0.0	10.3
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	10.3
Approach LOS			B

Intersection Summary			
Average Delay	0.6	HCM Level of Service	A
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	237	135	11	12	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	258	147	12	13	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	159				430	153
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	159				430	153
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	98
cM capacity (veh/h)	1421				578	893

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	267	159	35
Volume Left	10	0	13
Volume Right	0	12	22
cSH	1421	1700	742
Volume to Capacity	0.01	0.09	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.3	0.0	10.1
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.0	HCM Level of Service	A
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	7	311	137	12	12	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	338	149	13	13	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	162				509	155
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	162				509	155
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1417				521	890

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	346	162	20
Volume Left	8	0	13
Volume Right	0	13	7
cSH	1417	1700	605
Volume to Capacity	0.01	0.10	0.03
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.2	0.0	11.1
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	11.1
Approach LOS			B

Intersection Summary			
Average Delay	0.6	HCM Level of Service	A
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	319	171	12	13	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	347	186	13	14	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	199				559	192
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	199				559	192
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	97
cM capacity (veh/h)	1373				487	849

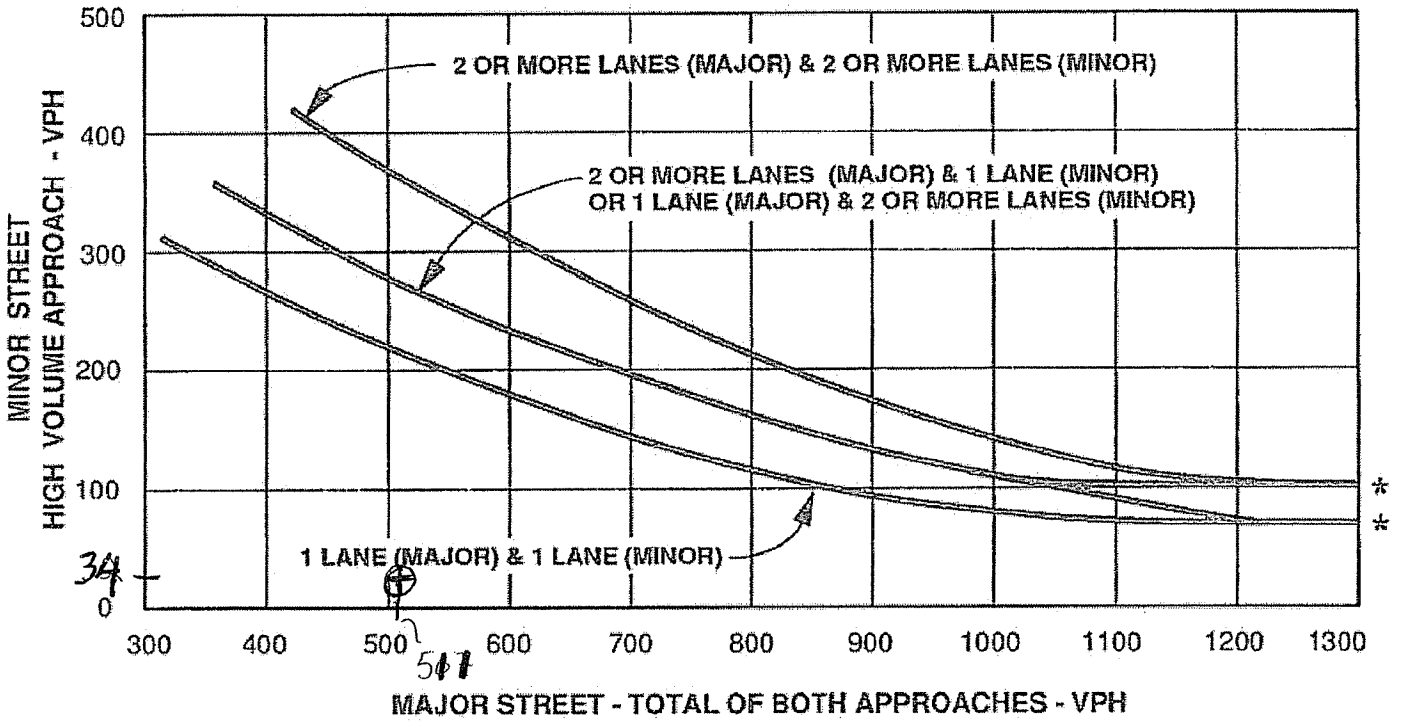
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	357	199	37
Volume Left	10	0	14
Volume Right	0	13	23
cSH	1373	1700	661
Volume to Capacity	0.01	0.12	0.06
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.3	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	0.8	HCM Level of Service	A
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Buena Vista Blvd & Cottonwood Rd
2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Buena Vista Blvd & Cottonwood Rd - PM Peak
Count Date: 9/9/2008

Exist Peak Hour Volumes

U		
0	WBL	0
1	WBT	121
<	WBR	25
>	EBL	9
1	EBT	127
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
>	SBL	16
0	SBT	0
<	SBR	10
TOTAL		308

Year 2035 Fut. Volumes w/o Proj

WBL	0
WBT	259
WBR	24
EBL	9
EBT	273
EBR	0
NBL	0
NBT	0
NBR	0
SBL	18
SBT	0
SBR	12
TOTAL	595

Year 2035 Fut. Vol + Project Traffic

WBL	0
WBT	363
WBR	24
EBL	27
EBT	319
EBR	0
NBL	0
NBT	0
NBR	0
SBL	27
SBT	0
SBR	16
TOTAL	776

Year 2020 Fut. Volumes w/o Proj

WBL	0
WBT	182
WBR	25
EBL	9
EBT	191
EBR	0
NBL	0
NBT	0
NBR	0
SBL	17
SBT	0
SBR	11
TOTAL	434

Year 2020 Fut. Vol + Project Traffic

WBL	0
WBT	286
WBR	25
EBL	27
EBT	237
EBR	0
NBL	0
NBT	0
NBR	0
SBL	26
SBT	0
SBR	15
TOTAL	615

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	104	48	56
WBR	0	0	0
EBL	18	8	10
EBT	46	23	23
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	9	7	2
SBT	0	0	0
SBR	4	1	3
TOTAL	181	87	94

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Buena Vista Blvd & Cottonwood Rd - PM Peak						
	Count Date:	9/9/2008						
2008	ADT							
WB Approach (To)	1.45							
WB Approach (Away)	1.44							
EB Approach (To)	1.32							
EB Approach (Away)	1.35							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	0.26							
SB Approach (Away)	0.34							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	3.0		WBL	1.55	WBT	2.14	WBR	1.26
WB Approach (Away)	3.0		1.40%	0	2.88%	259	-0.17%	24
EB Approach (To)	2.9		EBL	1.32	EBT	2.15	EBR	1.61
EB Approach (Away)	3.0		-0.06%	9	2.90%	273	1.50%	0
NB Approach (To)	*1*		NBL	1.59	NBT	0.71	NBR	1.55
NB Approach (Away)	*1*		1.48%	0	-1.56%	0	1.40%	0
SB Approach (To)	0.2		SBL	1.35	SBT	0.81	SBR	1.40
SB Approach (Away)	0.1		0.49%	18	-0.91%	0	0.57%	12
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	3.1		WBL	1.58	WBT	2.20	WBR	1.28
WB Approach (Away)	3.1		1.45%	0	2.98%	266	-0.15%	24
EB Approach (To)	3.0		EBL	1.33	EBT	2.20	EBR	1.63
EB Approach (Away)	3.0		-0.06%	9	2.97%	279	1.54%	0
NB Approach (To)	*1*		NBL	1.63	NBT	0.71	NBR	1.57
NB Approach (Away)	*1*		1.54%	0	-1.60%	0	1.44%	0
SB Approach (To)	0.2		SBL	1.39	SBT	0.83	SBR	1.45
SB Approach (Away)	0.1		0.64%	19	-0.80%	0	0.74%	12

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	127	121	25	16	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	138	132	27	17	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	159				303	145
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	159				303	145
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1421				684	902

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	148	159	28
Volume Left	10	0	17
Volume Right	0	27	11
cSH	1421	1700	754
Volume to Capacity	0.01	0.09	0.04
Queue Length 95th (ft)	1	0	3
Control Delay (s)	0.6	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	1.1	HCM Level of Service	A
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	191	182	25	17	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	208	198	27	18	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	225				439	211
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	225				439	211
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	99
cM capacity (veh/h)	1344				571	829

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	217	225	30
Volume Left	10	0	18
Volume Right	0	27	12
cSH	1344	1700	651
Volume to Capacity	0.01	0.13	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	10.8
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.8
Approach LOS			B

Intersection Summary			
Average Delay	0.9	HCM Level of Service	A
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	27	237	286	25	26	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	258	311	27	28	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	338				641	324
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	338				641	324
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				93	98
cM capacity (veh/h)	1221				429	717

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	287	338	45
Volume Left	29	0	28
Volume Right	0	27	16
cSH	1221	1700	503
Volume to Capacity	0.02	0.20	0.09
Queue Length 95th (ft)	2	0	7
Control Delay (s)	1.0	0.0	12.9
Lane LOS	A		B
Approach Delay (s)	1.0	0.0	12.9
Approach LOS			B

Intersection Summary			
Average Delay	1.3	HCM Level of Service	A
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	273	259	24	18	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	297	282	26	20	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	308				611	295
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	308				611	295
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				96	98
cM capacity (veh/h)	1253				454	745

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	307	308	33
Volume Left	10	0	20
Volume Right	0	26	13
cSH	1253	1700	538
Volume to Capacity	0.01	0.18	0.06
Queue Length 95th (ft)	1	0	5
Control Delay (s)	0.3	0.0	12.1
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	12.1
Approach LOS			B

Intersection Summary			
Average Delay	0.8	HCM Level of Service	A
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	27	319	363	24	27	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	347	395	26	29	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	421				813	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	421				813	408
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				91	97
cM capacity (veh/h)	1138				339	644

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	376	421	47
Volume Left	29	0	29
Volume Right	0	26	17
cSH	1138	1700	411
Volume to Capacity	0.03	0.25	0.11
Queue Length 95th (ft)	2	0	10
Control Delay (s)	0.9	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	0.9	0.0	14.9
Approach LOS			B

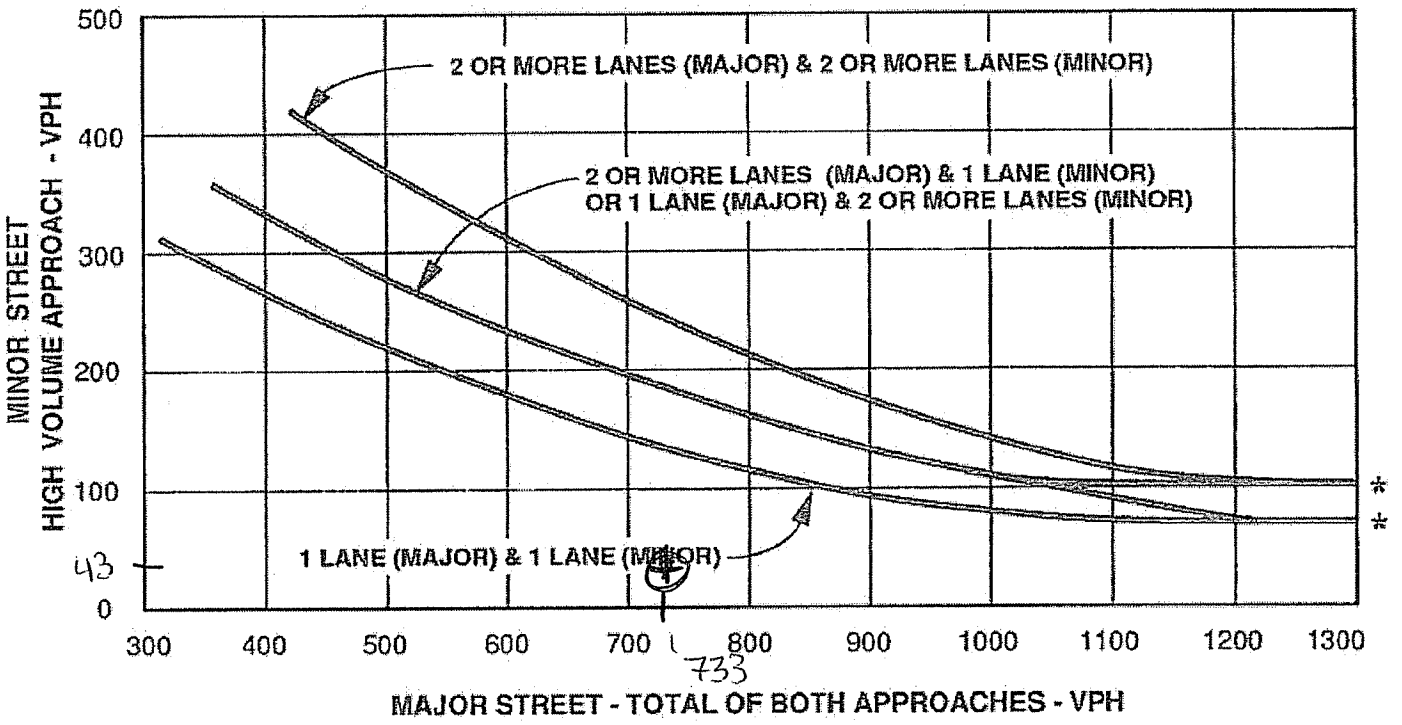
Intersection Summary			
Average Delay	1.2	HCM Level of Service	A
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Buena Vista Blvd & Cottonwood Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..7330..	1..430..
2 or More..	1..
2 or More..	2 or More..
1..	2 or More..

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1..7330..	1..430..
2 or More..	1..
2 or More..	2 or More..
1..	2 or More..

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied __X__

No one condition satisfied, but following conditions fulfilled 80% or more..... 26% (A) 51% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Buena Vista Blvd & Adobe Rd - AM Peak
Count Date: 10/8/2008

Exist Peak Hour Volumes

U		
>	WBL	6
1	WBT	72
1	WBR	0
>	EBL	0
1	EBT	156
1	EBR	6
>	NBL	10
1	NBT	0
<	NBR	9
>	SBL	0
1	SBT	0
<	SBR	0
	TOTAL	259

Year 2035
Fut. Volumes w/o Proj

WBL	26
WBT	143
WBR	0
EBL	0
EBT	312
EBR	26
NBL	44
NBT	0
NBR	40
SBL	2
SBT	0
SBR	4
TOTAL	597

Year 2035 Fut. Vol
+ Project Traffic

WBL	26
WBT	167
WBR	0
EBL	5
EBT	317
EBR	27
NBL	46
NBT	0
NBR	40
SBL	3
SBT	0
SBR	11
TOTAL	642

Year 2020
Fut. Volumes w/o Proj

WBL	15
WBT	103
WBR	0
EBL	0
EBT	224
EBR	15
NBL	25
NBT	0
NBR	22
SBL	1
SBT	0
SBR	2
TOTAL	407

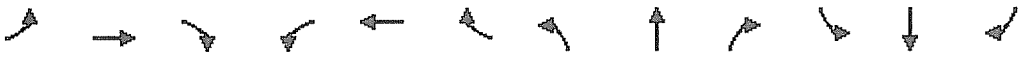
Year 2020 Fut. Vol
+ Project Traffic

WBL	15
WBT	127
WBR	0
EBL	5
EBT	229
EBR	16
NBL	27
NBT	0
NBR	22
SBL	2
SBT	0
SBR	9
TOTAL	452

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	24	22	2
WBR	0	0	0
EBL	5	0	5
EBT	5	2	3
EBR	1	0	1
NBL	2	2	0
NBT	0	0	0
NBR	0	0	0
SBL	1	0	1
SBT	0	0	0
SBR	7	4	3
TOTAL	45	30	15

	Project:	99 Houghton, LLC					
	Job No:	06-012					
	Intersection:	Buena Vista Blvd & Adobe Rd - AM Peak					
	Count Date:	10/8/2008					
2008	ADT						
WB Approach (To)	1.53						
WB Approach (Away)	1.51						
EB Approach (To)	1.52						
EB Approach (Away)	1.53						
NB Approach (To)	0.19						
NB Approach (Away)	0.19						
SB Approach (To)	0.02						
SB Approach (Away)	0.02						
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS
WB Approach (To)	3.0		WBL	5.73	WBT	1.99	WBR 3.23
WB Approach (Away)	3.0		5.69%	26	2.61%	143	4.18% 0
EB Approach (To)	3.0		EBL	3.23	EBT	2.00	EBR 5.73
EB Approach (Away)	3.0		4.18%	0	2.62%	312	5.69% 26
NB Approach (To)	*1.8*		NBL	5.73	NBT	6.97	NBR 5.74
NB Approach (Away)	*1.8*		5.69%	44	7.27%	0	5.70% 40
SB Approach (To)	0.1		SBL	3.09	SBT	6.82	SBR 3.08
SB Approach (Away)	0.1		4.06%	0	7.13%	0	4.04% 0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS
WB Approach (To)	3.1		WBL	5.77	WBT	2.05	WBR 4.44
WB Approach (Away)	3.1		5.75%	27	2.72%	148	5.09% 0
EB Approach (To)	3.1		EBL	4.43	EBT	2.04	EBR 5.75
EB Approach (Away)	3.1		5.07%	0	2.70%	318	5.73% 27
NB Approach (To)	*1.8*		NBL	5.76	NBT	8.15	NBR 5.76
NB Approach (Away)	*1.8*		5.74%	45	8.11%	0	5.74% 40
SB Approach (To)	0.1		SBL	3.77	SBT	7.49	SBR 3.77
SB Approach (Away)	0.1		4.65%	0	7.68%	0	4.65% 0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	156	6	6	72	0	10	0	9	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	170	7	7	78	0	11	0	10	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	78			176			261	261	170	271	267	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	78			176			261	261	170	271	267	78
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1520			1400			690	641	874	672	636	982

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	170	7	85	0	21	0
Volume Left	0	0	7	0	11	0
Volume Right	0	7	0	0	10	0
cSH	1520	1700	1400	1700	766	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	0	0	2	0
Control Delay (s)	0.0	0.0	0.6	0.0	9.8	0.0
Lane LOS			A		A	A
Approach Delay (s)	0.0		0.6		9.8	0.0
Approach LOS					A	A

Intersection Summary			
Average Delay	0.9	HCM Level of Service	A
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	224	15	15	103	0	25	0	22	1	0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	243	16	16	112	0	27	0	24	1	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	112			260			390	388	243	412	404	112
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	112			260			390	388	243	412	404	112
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			95	100	97	100	100	100
cM capacity (veh/h)	1478			1305			562	540	795	529	529	941

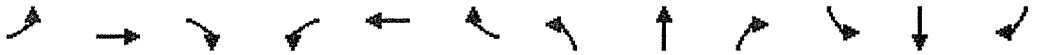
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	243	16	128	0	51	3
Volume Left	0	0	16	0	27	1
Volume Right	0	16	0	0	24	2
cSH	1478	1700	1305	1700	652	747
Volume to Capacity	0.00	0.01	0.01	0.00	0.08	0.00
Queue Length 95th (ft)	0	0	1	0	6	0
Control Delay (s)	0.0	0.0	1.1	0.0	11.0	9.8
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.1		11.0	9.8
Approach LOS					B	A

Intersection Summary			
Average Delay	1.7	HCM Level of Service	A
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	229	16	15	127	0	27	0	22	2	0	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	249	17	16	138	0	29	0	24	2	0	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	138			266			440	430	249	454	448	138
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	138			266			440	430	249	454	448	138
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			94	100	97	100	100	99
cM capacity (veh/h)	1446			1298			515	509	790	494	498	910

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	254	17	154	0	53	12
Volume Left	5	0	16	0	29	2
Volume Right	0	17	0	0	24	10
cSH	1446	1700	1298	1700	610	789
Volume to Capacity	0.00	0.01	0.01	0.00	0.09	0.02
Queue Length 95th (ft)	0	0	1	0	7	1
Control Delay (s)	0.2	0.0	0.9	0.0	11.5	9.6
Lane LOS	A		A		B	A
Approach Delay (s)	0.2		0.9		11.5	9.6
Approach LOS					B	A

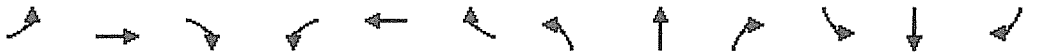
Intersection Summary			
Average Delay	1.9	HCM Level of Service	A
Intersection Capacity Utilization	32.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	312	26	26	143	0	44	0	40	2	0	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	339	28	28	155	0	48	0	43	2	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	155			367			555	551	339	595	579	155
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	155			367			555	551	339	595	579	155
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			89	100	94	99	100	100
cM capacity (veh/h)	1425			1191			432	432	703	383	416	890

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	339	28	184	0	91	7
Volume Left	0	0	28	0	48	2
Volume Right	0	28	0	0	43	4
cSH	1425	1700	1191	1700	529	618
Volume to Capacity	0.00	0.02	0.02	0.00	0.17	0.01
Queue Length 95th (ft)	0	0	2	0	15	1
Control Delay (s)	0.0	0.0	1.4	0.0	13.2	10.9
Lane LOS			A		B	B
Approach Delay (s)	0.0		1.4		13.2	10.9
Approach LOS					B	B

Intersection Summary			
Average Delay	2.4	HCM Level of Service	A
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	317	27	26	167	0	46	0	40	3	0	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	345	29	28	182	0	50	0	43	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	182			374			605	593	345	637	623	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	182			374			605	593	345	637	623	182
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			87	100	94	99	100	99
cM capacity (veh/h)	1394			1185			395	407	698	358	391	861

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	350	29	210	0	93	15
Volume Left	5	0	28	0	50	3
Volume Right	0	29	0	0	43	12
cSH	1394	1700	1185	1700	495	662
Volume to Capacity	0.00	0.02	0.02	0.00	0.19	0.02
Queue Length 95th (ft)	0	0	2	0	17	2
Control Delay (s)	0.2	0.0	1.3	0.0	14.0	10.6
Lane LOS	A		A		B	B
Approach Delay (s)	0.1		1.3		14.0	10.6
Approach LOS					B	B

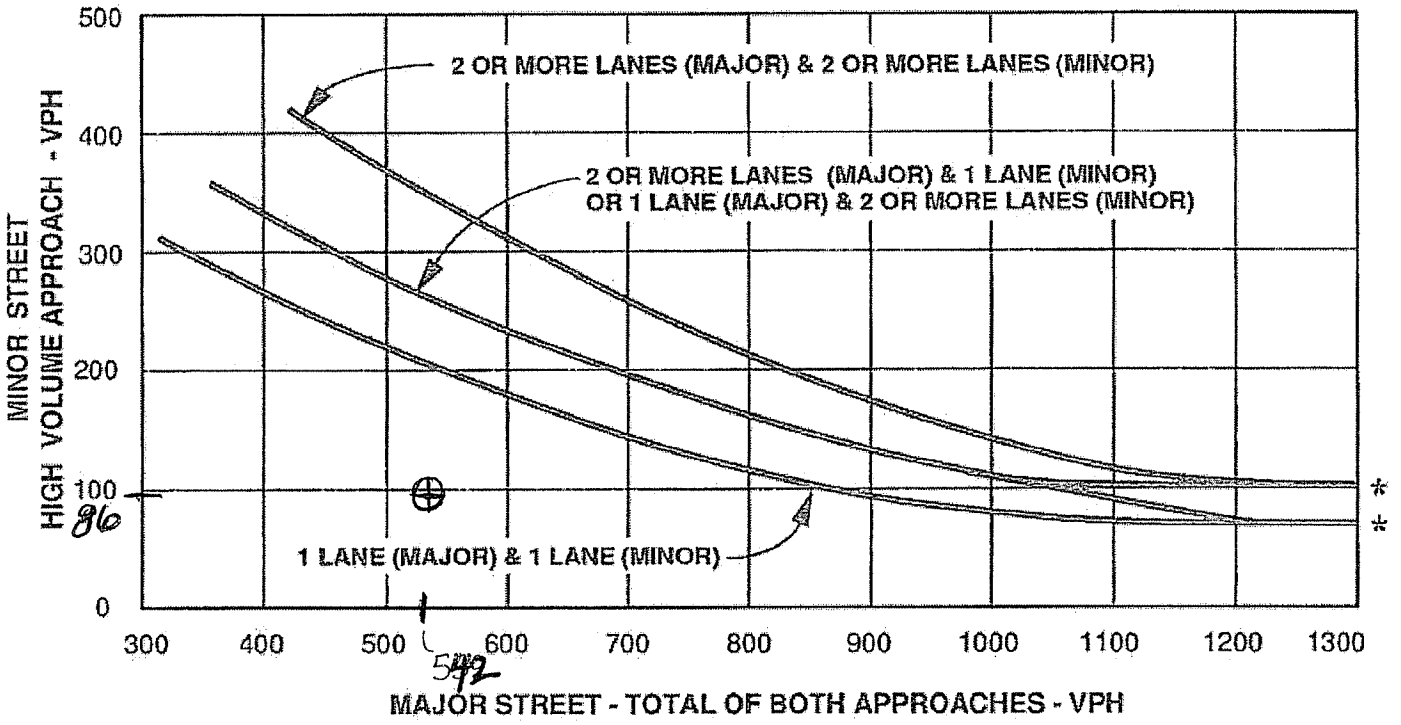
Intersection Summary			
Average Delay	2.6	HCM Level of Service	A
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

Buena Vista Blvd + Adobe Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Buena Vista Blvd & Adobe Rd - PM Peak
Count Date: 10/8/2008

Exist Peak Hour Volumes

U		
>	WBL	6
1	WBT	119
1	WBR	0
>	EBL	0
1	EBT	139
1	EBR	6
>	NBL	34
1	NBT	0
<	NBR	47
>	SBL	0
1	SBT	0
<	SBR	0
TOTAL		351

Year 2035
Fut. Volumes w/o Proj

WBL	16
WBT	236
WBR	0
EBL	0
EBT	279
EBR	17
NBL	95
NBT	0
NBR	129
SBL	0
SBT	0
SBR	0
TOTAL	772

Year 2035 Fut. Vol
+ Project Traffic

WBL	16
WBT	320
WBR	0
EBL	8
EBT	307
EBR	26
NBL	98
NBT	0
NBR	129
SBL	0
SBT	0
SBR	13
TOTAL	917

Year 2020
Fut. Volumes w/o Proj

WBL	11
WBT	170
WBR	0
EBL	0
EBT	200
EBR	11
NBL	61
NBT	0
NBR	83
SBL	0
SBT	0
SBR	0
TOTAL	536

Year 2020 Fut. Vol
+ Project Traffic

WBL	11
WBT	254
WBR	0
EBL	8
EBT	228
EBR	20
NBL	64
NBT	0
NBR	83
SBL	0
SBT	0
SBR	13
TOTAL	681

Project Generated Trips - Year 2035

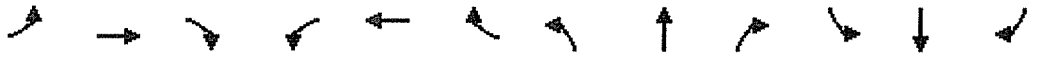
	Total	Indus.	Commer.
WBL	0	0	0
WBT	84	44	40
WBR	0	0	0
EBL	8	1	7
EBT	28	16	12
EBR	9	6	3
NBL	3	1	2
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	13	2	11
TOTAL	145	70	75

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Buena Vista Blvd & Adobe Rd - PM Peak						
	Count Date:	10/8/2008						
2008	ADT							
WB Approach (To)	1.57							
WB Approach (Away)	1.54							
EB Approach (To)	1.48							
EB Approach (Away)	1.50							
NB Approach (To)	0.47							
NB Approach (Away)	0.47							
SB Approach (To)	0.02							
SB Approach (Away)	0.02							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	3.0		WBL	2.88	WBT	1.99	WBR	3.21
WB Approach (Away)	3.0		3.83%	16	2.60%	236	4.13%	0
EB Approach (To)	3.0		EBL	3.26	EBT	2.01	EBR	2.94
EB Approach (Away)	3.0		4.24%	0	2.63%	279	3.93%	17
NB Approach (To)	*1.8*		NBL	2.93	NBT	4.15	NBR	2.90
NB Approach (Away)	*1.8*		3.92%	95	5.45%	0	3.85%	129
SB Approach (To)	0.1		SBL	3.07	SBT	4.00	SBR	3.10
SB Approach (Away)	0.1		4.02%	0	5.32%	0	4.08%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	3.1		WBL	2.92	WBT	2.05	WBR	4.41
WB Approach (Away)	3.1		3.89%	17	2.71%	243	5.04%	0
EB Approach (To)	3.1		EBL	4.46	EBT	2.05	EBR	2.96
EB Approach (Away)	3.1		5.12%	0	2.72%	285	3.97%	17
NB Approach (To)	*1.8*		NBL	2.96	NBT	5.33	NBR	2.92
NB Approach (Away)	*1.8*		3.97%	96	6.30%	0	3.89%	131
SB Approach (To)	0.1		SBL	3.75	SBT	4.66	SBR	3.79
SB Approach (Away)	0.1		4.61%	0	5.87%	0	4.68%	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	139	6	6	119	0	34	0	47	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	151	7	7	129	0	37	0	51	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	129			158			293	293	151	345	300	129
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	129			158			293	293	151	345	300	129
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	100	94	100	100	100
cM capacity (veh/h)	1456			1422			656	615	895	573	610	920

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	151	7	136	0	88	0
Volume Left	0	0	7	0	37	0
Volume Right	0	7	0	0	51	0
cSH	1456	1700	1422	1700	777	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.11	0.00
Queue Length 95th (ft)	0	0	0	0	10	0
Control Delay (s)	0.0	0.0	0.4	0.0	10.2	0.0
Lane LOS			A		B	A
Approach Delay (s)	0.0		0.4		10.2	0.0
Approach LOS					B	A

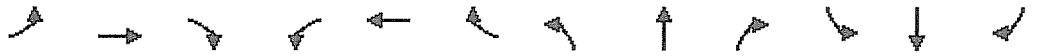
Intersection Summary			
Average Delay	2.5	HCM Level of Service	A
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	200	11	11	170	0	61	0	83	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	217	12	12	185	0	66	0	90	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	185			229			426	426	217	516	438	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	185			229			426	426	217	516	438	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			88	100	89	100	100	100
cM capacity (veh/h)	1390			1339			535	516	822	415	508	857

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	217	12	197	0	157	0
Volume Left	0	0	12	0	66	0
Volume Right	0	12	0	0	90	0
cSH	1390	1700	1339	1700	670	1700
Volume to Capacity	0.00	0.01	0.01	0.00	0.23	0.00
Queue Length 95th (ft)	0	0	1	0	23	0
Control Delay (s)	0.0	0.0	0.5	0.0	12.0	0.0
Lane LOS			A		B	A
Approach Delay (s)	0.0		0.5		12.0	0.0
Approach LOS					B	A

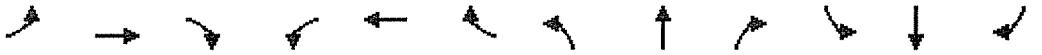
Intersection Summary			
Average Delay	3.4	HCM Level of Service	A
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	228	20	11	254	0	64	0	83	0	0	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	248	22	12	276	0	70	0	90	0	0	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	276			270			579	565	248	655	587	276
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276			270			579	565	248	655	587	276
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			83	100	89	100	100	98
cM capacity (veh/h)	1287			1294			413	427	791	332	415	763

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	257	22	288	0	160	14
Volume Left	9	0	12	0	70	0
Volume Right	0	22	0	0	90	14
cSH	1287	1700	1294	1700	566	763
Volume to Capacity	0.01	0.01	0.01	0.00	0.28	0.02
Queue Length 95th (ft)	1	0	1	0	29	1
Control Delay (s)	0.3	0.0	0.4	0.0	13.8	9.8
Lane LOS	A		A		B	A
Approach Delay (s)	0.3		0.4		13.8	9.8
Approach LOS					B	A

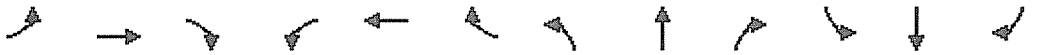
Intersection Summary			
Average Delay	3.4	HCM Level of Service	A
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	279	17	16	236	0	95	0	129	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	303	18	17	257	0	103	0	140	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	257			322			595	595	303	735	613	257
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	257			322			595	595	303	735	613	257
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			75	100	81	100	100	100
cM capacity (veh/h)	1308			1238			412	412	736	269	402	782

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	303	18	274	0	243	0
Volume Left	0	0	17	0	103	0
Volume Right	0	18	0	0	140	0
cSH	1308	1700	1238	1700	552	1700
Volume to Capacity	0.00	0.01	0.01	0.00	0.44	0.02
Queue Length 95th (ft)	0	0	1	0	56	0
Control Delay (s)	0.0	0.0	0.6	0.0	16.6	0.0
Lane LOS			A		C	A
Approach Delay (s)	0.0		0.6		16.6	0.0
Approach LOS					C	A

Intersection Summary				
Average Delay	5.0	HCM Level of Service	A
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	307	26	16	320	0	98	0	129	0	0	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	334	28	17	348	0	107	0	140	0	0	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	348			362			748	734	334	874	762	348
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	348			362			748	734	334	874	762	348
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			66	100	80	100	100	98
cM capacity (veh/h)	1211			1197			317	340	708	213	327	695

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	342	28	365	0	247	14
Volume Left	9	0	17	0	107	0
Volume Right	0	28	0	0	140	14
cSH	1211	1700	1197	1700	462	695
Volume to Capacity	0.01	0.02	0.01	0.00	0.53	0.02
Queue Length 95th (ft)	1	0	1	0	77	2
Control Delay (s)	0.3	0.0	0.5	0.0	21.4	10.3
Lane LOS	A		A		C	B
Approach Delay (s)	0.3		0.5		21.4	10.3
Approach LOS					C	B

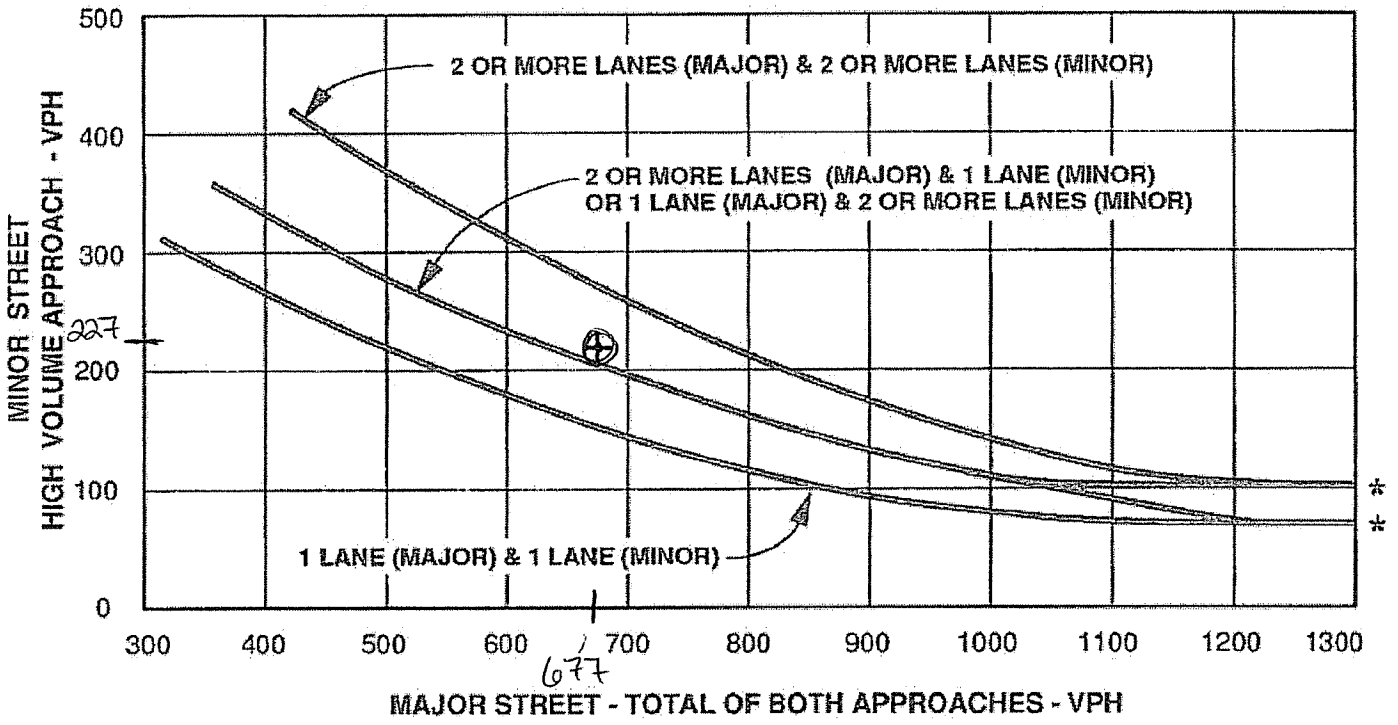
Intersection Summary			
Average Delay	5.7	HCM Level of Service	A
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		

Buena Vista Blvd & Adobe Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN.. ..... RURAL..... X	Minimum Requirements EADT			
CONDITION A - Minimum Vehicular Volume	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied ___X___ Not Satisfied _____	Urban	Rural	Urban	Rural
Number of lanes for moving traffic on each approach Major Street / Minor Street 1 / 1	8,000	5,600	2,400	1,680
2 or More / 1 (6770 / 2270)	9,600	6,720	2,400	1,680
2 or More / 2 or More	9,600	6,720	3,200	2,240
1 / 2 or More	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied _____ Not Satisfied ___X___				
Number of lanes for moving traffic on each approach Major Street / Minor Street 1 / 1	Urban	Rural	Urban	Rural
2 or More / 1 (6770 / 2270)	12,000	8,400	1,200	850
2 or More / 2 or More	14,400	10,080	1,200	850
1 / 2 or More	14,400	10,080	1,600	1,120
	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B Satisfied _____ Not Satisfied _____ No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B	2 CONDITIONS 80%		2 CONDITIONS 80%	

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Shafter Rd & Chevalier Rd - AM Peak
Count Date: 10/7/2008

Exist Peak Hour Volumes

U		
1	WBL	0
0	WBT	0
1	WBR	7
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
1	NBT	0
<	NBR	0
>	SBL	2
1	SBT	0
0	SBR	0
	TOTAL	9

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	12
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	3
SBT	0
SBR	0
TOTAL	16

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	17
EBL	0
EBT	0
EBR	0
NBL	0
NBT	10
NBR	0
SBL	5
SBT	9
SBR	0
TOTAL	42

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	9
EBL	0
EBT	0
EBR	0
NBL	0
NBT	0
NBR	0
SBL	3
SBT	0
SBR	0
TOTAL	12

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	14
EBL	0
EBT	0
EBR	0
NBL	0
NBT	10
NBR	0
SBL	5
SBT	9
SBR	0
TOTAL	38

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	5	0	5
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	10	0	10
NBR	0	0	0
SBL	2	0	2
SBT	9	4	5
SBR	0	0	0
TOTAL	26	4	22

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Shafter Rd & Chevalier Rd - AM Peak						
	Count Date:	10/7/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.80	WBT	1.80	WBR	1.80
WB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	12
EB Approach (To)	*1.8*		EBL	1.80	EBT	1.80	EBR	1.80
EB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
NB Approach (To)	*1.8*		NBL	1.80	NBT	1.80	NBR	1.80
NB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
SB Approach (To)	*1.8*		SBL	1.80	SBT	1.80	SBR	1.80
SB Approach (Away)	*1.8*		2.06%	3	2.06%	0	2.06%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.80	WBT	1.80	WBR	1.80
WB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	12
EB Approach (To)	*1.8*		EBL	1.80	EBT	1.80	EBR	1.80
EB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
NB Approach (To)	*1.8*		NBL	1.80	NBT	1.80	NBR	1.80
NB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
SB Approach (To)	*1.8*		SBL	1.80	SBT	1.80	SBR	1.80
SB Approach (Away)	*1.8*		2.06%	3	2.06%	0	2.06%	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	7	0	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	0	0	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	4	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	1016	1085			1623	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	8	0	2
Volume Left	0	0	0	2
Volume Right	0	8	0	0
cSH	1700	1085	1700	1623
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	0.0	8.3	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	8.3		0.0	7.2
Approach LOS	A			

Intersection Summary			
Average Delay	8.1	HCM Level of Service	A
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	9	0	0	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	0	0	3	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	7	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	7	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	1013	1085			1623	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	10	0	3
Volume Left	0	0	0	3
Volume Right	0	10	0	0
cSH	1700	1085	1700	1623
Volume to Capacity	0.00	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	0.0	8.3	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	8.3		0.0	7.2
Approach LOS	A			

Intersection Summary			
Average Delay	8.1	HCM Level of Service	A
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	14	10	0	5	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	15	11	0	5	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	32	11			11	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32	11			11	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	979	1070			1608	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	15	11	15
Volume Left	0	0	0	5
Volume Right	0	15	0	0
cSH	1700	1070	1700	1608
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	0.0	8.4	0.0	2.6
Lane LOS	A	A		A
Approach Delay (s)	8.4		0.0	2.6
Approach LOS	A			

Intersection Summary			
Average Delay	4.1	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	12	0	0	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	13	0	0	3	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	7	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	7	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	1013	1085			1623	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	13	0	3
Volume Left	0	0	0	3
Volume Right	0	13	0	0
cSH	1700	1085	1700	1623
Volume to Capacity	0.00	0.01	0.01	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	0.0	8.4	0.0	7.2
Lane LOS	A	A		A
Approach Delay (s)	8.4		0.0	7.2
Approach LOS	A			

Intersection Summary			
Average Delay	8.1	HCM Level of Service	A
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	17	10	0	5	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	11	0	5	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	32	11			11	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32	11			11	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	979	1070			1608	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	18	11	15
Volume Left	0	0	0	5
Volume Right	0	18	0	0
cSH	1700	1070	1700	1608
Volume to Capacity	0.00	0.02	0.01	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	0.0	8.4	0.0	2.6
Lane LOS	A	A		A
Approach Delay (s)	8.4		0.0	2.6
Approach LOS	A			

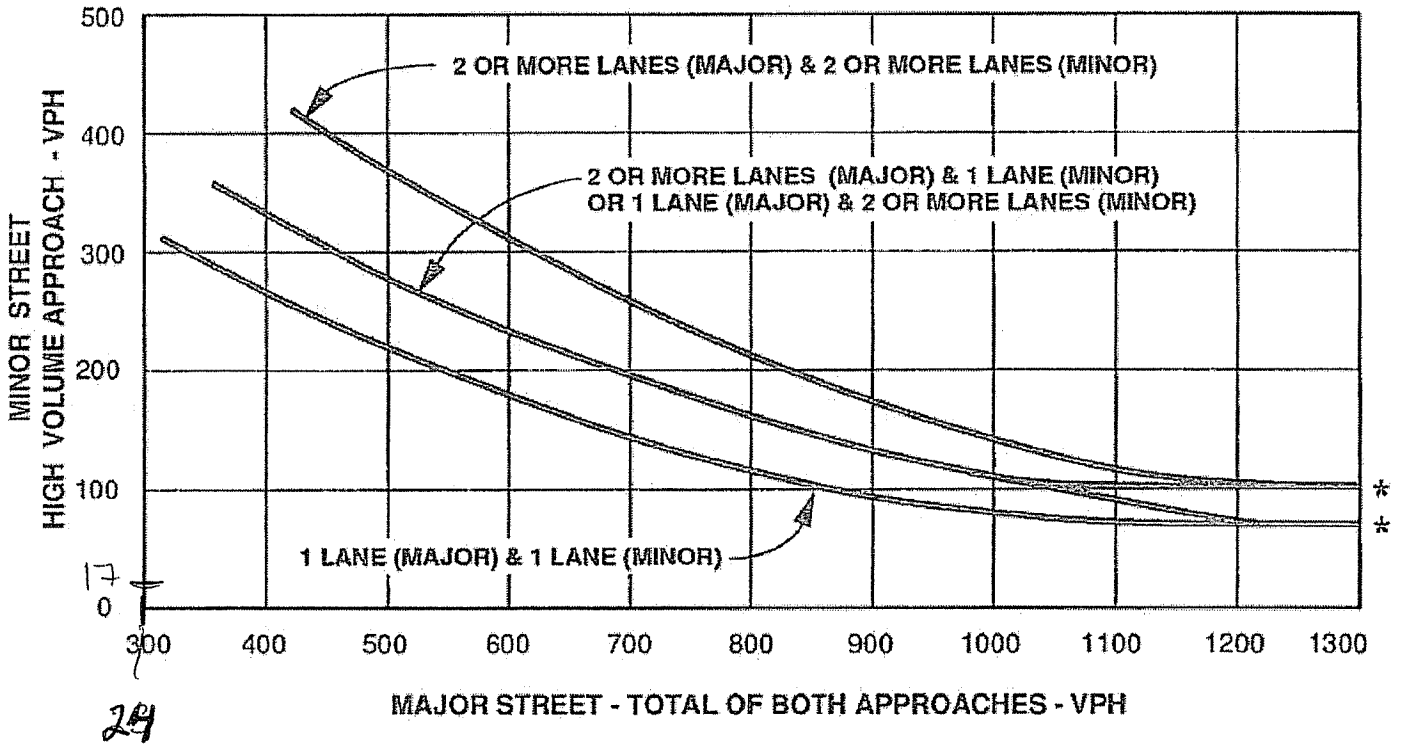
Intersection Summary			
Average Delay	4.4	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Shafter Rd + Chevalier Rd

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Shafter Rd & Chevalier Rd - PM Peak
Count Date: 10/7/2008

Exist Peak Hour Volumes

U		
1	WBL	0
0	WBT	0
1	WBR	1
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
1	NBT	1
<	NBR	0
>	SBL	3
1	SBT	3
0	SBR	0
	TOTAL	8

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	2
EBL	0
EBT	0
EBR	0
NBL	0
NBT	2
NBR	0
SBL	5
SBT	5
SBR	0
TOTAL	14

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	7
EBL	0
EBT	0
EBR	0
NBL	0
NBT	13
NBR	0
SBL	19
SBT	21
SBR	0
TOTAL	60

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	1
EBL	0
EBT	0
EBR	0
NBL	0
NBT	1
NBR	0
SBL	4
SBT	4
SBR	0
TOTAL	11

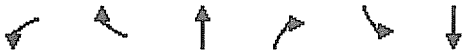
Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	6
EBL	0
EBT	0
EBR	0
NBL	0
NBT	12
NBR	0
SBL	18
SBT	20
SBR	0
TOTAL	57

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	5	1	4
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	11	5	6
NBR	0	0	0
SBL	14	4	10
SBT	16	6	10
SBR	0	0	0
TOTAL	46	16	30

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Shafter Rd & Chevalier Rd - PM Peak						
	Count Date:	10/7/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.80	WBT	1.80	WBR	1.80
WB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	2
EB Approach (To)	*1.8*		EBL	1.80	EBT	1.80	EBR	1.80
EB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
NB Approach (To)	*1.8*		NBL	1.80	NBT	1.80	NBR	1.80
NB Approach (Away)	*1.8*		2.06%	0	2.06%	2	2.06%	0
SB Approach (To)	*1.8*		SBL	1.80	SBT	1.80	SBR	1.80
SB Approach (Away)	*1.8*		2.06%	5	2.06%	5	2.06%	0
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	1.80	WBT	1.80	WBR	1.80
WB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	2
EB Approach (To)	*1.8*		EBL	1.80	EBT	1.80	EBR	1.80
EB Approach (Away)	*1.8*		2.06%	0	2.06%	0	2.06%	0
NB Approach (To)	*1.8*		NBL	1.80	NBT	1.80	NBR	1.80
NB Approach (Away)	*1.8*		2.06%	0	2.06%	2	2.06%	0
SB Approach (To)	*1.8*		SBL	1.80	SBT	1.80	SBR	1.80
SB Approach (Away)	*1.8*		2.06%	5	2.06%	5	2.06%	0



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	1	1	0	3	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	1	0	3	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	11	1			1	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	11	1			1	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1007	1083			1622	

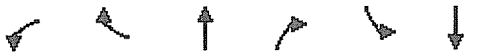
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	1	1	7
Volume Left	0	0	0	3
Volume Right	0	1	0	0
cSH	1700	1083	1700	1622
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.3	0.0	3.6
Lane LOS	A	A		A
Approach Delay (s)	8.3		0.0	3.6
Approach LOS	A			

Intersection Summary			
Average Delay	3.8	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	1	1	0	4	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	1	0	4	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	14	1			1	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	1			1	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1002	1083			1622	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	1	1	9
Volume Left	0	0	0	4
Volume Right	0	1	0	0
cSH	1700	1083	1700	1622
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.3	0.0	3.6
Lane LOS	A	A		A
Approach Delay (s)	8.3		0.0	3.6
Approach LOS	A			

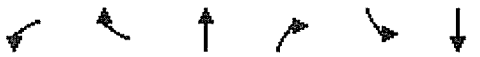
Intersection Summary			
Average Delay	3.7	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	6	12	0	18	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	7	13	0	20	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	74	13			13	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74	13			13	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	918	1067			1605	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	7	13	41
Volume Left	0	0	0	20
Volume Right	0	7	0	0
cSH	1700	1067	1700	1605
Volume to Capacity	0.00	0.01	0.01	0.01
Queue Length 95th (ft)	0	0	0	1
Control Delay (s)	0.0	8.4	0.0	3.5
Lane LOS	A	A		A
Approach Delay (s)	8.4		0.0	3.5
Approach LOS	A			

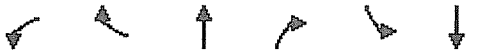
Intersection Summary			
Average Delay	3.3	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	2	2	0	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	2	0	5	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	18	2			2	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	18	2			2	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	996	1082			1620	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	2	2	11
Volume Left	0	0	0	5
Volume Right	0	2	0	0
cSH	1700	1082	1700	1620
Volume to Capacity	0.00	0.00	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	8.3	0.0	3.6
Lane LOS	A	A		A
Approach Delay (s)	8.3		0.0	3.6
Approach LOS	A			

Intersection Summary			
Average Delay	3.8	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	7	13	0	19	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	8	14	0	21	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	78	14			14	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	14			14	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	913	1066			1604	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	0	8	14	43
Volume Left	0	0	0	21
Volume Right	0	8	0	0
cSH	1700	1066	1700	1604
Volume to Capacity	0.00	0.01	0.01	0.01
Queue Length 95th (ft)	0	1	0	1
Control Delay (s)	0.0	8.4	0.0	3.5
Lane LOS	A	A		A
Approach Delay (s)	8.4		0.0	3.5
Approach LOS	A			

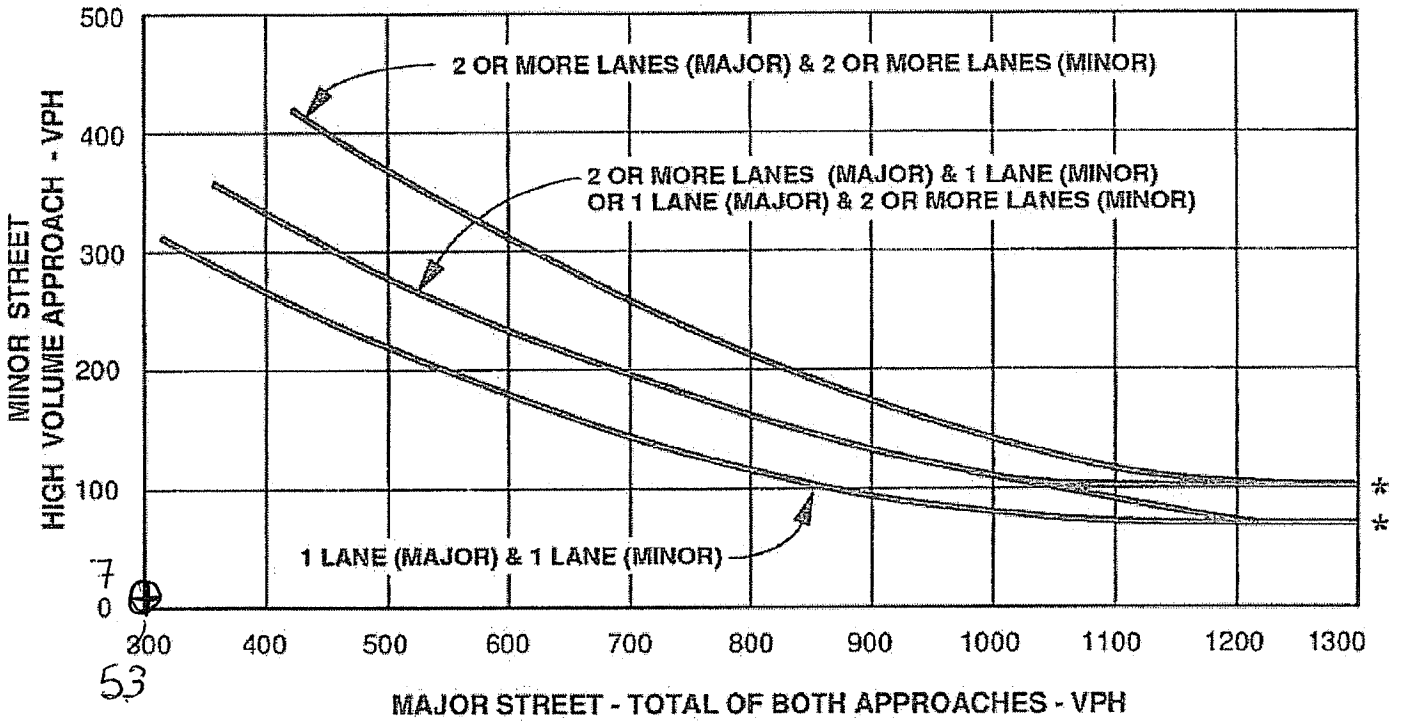
Intersection Summary			
Average Delay	3.3	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Shafter Rd & Chevalier Rd

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..... **CONDITION A - Minimum Vehicular Volume** Satisfied _____ Not Satisfied _____	Minimum Requirements EADT			
	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach	Urban	Rural	Urban	Rural
Major Street / Minor Street				
1 / 1	8,000	5,600	2,400	1,680
2 or More / 1	9,600	6,720	2,400	1,680
2 or More / 2 or More	9,600	6,720	3,200	2,240
1 / 2 or More	8,000	5,600	3,200	2,240
530 / 70				
CONDITION B - Interruption of Continuous Traffic Satisfied _____ Not Satisfied _____	Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Number of lanes for moving traffic on each approach	Urban	Rural	Urban	Rural
Major Street / Minor Street				
1 / 1	12,000	8,400	1,200	850
2 or More / 1	14,400	10,080	1,200	850
2 or More / 2 or More	14,400	10,080	1,600	1,120
1 / 2 or More	12,000	8,400	1,600	1,120
530 / 70				
Combination of CONDITIONS A + B Satisfied _____ Not Satisfied _____	2 CONDITIONS 80%		2 CONDITIONS 80%	
No one condition satisfied, but following conditions fulfilled 80% or more..... A: 60% B: 60%				

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Shafter Rd & South Union Ave - AM Peak
Count Date: 9/25/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	0
1	WBR	4
>	EBL	3
1	EBT	0
1	EBR	1
1	NBL	1
2	NBT	43
<	NBR	2
1	SBL	4
2	SBT	48
<	SBR	4
TOTAL		111

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	9
EBL	6
EBT	0
EBR	2
NBL	2
NBT	231
NBR	5
SBL	9
SBT	260
SBR	8
TOTAL	536

Year 2035 Fut. Vol
+ Project Traffic

WBL	2
WBT	2
WBR	15
EBL	6
EBT	1
EBR	2
NBL	4
NBT	253
NBR	5
SBL	11
SBT	274
SBR	9
TOTAL	586

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	6
EBL	4
EBT	0
EBR	1
NBL	2
NBT	126
NBR	3
SBL	6
SBT	141
SBR	6
TOTAL	298

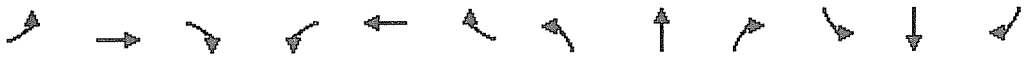
Year 2020 Fut. Vol
+ Project Traffic

WBL	2
WBT	2
WBR	12
EBL	4
EBT	1
EBR	1
NBL	4
NBT	148
NBR	3
SBL	8
SBT	155
SBR	7
TOTAL	348

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	2	0	2
WBR	6	5	1
EBL	0	0	0
EBT	1	0	1
EBR	0	0	0
NBL	2	0	2
NBT	22	18	4
NBR	0	0	0
SBL	2	1	1
SBT	14	9	5
SBR	1	0	1
TOTAL	50	33	17

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Shafter Rd & South Union Ave - AM Peak						
	Count Date:	9/25/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.39							
NB Approach (Away)	0.42							
SB Approach (To)	0.54							
SB Approach (Away)	0.51							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.67	WBT	0.90	WBR	3.47
WB Approach (Away)	*1*		3.31%	2	-0.39%	0	3.18%	9
EB Approach (To)	0.8		EBL	3.36	EBT	0.89	EBR	3.56
EB Approach (Away)	0.8		2.74%	6	-0.44%	0	2.87%	2
NB Approach (To)	2.4		NBL	3.56	NBT	6.13	NBR	3.66
NB Approach (Away)	2.7		2.91%	2	6.49%	231	3.30%	5
SB Approach (To)	3.2		SBL	3.50	SBT	6.17	SBR	3.40
SB Approach (Away)	3.0		3.20%	9	6.51%	260	2.81%	8
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.63	WBT	0.89	WBR	3.57
WB Approach (Away)	*1*		3.28%	2	-0.41%	0	3.25%	9
EB Approach (To)	0.8		EBL	3.46	EBT	0.88	EBR	3.52
EB Approach (Away)	0.8		2.79%	6	-0.46%	0	2.83%	2
NB Approach (To)	2.6		NBL	3.70	NBT	6.38	NBR	3.81
NB Approach (Away)	2.6		2.97%	2	6.63%	240	3.39%	5
SB Approach (To)	3.2		SBL	3.46	SBT	6.09	SBR	3.35
SB Approach (Away)	3.1		3.18%	9	6.46%	257	2.77%	8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	1	1	0	4	1	43	2	4	48	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	1	1	0	4	1	47	2	4	52	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	93	114	28	86	115	24	57			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	93	114	28	86	115	24	57			49		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	875	772	1040	887	771	1046	1546			1556		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	1	1	4	1	31	18	4	35	22
Volume Left	3	0	1	0	1	0	0	4	0	0
Volume Right	0	1	0	4	0	0	2	0	0	4
cSH	875	1040	887	1046	1546	1700	1700	1556	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	0	0	0	0	0	0	0	0
Control Delay (s)	9.1	8.5	9.1	8.5	7.3	0.0	0.0	7.3	0.0	0.0
Lane LOS	A	A	A	A	A			A		
Approach Delay (s)	9.0		8.6		0.2			0.5		
Approach LOS	A		A							

Intersection Summary			
Average Delay	1.0	HCM Level of Service	A
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	1	2	0	6	2	126	3	6	141	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	1	2	0	7	2	137	3	7	153	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	249	314	80	234	316	70	160			140		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	249	314	80	234	316	70	160			140		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	99	100			100		
cM capacity (veh/h)	676	596	964	697	595	978	1417			1441		

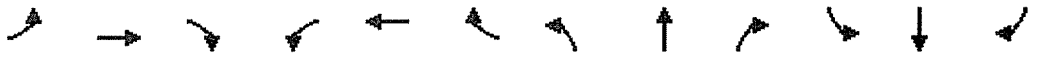
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	1	2	7	2	91	49	7	102	58
Volume Left	4	0	2	0	2	0	0	7	0	0
Volume Right	0	1	0	7	0	0	3	0	0	7
cSH	676	964	697	978	1417	1700	1700	1441	1700	1700
Volume to Capacity	0.01	0.00	0.00	0.01	0.00	0.05	0.03	0.00	0.06	0.03
Queue Length 95th (ft)	0	0	0	1	0	0	0	0	0	0
Control Delay (s)	10.4	8.7	10.2	8.7	7.5	0.0	0.0	7.5	0.0	0.0
Lane LOS	B	A	B	A	A			A		
Approach Delay (s)	10.0		9.1		0.1			0.3		
Approach LOS	B		A							

Intersection Summary			
Average Delay	0.6	HCM Level of Service	A
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	1	1	2	2	12	4	148	3	8	155	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	1	1	2	2	13	4	161	3	9	168	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	293	362	88	274	365	82	176			164		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	293	362	88	274	365	82	176			164		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	99	100			99		
cM capacity (veh/h)	622	558	953	650	557	961	1398			1412		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	5	1	4	13	4	107	57	9	112	64
Volume Left	4	0	2	0	4	0	0	9	0	0
Volume Right	0	1	0	13	0	0	3	0	0	8
cSH	608	953	600	961	1398	1700	1700	1412	1700	1700
Volume to Capacity	0.01	0.00	0.01	0.01	0.00	0.06	0.03	0.01	0.07	0.04
Queue Length 95th (ft)	1	0	1	1	0	0	0	0	0	0
Control Delay (s)	11.0	8.8	11.0	8.8	7.6	0.0	0.0	7.6	0.0	0.0
Lane LOS	B	A	B	A	A			A		
Approach Delay (s)	10.6		9.4		0.2			0.4		
Approach LOS	B		A							

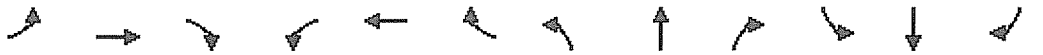
Intersection Summary			
Average Delay	0.9	HCM Level of Service	A
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	0	2	2	0	9	2	231	5	9	260	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	2	2	0	10	2	251	5	10	283	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	446	567	146	421	569	128	291			257		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446	567	146	421	569	128	291			257		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	99	100			99		
cM capacity (veh/h)	487	427	875	512	426	898	1267			1305		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	7	2	2	10	2	167	89	10	188	103
Volume Left	7	0	2	0	2	0	0	10	0	0
Volume Right	0	2	0	10	0	0	5	0	0	9
cSH	487	875	512	898	1267	1700	1700	1305	1700	1700
Volume to Capacity	0.01	0.00	0.00	0.01	0.00	0.10	0.05	0.01	0.11	0.06
Queue Length 95th (ft)	1	0	0	1	0	0	0	1	0	0
Control Delay (s)	12.5	9.1	12.1	9.1	7.8	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A	B	A	A			A		
Approach Delay (s)	11.7		9.6		0.1			0.3		
Approach LOS	B		A							

Intersection Summary			
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	1	2	2	2	15	4	253	5	11	274	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	1	2	2	2	16	4	275	5	12	298	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	490	616	154	462	618	140	308			280		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	490	616	154	462	618	140	308			280		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	99	98	100			99		
cM capacity (veh/h)	446	399	865	476	398	882	1250			1279		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	8	2	4	16	4	183	97	12	199	109
Volume Left	7	0	2	0	4	0	0	12	0	0
Volume Right	0	2	0	16	0	0	5	0	0	10
cSH	439	865	434	882	1250	1700	1700	1279	1700	1700
Volume to Capacity	0.02	0.00	0.01	0.02	0.00	0.11	0.06	0.01	0.12	0.06
Queue Length 95th (ft)	1	0	1	1	0	0	0	1	0	0
Control Delay (s)	13.3	9.2	13.4	9.2	7.9	0.0	0.0	7.8	0.0	0.0
Lane LOS	B	A	B	A	A			A		
Approach Delay (s)	12.4		10.0		0.1			0.3		
Approach LOS	B		B							

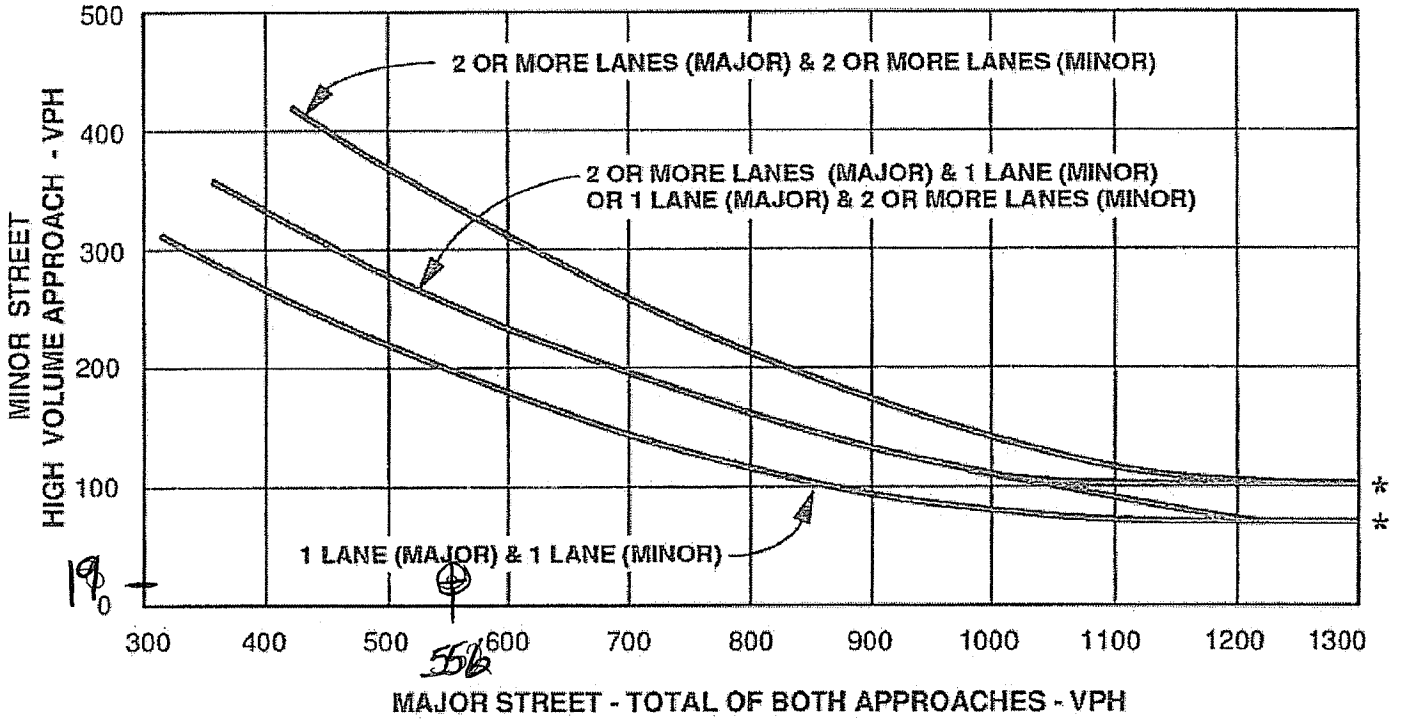
Intersection Summary			
Average Delay	0.7	HCM Level of Service	A
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

Shafter Rd & South Union Ave

2035 with Project- AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Shafter Rd & South Union Ave - PM Peak
Count Date: 9/25/2008

Exist Peak Hour Volumes

U		
>	WBL	1
1	WBT	0
1	WBR	8
>	EBL	2
1	EBT	0
1	EBR	0
1	NBL	0
2	NBT	129
<	NBR	3
1	SBL	1
2	SBT	58
<	SBR	1
TOTAL		203

Year 2035
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	19
EBL	4
EBT	0
EBR	0
NBL	0
NBT	694
NBR	7
SBL	2
SBT	314
SBR	2
TOTAL	1044

Year 2035 Fut. Vol
+ Project Traffic

WBL	2
WBT	2
WBR	24
EBL	6
EBT	11
EBR	3
NBL	2
NBT	712
NBR	7
SBL	12
SBT	350
SBR	2
TOTAL	1133

Year 2020
Fut. Volumes w/o Proj

WBL	2
WBT	0
WBR	13
EBL	3
EBT	0
EBR	0
NBL	0
NBT	377
NBR	5
SBL	2
SBT	170
SBR	1
TOTAL	573

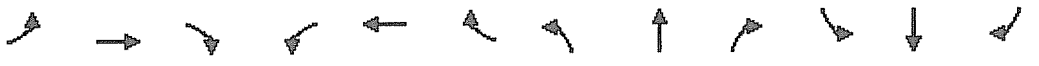
Year 2020 Fut. Vol
+ Project Traffic

WBL	2
WBT	2
WBR	18
EBL	5
EBT	11
EBR	3
NBL	2
NBT	395
NBR	5
SBL	12
SBT	206
SBR	1
TOTAL	662

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	2	0	2
WBR	5	2	3
EBL	2	0	2
EBT	11	4	7
EBR	3	0	3
NBL	2	0	2
NBT	18	12	6
NBR	0	0	0
SBL	10	2	8
SBT	36	17	19
SBR	0	0	0
TOTAL	89	37	52

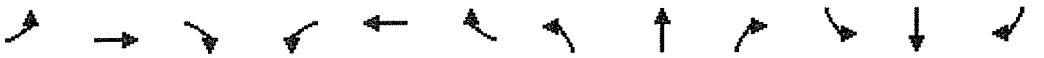
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Shafter Rd & South Union Ave - PM Peak						
	Count Date:	9/25/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.39							
NB Approach (Away)	0.42							
SB Approach (To)	0.54							
SB Approach (Away)	0.51							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.67	WBT	0.90	WBR	3.47
WB Approach (Away)	*1*		3.31%	2	-0.39%	0	3.18%	19
EB Approach (To)	0.8		EBL	3.36	EBT	0.89	EBR	3.56
EB Approach (Away)	0.8		2.74%	4	-0.44%	0	2.87%	0
NB Approach (To)	2.4		NBL	3.56	NBT	6.13	NBR	3.66
NB Approach (Away)	2.7		2.91%	0	6.49%	694	3.30%	7
SB Approach (To)	3.2		SBL	3.50	SBT	6.17	SBR	3.40
SB Approach (Away)	3.0		3.20%	2	6.51%	314	2.81%	2
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1*		WBL	3.63	WBT	0.89	WBR	3.57
WB Approach (Away)	*1*		3.28%	2	-0.41%	0	3.25%	19
EB Approach (To)	0.8		EBL	3.46	EBT	0.88	EBR	3.52
EB Approach (Away)	0.8		2.79%	4	-0.46%	0	2.83%	0
NB Approach (To)	2.6		NBL	3.70	NBT	6.38	NBR	3.81
NB Approach (Away)	2.6		2.97%	0	6.63%	720	3.39%	7
SB Approach (To)	3.2		SBL	3.46	SBT	6.09	SBR	3.35
SB Approach (Away)	3.1		3.18%	2	6.46%	310	2.77%	2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	0	0	1	0	8	0	129	3	1	58	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	0	1	0	9	0	140	3	1	63	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	145	209	32	176	208	72	64			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	145	209	32	176	208	72	64			143		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	99	100			100		
cM capacity (veh/h)	803	686	1034	770	687	976	1536			1437		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	2	0	1	9	0	93	50	1	42	22
Volume Left	2	0	1	0	0	0	0	1	0	0
Volume Right	0	0	0	9	0	0	3	0	0	1
cSH	803	1700	770	976	1700	1700	1700	1437	1700	1700
Volume to Capacity	0.00	0.00	0.00	0.01	0.00	0.05	0.03	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	0	1	0	0	0	0	0	0
Control Delay (s)	9.5	0.0	9.7	8.7	0.0	0.0	0.0	7.5	0.0	0.0
Lane LOS	A	A	A	A				A		
Approach Delay (s)	9.5		8.8		0.0			0.1		
Approach LOS	A		A							

Intersection Summary				
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	0	0	2	0	13	0	377	5	2	170	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	0	2	0	14	0	410	5	2	185	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	409	605	93	509	603	208	186			415		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	409	605	93	509	603	208	186			415		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	98	100			100		
cM capacity (veh/h)	517	410	946	446	411	798	1386			1140		

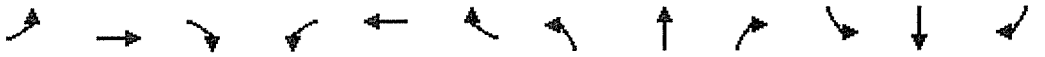
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	0	2	14	0	273	142	2	123	63
Volume Left	3	0	2	0	0	0	0	2	0	0
Volume Right	0	0	0	14	0	0	5	0	0	1
cSH	517	1700	446	798	1700	1700	1700	1140	1700	1700
Volume to Capacity	0.01	0.00	0.00	0.02	0.00	0.16	0.08	0.00	0.07	0.04
Queue Length 95th (ft)	0	0	0	1	0	0	0	0	0	0
Control Delay (s)	12.0	0.0	13.1	9.6	0.0	0.0	0.0	8.2	0.0	0.0
Lane LOS	B	A	B	A				A		
Approach Delay (s)	12.0		10.1		0.0			0.1		
Approach LOS	B		B							

Intersection Summary			
Average Delay	0.4	HCM Level of Service	A
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	11	3	2	2	18	2	395	5	12	206	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	12	3	2	2	20	2	429	5	13	224	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	490	690	112	584	688	217	225			435		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	490	690	112	584	688	217	225			435		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	97	100	99	99	98	100			99		
cM capacity (veh/h)	443	362	919	380	363	787	1341			1121		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	17	3	4	20	2	286	149	13	149	76
Volume Left	5	0	2	0	2	0	0	13	0	0
Volume Right	0	3	0	20	0	0	5	0	0	1
cSH	384	919	371	787	1341	1700	1700	1121	1700	1700
Volume to Capacity	0.05	0.00	0.01	0.02	0.00	0.17	0.09	0.01	0.09	0.04
Queue Length 95th (ft)	4	0	1	2	0	0	0	1	0	0
Control Delay (s)	14.8	8.9	14.8	9.7	7.7	0.0	0.0	8.2	0.0	0.0
Lane LOS	B	A	B	A	A			A		
Approach Delay (s)	13.9		10.6		0.0			0.5		
Approach LOS	B		B							

Intersection Summary			
Average Delay	0.9	HCM Level of Service	A
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	0	0	2	0	19	0	694	7	2	314	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	2	0	21	0	754	8	2	341	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	745	1109	172	933	1106	381	343			762		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	745	1109	172	933	1106	381	343			762		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	97	100			100		
cM capacity (veh/h)	292	208	842	220	209	617	1212			846		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	0	2	21	0	503	259	2	228	116
Volume Left	4	0	2	0	0	0	0	2	0	0
Volume Right	0	0	0	21	0	0	8	0	0	2
cSH	292	1700	220	617	1700	1700	1700	846	1700	1700
Volume to Capacity	0.01	0.00	0.01	0.03	0.00	0.30	0.15	0.00	0.13	0.07
Queue Length 95th (ft)	1	0	1	3	0	0	0	0	0	0
Control Delay (s)	17.5	0.0	21.5	11.0	0.0	0.0	0.0	9.3	0.0	0.0
Lane LOS	C	A	C	B				A		
Approach Delay (s)	17.5		12.0		0.0			0.1		
Approach LOS	C		B							

Intersection Summary				
Average Delay	0.3	HCM Level of Service	A
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	11	3	2	2	24	2	712	7	12	350	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	12	3	2	2	26	2	774	8	13	380	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	826	1193	191	1008	1191	391	383			782		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	826	1193	191	1008	1191	391	383			782		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	93	100	99	99	96	100			98		
cM capacity (veh/h)	247	182	818	182	183	608	1172			832		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	18	3	4	26	2	516	266	13	254	129
Volume Left	7	0	2	0	2	0	0	13	0	0
Volume Right	0	3	0	26	0	0	8	0	0	2
cSH	201	818	182	608	1172	1700	1700	832	1700	1700
Volume to Capacity	0.09	0.00	0.02	0.04	0.00	0.30	0.16	0.02	0.15	0.08
Queue Length 95th (ft)	8	0	2	3	0	0	0	1	0	0
Control Delay (s)	24.7	9.4	25.2	11.2	8.1	0.0	0.0	9.4	0.0	0.0
Lane LOS	C	A	D	B	A			A		
Approach Delay (s)	22.4		13.2		0.0			0.3		
Approach LOS	C		B							

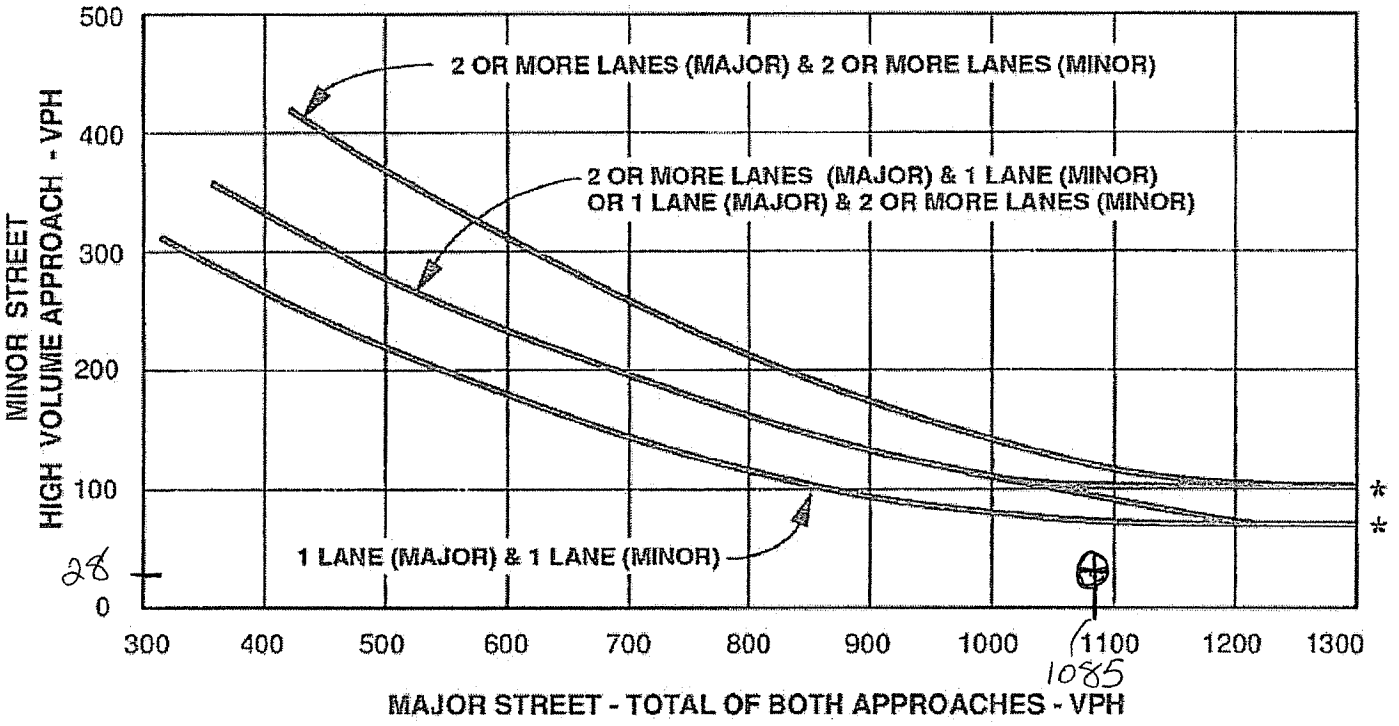
Intersection Summary			
Average Delay	0.8	HCM Level of Service	A
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Shafter Rd + South Union Ave

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...10,850...	2 or More...280...
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More...10,850...	2 or More...280...
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 56% (A) 63% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Kaiser Ln & South Union Ave - AM Peak
Count Date: *9/25/2008*

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
1	EBR	2
>	NBL	0
2	NBT	43
0	NBR	0
0	SBL	0
2	SBT	60
<	SBR	1
	TOTAL	106

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	6
NBL	0
NBT	231
NBR	0
SBL	0
SBT	325
SBR	3
TOTAL	565

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	14
NBL	8
NBT	255
NBR	0
SBL	0
SBT	338
SBR	3
TOTAL	618

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	4
NBL	0
NBT	126
NBR	0
SBL	0
SBT	176
SBR	2
TOTAL	308

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	12
NBL	8
NBT	150
NBR	0
SBL	0
SBT	189
SBR	2
TOTAL	361

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	8	4	4
NBL	8	0	8
NBT	24	18	6
NBR	0	0	0
SBL	0	0	0
SBT	13	9	4
SBR	0	0	0
TOTAL	53	31	22

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Kaiser Ln & South Union Ave - AM Peak						
	Count Date:	9/25/2008						
2006	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.39							
NB Approach (Away)	0.42							
SB Approach (To)	0.54							
SB Approach (Away)	0.51							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	4.07	WBT	1.80	WBR	3.87
WB Approach (Away)	*1.8*		4.33%	0	2.06%	0	4.21%	0
EB Approach (To)	*1.8*		EBL	3.87	EBT	1.80	EBR	4.07
EB Approach (Away)	*1.8*		4.21%	0	2.06%	0	4.33%	6
NB Approach (To)	2.4		NBL	4.06	NBT	6.13	NBR	4.06
NB Approach (Away)	2.7		4.33%	0	6.49%	231	4.33%	0
SB Approach (To)	3.2		SBL	3.90	SBT	6.17	SBR	3.90
SB Approach (Away)	3.0		4.23%	0	6.51%	325	4.23%	3
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	4.03	WBT	1.80	WBR	3.97
WB Approach (Away)	*1.8*		4.31%	0	2.06%	0	4.28%	0
EB Approach (To)	*1.8*		EBL	3.97	EBT	1.80	EBR	4.03
EB Approach (Away)	*1.8*		4.28%	0	2.06%	0	4.31%	6
NB Approach (To)	2.6		NBL	4.21	NBT	6.38	NBR	4.21
NB Approach (Away)	2.6		4.41%	0	6.63%	240	4.41%	0
SB Approach (To)	3.2		SBL	3.86	SBT	6.09	SBR	3.86
SB Approach (Away)	3.1		4.21%	0	6.46%	321	4.21%	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	2	0	43	60	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	0	47	65	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	89	33	66			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89	33	66			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	902	1033	1533			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	23	23	43	23
Volume Left	0	0	0	0	0
Volume Right	2	0	0	0	1
cSH	1033	1700	1700	1700	1700
Volume to Capacity	0.00	0.01	0.01	0.03	0.01
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.5	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.5	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.2	HCM Level of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	4	0	126	176	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	4	0	137	191	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	261	97	193			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	261	97	193			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	706	941	1377			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	4	68	68	128	66
Volume Left	0	0	0	0	0
Volume Right	4	0	0	0	2
cSH	941	1700	1700	1700	1700
Volume to Capacity	0.00	0.04	0.04	0.08	0.04
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.8	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.8	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.1	HCM Level of Service	A
Intersection Capacity Utilization	14.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	12	8	150	189	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	13	9	163	205	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	305	104	208			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	305	104	208			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	658	931	1361			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	63	109	137	71
Volume Left	0	9	0	0	0
Volume Right	13	0	0	0	2
cSH	931	1361	1700	1700	1700
Volume to Capacity	0.01	0.01	0.06	0.08	0.04
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	8.9	1.1	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.9	0.4		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.5	HCM Level of Service	A
Intersection Capacity Utilization	15.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	6	0	231	325	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	7	0	251	353	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	480	178	357			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	480	178	357			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	514	834	1199			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	7	126	126	236	121
Volume Left	0	0	0	0	0
Volume Right	7	0	0	0	3
cSH	834	1700	1700	1700	1700
Volume to Capacity	0.01	0.07	0.07	0.14	0.07
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	9.4	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.4	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.1	HCM Level of Service	A
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	14	8	255	338	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	15	9	277	367	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	525	185	371			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	525	185	371			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	99			
cM capacity (veh/h)	479	825	1184			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	101	185	245	126
Volume Left	0	9	0	0	0
Volume Right	15	0	0	0	3
cSH	825	1184	1700	1700	1700
Volume to Capacity	0.02	0.01	0.11	0.14	0.07
Queue Length 95th (ft)	1	1	0	0	0
Control Delay (s)	9.4	0.8	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.4	0.3		0.0	
Approach LOS	A				

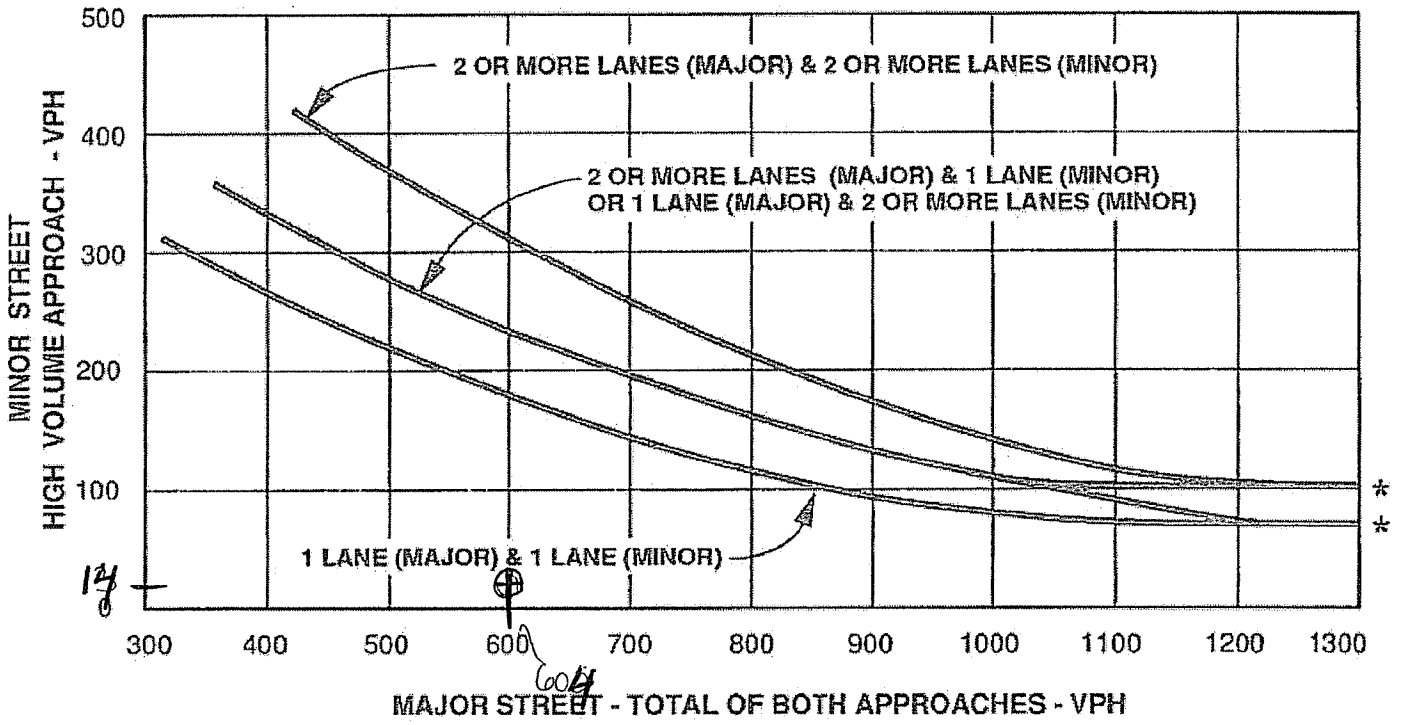
Intersection Summary			
Average Delay	0.3	HCM Level of Service	A
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		

Kaiser Ln & South Union Ave

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Kaiser Ln & South Union Ave - PM Peak
Count Date: 9/25/2008

Exist Peak Hour Volumes

U		
0	WBL	0
0	WBT	0
0	WBR	0
0	EBL	0
0	EBT	0
1	EBR	1
>	NBL	0
2	NBT	121
0	NBR	0
0	SBL	0
2	SBT	65
<	SBR	2
	TOTAL	189

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	2
NBL	0
NBT	356
NBR	0
SBL	0
SBT	201
SBR	5
TOTAL	564

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	17
NBL	4
NBT	374
NBR	0
SBL	0
SBT	233
SBR	5
TOTAL	633

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	2
NBL	0
NBT	224
NBR	0
SBL	0
SBT	125
SBR	3
TOTAL	354

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	0
WBR	0
EBL	0
EBT	0
EBR	17
NBL	4
NBT	242
NBR	0
SBL	0
SBT	157
SBR	3
TOTAL	423

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	15	6	9
NBL	4	1	3
NBT	18	11	7
NBR	0	0	0
SBL	0	0	0
SBT	32	14	18
SBR	0	0	0
TOTAL	69	32	37

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Kaiser Ln & South Union Ave - PM Peak						
	Count Date:	9/25/2008						
2008	ADT							
WB Approach (To)	*1*							
WB Approach (Away)	*1*							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	0.92							
NB Approach (Away)	0.95							
SB Approach (To)	0.95							
SB Approach (Away)	0.93							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	2.29	WBT	1.80	WBR	2.52
WB Approach (Away)	*1.8*		3.06%	0	2.22%	0	3.36%	0
EB Approach (To)	*1.8*		EBL	2.52	EBT	1.80	EBR	2.29
EB Approach (Away)	*1.8*		3.36%	0	2.22%	0	3.06%	2
NB Approach (To)	2.4		NBL	2.23	NBT	2.96	NBR	2.23
NB Approach (Away)	2.7		2.97%	0	4.11%	356	2.97%	0
SB Approach (To)	3.2		SBL	2.61	SBT	3.10	SBR	2.61
SB Approach (Away)	3.0		3.46%	0	4.30%	201	3.46%	5
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	*1.8*		WBL	2.28	WBT	1.80	WBR	2.58
WB Approach (Away)	*1.8*		3.04%	0	2.22%	0	3.43%	0
EB Approach (To)	*1.8*		EBL	2.58	EBT	1.80	EBR	2.28
EB Approach (Away)	*1.8*		3.43%	0	2.22%	0	3.04%	2
NB Approach (To)	2.6		NBL	2.29	NBT	3.07	NBR	2.29
NB Approach (Away)	2.6		3.06%	0	4.27%	370	3.06%	0
SB Approach (To)	3.2		SBL	2.59	SBT	3.06	SBR	2.59
SB Approach (Away)	3.1		3.43%	0	4.25%	198	3.43%	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	1	0	121	65	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	0	132	71	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	138	36	73			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	138	36	73			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	842	1028	1525			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	1	44	88	47	26
Volume Left	0	0	0	0	0
Volume Right	1	0	0	0	2
cSH	1028	1525	1700	1700	1700
Volume to Capacity	0.00	0.00	0.05	0.03	0.02
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.5	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.5	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0	HCM Levels of Service	A
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	2	0	224	125	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	0	243	136	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	259	70	139			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	259	70	139			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	707	979	1442			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	81	162	91	49
Volume Left	0	0	0	0	0
Volume Right	2	0	0	0	3
cSH	979	1442	1700	1700	1700
Volume to Capacity	0.00	0.00	0.10	0.05	0.03
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.7	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.7	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	17	4	242	157	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	4	263	171	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	312	87	174			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	312	87	174			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	653	954	1400			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	18	92	175	114	60
Volume Left	0	4	0	0	0
Volume Right	18	0	0	0	3
cSH	954	1400	1700	1700	1700
Volume to Capacity	0.02	0.00	0.10	0.07	0.04
Queue Length 95th (ft)	1	0	0	0	0
Control Delay (s)	8.8	0.4	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	8.8	0.1		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.4	HCM Level of Service	A
Intersection Capacity Utilization	14.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	2	0	356	201	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	0	387	218	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	415	112	224			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	415	112	224			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	566	920	1342			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	2	129	258	146	78
Volume Left	0	0	0	0	0
Volume Right	2	0	0	0	5
cSH	920	1342	1700	1700	1700
Volume to Capacity	0.00	0.00	0.15	0.09	0.05
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.9	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	8.9	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0	HCM Level of Service	A
Intersection Capacity Utilization	15.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	17	4	374	233	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	18	4	407	253	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	468	129	259			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	468	129	259			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	522	896	1303			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	18	140	271	169	90
Volume Left	0	4	0	0	0
Volume Right	18	0	0	0	5
cSH	896	1303	1700	1700	1700
Volume to Capacity	0.02	0.00	0.16	0.10	0.05
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	9.1	0.3	0.0	0.0	0.0
Lane LOS	A	A			
Approach Delay (s)	9.1	0.1		0.0	
Approach LOS	A				

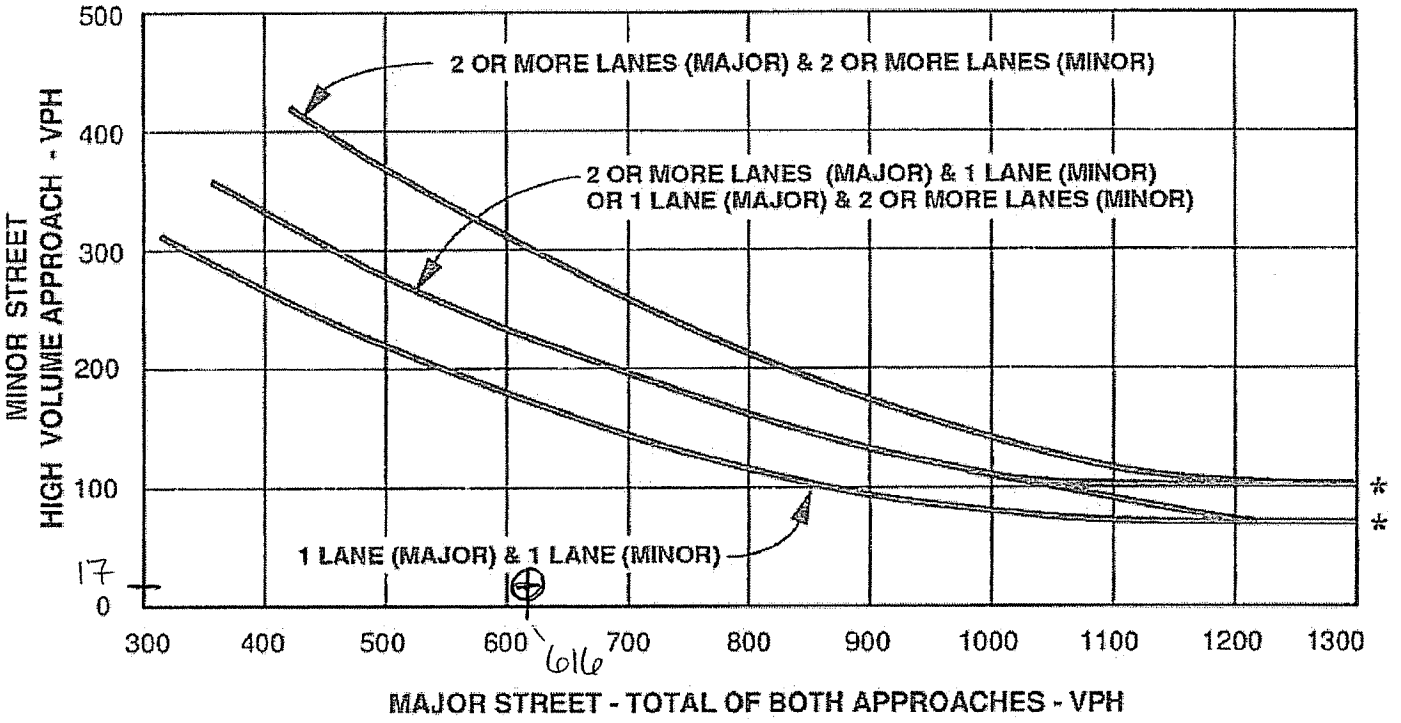
Intersection Summary			
Average Delay	0.3	HCM Level of Service	A
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

Kaiser Ln & South Union

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More..6160..	1..170..
2 or More.....	2 or More.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More..6160..	1..170..
2 or More.....	2 or More.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied __X__

No one condition satisfied, but following conditions fulfilled 80% or more..... 51% (A) 41% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: SR 99 Southbound On/Off Ramp & Costajo St - AM Peak
Count Date: *7/18/2007*

Exist Peak Hour Volumes

U		
1	WBL	125
0	WBT	0
1	WBR	25
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
1	NBT	18
1	NBR	26
>	SBL	9
1	SBT	34
0	SBR	0
	TOTAL	237

Year 2035
Fut. Volumes w/o Proj

WBL	334
WBT	0
WBR	67
EBL	0
EBT	0
EBR	0
NBL	0
NBT	32
NBR	64
SBL	22
SBT	61
SBR	0
TOTAL	581

Year 2035 Fut. Vol
+ Project Traffic

WBL	334
WBT	0
WBR	67
EBL	0
EBT	0
EBR	0
NBL	0
NBT	32
NBR	66
SBL	22
SBT	61
SBR	0
TOTAL	583

Year 2020
Fut. Volumes w/o Proj

WBL	222
WBT	0
WBR	44
EBL	0
EBT	0
EBR	0
NBL	0
NBT	25
NBR	44
SBL	15
SBT	47
SBR	0
TOTAL	396

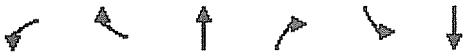
Year 2020 Fut. Vol
+ Project Traffic

WBL	222
WBT	0
WBR	44
EBL	0
EBT	0
EBR	0
NBL	0
NBT	25
NBR	46
SBL	15
SBT	47
SBR	0
TOTAL	398

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	2	1	1
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	2	1	1

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	SR 99 Southbound On/Off Ramp & Costajo St - AM Peak						
	Count Date:	7/18/2007						
2007	ADT							
WB Approach (To)	2.29							
WB Approach (Away)	0.03							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	9.1		WBL	2.88	WBT	2.48	WBR	2.88
WB Approach (Away)	0.1		3.58%	334	2.52%	0	3.58%	67
EB Approach (To)	*1*		EBL	1.40	EBT	2.17	EBR	1.40
EB Approach (Away)	*1*		1.06%	0	2.20%	0	1.06%	0
NB Approach (To)	*1.8*		NBL	1.40	NBT	1.80	NBR	2.57
NB Approach (Away)	*1.8*		1.06%	0	2.12%	32	3.26%	64
SB Approach (To)	*1.8*		SBL	2.57	SBT	1.80	SBR	1.40
SB Approach (Away)	*1.8*		3.26%	22	2.12%	61	1.06%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	8.5		WBL	2.75	WBT	2.35	WBR	2.75
WB Approach (Away)	0.1		3.46%	323	2.39%	0	3.46%	65
EB Approach (To)	*1*		EBL	1.40	EBT	2.13	EBR	1.40
EB Approach (Away)	*1*		1.06%	0	2.16%	0	1.06%	0
NB Approach (To)	*1.8*		NBL	1.40	NBT	1.80	NBR	2.53
NB Approach (Away)	*1.8*		1.06%	0	2.12%	32	3.22%	63
SB Approach (To)	*1.8*		SBL	2.53	SBT	1.80	SBR	1.40
SB Approach (Away)	*1.8*		3.22%	22	2.12%	61	1.06%	0



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	125	25	18	26	9	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	27	20	28	10	37
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	76	20			48	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	76	20			48	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	97			99	
cM capacity (veh/h)	921	1058			1559	

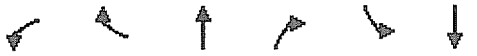
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	136	27	20	28	47
Volume Left	136	0	0	0	10
Volume Right	0	27	0	28	0
cSH	921	1058	1700	1700	1559
Volume to Capacity	0.15	0.03	0.01	0.02	0.01
Queue Length 95th (ft)	13	2	0	0	0
Control Delay (s)	9.6	8.5	0.0	0.0	1.6
Lane LOS	A	A			A
Approach Delay (s)	9.4		0.0		1.6
Approach LOS	A				

Intersection Summary			
Average Delay	6.2	HCM Level of Service	A
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	222	44	25	44	15	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	241	48	27	48	16	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	111	27			75	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	111	27			75	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	95			99	
cM capacity (veh/h)	877	1048			1524	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	241	48	27	48	67
Volume Left	241	0	0	0	16
Volume Right	0	48	0	48	0
cSH	877	1048	1700	1700	1524
Volume to Capacity	0.28	0.05	0.02	0.03	0.01
Queue Length 95th (ft)	28	4	0	0	1
Control Delay (s)	10.7	8.6	0.0	0.0	1.8
Lane LOS	B	A			A
Approach Delay (s)	10.3		0.0		1.8
Approach LOS	B				

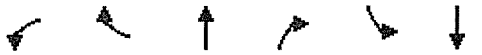
Intersection Summary			
Average Delay	7.2	HCM Level of Service	A
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	222	44	25	46	15	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	241	48	27	50	16	51
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	111	27			77	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	111	27			77	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	95			99	
cM capacity (veh/h)	877	1048			1521	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	241	48	27	50	67
Volume Left	241	0	0	0	16
Volume Right	0	48	0	50	0
cSH	877	1048	1700	1700	1521
Volume to Capacity	0.28	0.05	0.02	0.03	0.01
Queue Length 95th (ft)	28	4	0	0	1
Control Delay (s)	10.7	8.6	0.0	0.0	1.9
Lane LOS	B	A			A
Approach Delay (s)	10.3		0.0		1.9
Approach LOS	B				

Intersection Summary			
Average Delay	7.2	HCM Level of Service	A
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	334	67	32	64	22	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	363	73	35	70	24	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	149	35			104	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	149	35			104	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	93			98	
cM capacity (veh/h)	830	1038			1487	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	363	73	35	70	90
Volume Left	363	0	0	0	24
Volume Right	0	73	0	70	0
cSH	830	1038	1700	1700	1487
Volume to Capacity	0.44	0.07	0.02	0.04	0.02
Queue Length 95th (ft)	56	6	0	0	1
Control Delay (s)	12.7	8.7	0.0	0.0	2.1
Lane LOS	B	A			A
Approach Delay (s)	12.0		0.0		2.1
Approach LOS	B				

Intersection Summary			
Average Delay	8.6	HCM Level of Service	A
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	334	67	32	66	22	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	363	73	35	72	24	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	149	35			107	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	149	35			107	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	56	93			98	
cM capacity (veh/h)	830	1038			1484	

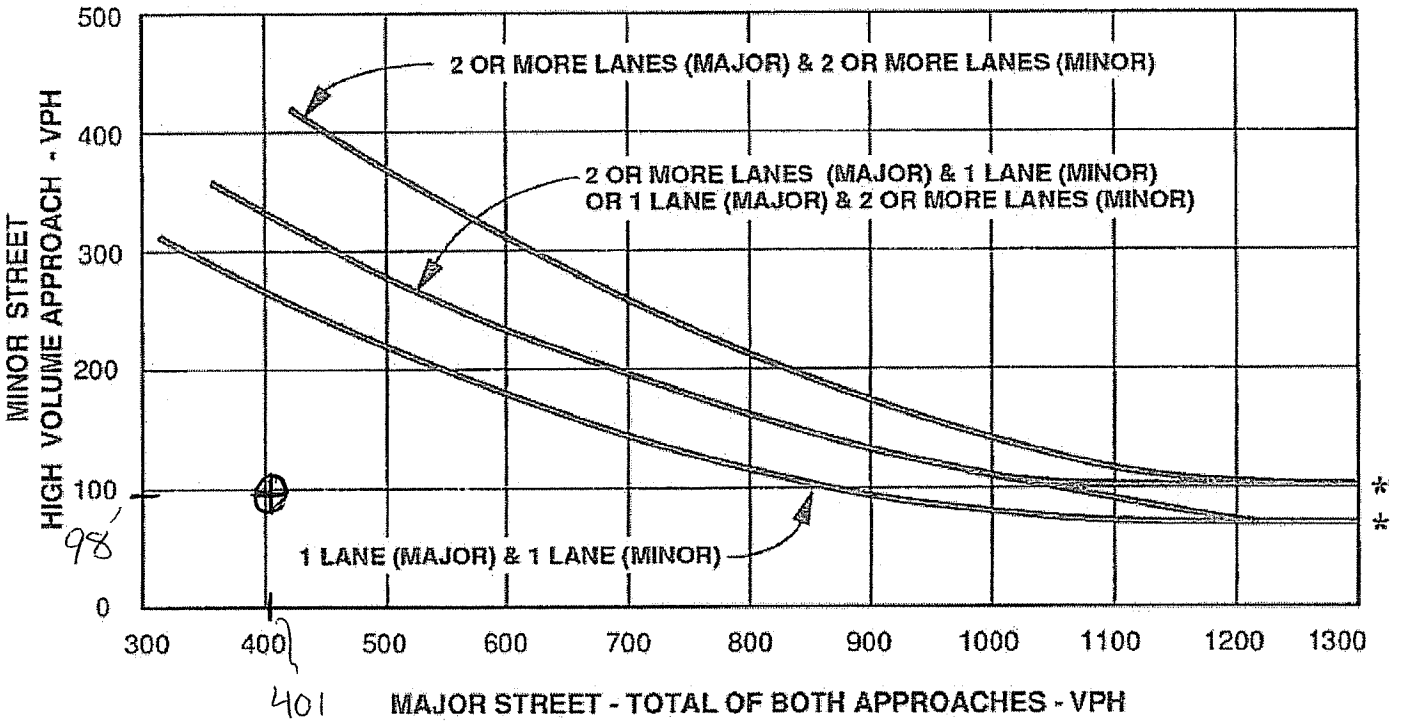
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	363	73	35	72	90
Volume Left	363	0	0	0	24
Volume Right	0	73	0	72	0
cSH	830	1038	1700	1700	1484
Volume to Capacity	0.44	0.07	0.02	0.04	0.02
Queue Length 95th (ft)	56	6	0	0	1
Control Delay (s)	12.7	8.7	0.0	0.0	2.1
Lane LOS	B	A			A
Approach Delay (s)	12.0		0.0		2.1
Approach LOS	B				

Intersection Summary			
Average Delay	8.6	HCM Level of Service	A
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

SR 99 Southbound On/Off Ramp & Costajo St
2035 With Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: SR 99 Southbound Off/On Ramp & Costajo St - PM Peak
Count Date: *7/17/2007*

Exist Peak Hour Volumes

U		
1	WBL	209
0	WBT	0
1	WBR	22
0	EBL	0
0	EBT	0
0	EBR	0
0	NBL	0
1	NBT	8
1	NBR	85
>	SBL	8
1	SBT	40
0	SBR	0
	TOTAL	372

Year 2035
Fut. Volumes w/o Proj

WBL	472
WBT	0
WBR	50
EBL	0
EBT	0
EBR	0
NBL	0
NBT	14
NBR	180
SBL	17
SBT	72
SBR	0
TOTAL	805

Year 2035 Fut. Vol
+ Project Traffic

WBL	489
WBT	0
WBR	50
EBL	0
EBT	0
EBR	0
NBL	0
NBT	14
NBR	182
SBL	17
SBT	72
SBR	0
TOTAL	824

Year 2020
Fut. Volumes w/o Proj

WBL	331
WBT	0
WBR	35
EBL	0
EBT	0
EBR	0
NBL	0
NBT	11
NBR	129
SBL	12
SBT	55
SBR	0
TOTAL	573

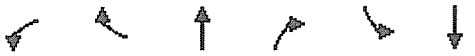
Year 2020 Fut. Vol
+ Project Traffic

WBL	348
WBT	0
WBR	35
EBL	0
EBT	0
EBR	0
NBL	0
NBT	11
NBR	131
SBL	12
SBT	55
SBR	0
TOTAL	592

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	17	17	0
WBT	0	0	0
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	2	0	2
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	19	17	2

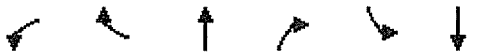
	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	SR 99 Southbound Off/On Ramp & Costajo St - PM Peak						
	Count Date:	7/17/2007						
2007	ADT							
WB Approach (To)	3.20							
WB Approach (Away)	0.04							
EB Approach (To)	*1*							
EB Approach (Away)	*1*							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	9.1		WBL	2.31	WBT	1.91	WBR	2.31
WB Approach (Away)	0.1		2.95%	472	1.89%	0	2.95%	50
EB Approach (To)	*1*		EBL	1.40	EBT	1.75	EBR	1.40
EB Approach (Away)	*1*		1.06%	0	1.66%	0	1.06%	0
NB Approach (To)	*1.8*		NBL	1.40	NBT	1.80	NBR	2.15
NB Approach (Away)	*1.8*		1.06%	0	2.12%	14	2.73%	180
SB Approach (To)	*1.8*		SBL	2.15	SBT	1.80	SBR	1.40
SB Approach (Away)	*1.8*		2.73%	17	2.12%	72	1.06%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	8.5		WBL	2.22	WBT	1.82	WBR	2.22
WB Approach (Away)	0.1		2.83%	457	1.77%	0	2.83%	48
EB Approach (To)	*1*		EBL	1.40	EBT	1.73	EBR	1.40
EB Approach (Away)	*1*		1.06%	0	1.63%	0	1.06%	0
NB Approach (To)	*1.8*		NBL	1.40	NBT	1.80	NBR	2.13
NB Approach (Away)	*1.8*		1.06%	0	2.12%	14	2.69%	179
SB Approach (To)	*1.8*		SBL	2.13	SBT	1.80	SBR	1.40
SB Approach (Away)	*1.8*		2.69%	17	2.12%	72	1.06%	0



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	209	22	8	85	8	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	227	24	9	92	9	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	70	9			101	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	70	9			101	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	98			99	
cM capacity (veh/h)	930	1073			1491	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	227	24	9	92	52
Volume Left	227	0	0	0	9
Volume Right	0	24	0	92	0
cSH	930	1073	1700	1700	1491
Volume to Capacity	0.24	0.02	0.01	0.05	0.01
Queue Length 95th (ft)	24	2	0	0	0
Control Delay (s)	10.1	8.4	0.0	0.0	1.3
Lane LOS	B	A			A
Approach Delay (s)	10.0		0.0		1.3
Approach LOS	A				

Intersection Summary			
Average Delay	6.3	HCM Level of Service	A
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	331	35	11	129	12	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	360	38	12	140	13	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	98	12			152	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	12			152	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	60	96			99	
cM capacity (veh/h)	893	1069			1429	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	360	38	12	140	73
Volume Left	360	0	0	0	13
Volume Right	0	38	0	140	0
cSH	893	1069	1700	1700	1429
Volume to Capacity	0.40	0.04	0.01	0.08	0.01
Queue Length 95th (ft)	49	3	0	0	1
Control Delay (s)	11.7	8.5	0.0	0.0	1.4
Lane LOS	B	A			A
Approach Delay (s)	11.4		0.0		1.4
Approach LOS	B				

Intersection Summary			
Average Delay	7.5	HCM Level of Service	A
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	348	35	11	131	12	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	378	38	12	142	13	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	98	12			154	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	98	12			154	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	58	96			99	
cM capacity (veh/h)	893	1069			1426	

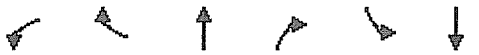
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	378	38	12	142	73
Volume Left	378	0	0	0	13
Volume Right	0	38	0	142	0
cSH	893	1069	1700	1700	1426
Volume to Capacity	0.42	0.04	0.01	0.08	0.01
Queue Length 95th (ft)	53	3	0	0	1
Control Delay (s)	12.0	8.5	0.0	0.0	1.4
Lane LOS	B	A			A
Approach Delay (s)	11.6		0.0		1.4
Approach LOS	B				

Intersection Summary			
Average Delay	7.7	HCM Level of Service	A
Intersection Capacity Utilization	36.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	472	50	14	180	17	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	513	54	15	196	18	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	130	15			211	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130	15			211	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	40	95			99	
cM capacity (veh/h)	852	1064			1360	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	513	54	15	196	97
Volume Left	513	0	0	0	18
Volume Right	0	54	0	196	0
cSH	852	1064	1700	1700	1360
Volume to Capacity	0.60	0.05	0.01	0.12	0.01
Queue Length 95th (ft)	103	4	0	0	1
Control Delay (s)	15.4	8.6	0.0	0.0	1.6
Lane LOS	C	A			A
Approach Delay (s)	14.8		0.0		1.6
Approach LOS	B				

Intersection Summary			
Average Delay	9.7	HCM Level of Service	A
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	489	50	14	182	17	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	532	54	15	198	18	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	130	15			213	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130	15			213	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	38	95			99	
cM capacity (veh/h)	852	1064			1357	

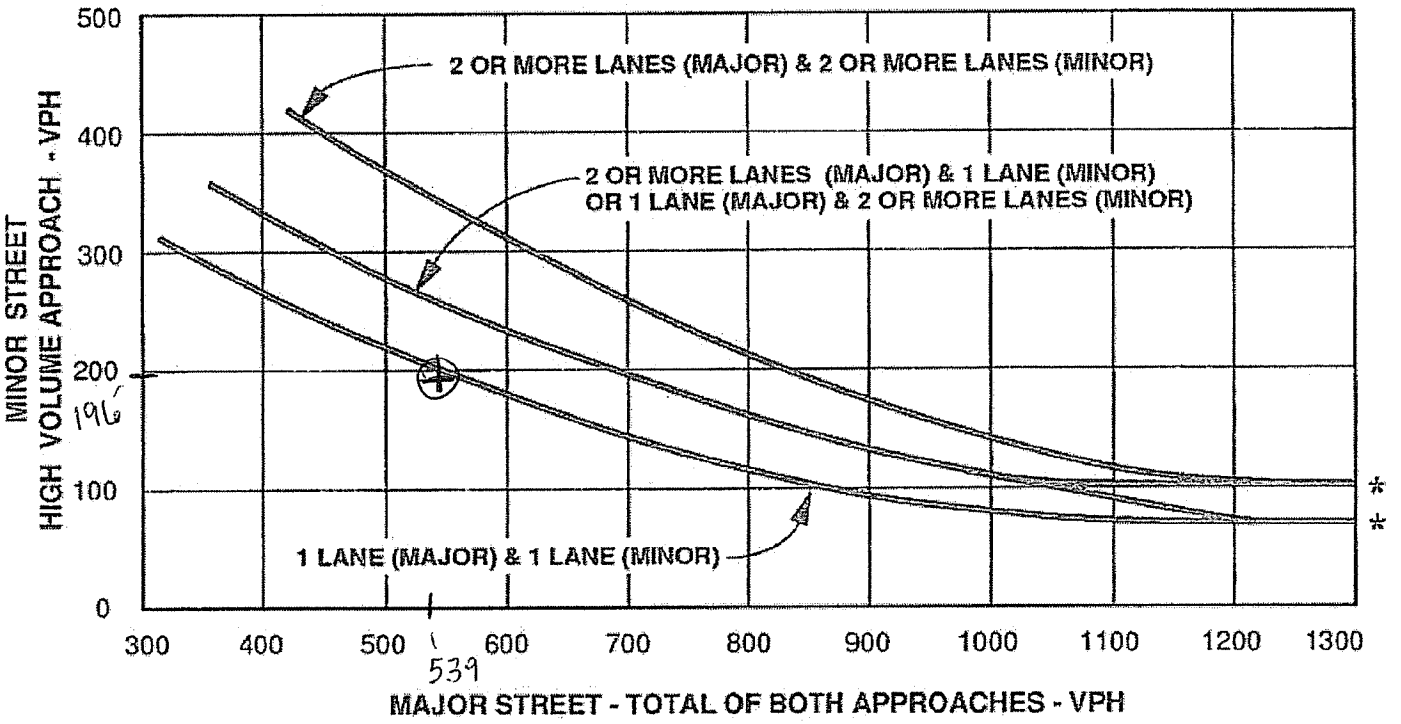
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	532	54	15	198	97
Volume Left	532	0	0	0	18
Volume Right	0	54	0	198	0
cSH	852	1064	1700	1700	1357
Volume to Capacity	0.62	0.05	0.01	0.12	0.01
Queue Length 95th (ft)	112	4	0	0	1
Control Delay (s)	16.0	8.6	0.0	0.0	1.6
Lane LOS	C	A			A
Approach Delay (s)	15.3		0.0		1.6
Approach LOS	C				

Intersection Summary			
Average Delay	10.2	HCM Level of Service	B
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

SR 99 SouthBound Ramps & Costajo St
2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More..5390.....	2 or More..1960.....
1.....	2 or More.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More..5390.....	2 or More..1960.....
1.....	2 or More.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied __X__

No one condition satisfied, but following conditions fulfilled 80% or more..... 84% (A) 77% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & Costajo St - AM Peak
Count Date: 7/18/2007

Exist Peak Hour Volumes

U		
0	WBL	0
1	WBT	50
1	WBR	24
>	EBL	20
1	EBT	56
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
1	SBL	110
0	SBT	0
1	SBR	49
	TOTAL	309

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	117
WBR	29
EBL	16
EBT	132
EBR	0
NBL	0
NBT	0
NBR	0
SBL	407
SBT	0
SBR	120
TOTAL	820

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	120
WBR	31
EBL	16
EBT	135
EBR	0
NBL	0
NBT	0
NBR	0
SBL	407
SBT	0
SBR	120
TOTAL	828

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	81
WBR	26
EBL	18
EBT	91
EBR	0
NBL	0
NBT	0
NBR	0
SBL	248
SBT	0
SBR	82
TOTAL	546

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	84
WBR	28
EBL	18
EBT	94
EBR	0
NBL	0
NBT	0
NBR	0
SBL	248
SBT	0
SBR	82
TOTAL	554

Project Generated Trips - Year 2035

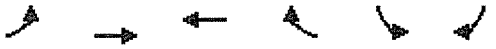
	Total	Indus.	Commer.
WBL	0	0	0
WBT	3	1	2
WBR	2	1	1
EBL	0	0	0
EBT	3	1	2
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	8	3	5

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & Costajo St - AM Peak						
	Count Date:	7/18/2007						
2006	ADT							
WB Approach (To)	0.35							
WB Approach (Away)	2.65							
EB Approach (To)	0.99							
EB Approach (Away)	1.20							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	2.27							
SB Approach (Away)	0.26							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj		ADJUSTMENTS
WB Approach (To)	1.3		WBL	2.32	WBT	2.61	WBR	2.01
WB Approach (Away)	9.9		2.29%	0	3.09%	117	0.66%	29
EB Approach (To)	1.5		EBL	0.97	EBT	2.64	EBR	1.28
EB Approach (Away)	1.9		-0.86%	16	3.10%	132	0.77%	0
NB Approach (To)	*1*		NBL	1.29	NBT	0.69	NBR	2.36
NB Approach (Away)	*1*		0.80%	0	-1.63%	0	2.33%	0
SB Approach (To)	9.1		SBL	3.86	SBT	2.49	SBR	2.78
SB Approach (Away)	0.1		4.79%	407	2.46%	0	3.25%	120
2035	ADT with Proj		2007	TO	2035	ADT with Proj		ADJUSTMENTS
WB Approach (To)	1.2		WBL	2.22	WBT	2.48	WBR	3.60
WB Approach (Away)	9.3		2.19%	0	2.93%	112	4.54%	83
EB Approach (To)	1.5		EBL	2.65	EBT	2.51	EBR	1.26
EB Approach (Away)	1.8		3.09%	47	2.95%	126	0.73%	0
NB Approach (To)	*1*		NBL	1.26	NBT	2.38	NBR	2.25
NB Approach (Away)	*1*		0.74%	0	2.35%	0	2.21%	0
SB Approach (To)	8.5		SBL	3.61	SBT	2.37	SBR	2.63
SB Approach (Away)	1.0		4.55%	382	2.33%	0	3.07%	114

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	20	56	50	24	110	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	61	54	26	120	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	80				159	54
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	80				159	54
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				85	95
cM capacity (veh/h)	1517				820	1013

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	83	54	26	120	53
Volume Left	22	0	0	120	0
Volume Right	0	0	26	0	53
cSH	1517	1700	1700	820	1013
Volume to Capacity	0.01	0.03	0.02	0.15	0.05
Queue Length 95th (ft)	1	0	0	13	4
Control Delay (s)	2.0	0.0	0.0	10.1	8.8
Lane LOS	A			B	A
Approach Delay (s)	2.0	0.0		9.7	
Approach LOS				A	

Intersection Summary			
Average Delay	5.5	HCM Level of Service	A
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	91	81	26	248	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	99	88	28	270	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	116				226	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	116				226	88
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				64	91
cM capacity (veh/h)	1472				752	970

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	118	88	28	270	89
Volume Left	20	0	0	270	0
Volume Right	0	0	28	0	89
cSH	1472	1700	1700	752	970
Volume to Capacity	0.01	0.05	0.02	0.36	0.09
Queue Length 95th (ft)	1	0	0	41	8
Control Delay (s)	1.3	0.0	0.0	12.4	9.1
Lane LOS	A			B	A
Approach Delay (s)	1.3	0.0		11.6	
Approach LOS				B	

Intersection Summary			
Average Delay	7.3	HCM Level of Service	A
Intersection Capacity Utilization	32.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	94	84	28	248	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	102	91	30	270	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	122				233	91
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				233	91
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				64	91
cM capacity (veh/h)	1466				745	966

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	122	91	30	270	89
Volume Left	20	0	0	270	0
Volume Right	0	0	30	0	89
cSH	1466	1700	1700	745	966
Volume to Capacity	0.01	0.05	0.02	0.36	0.09
Queue Length 95th (ft)	1	0	0	41	8
Control Delay (s)	1.3	0.0	0.0	12.5	9.1
Lane LOS	A			B	A
Approach Delay (s)	1.3	0.0		11.7	
Approach LOS				B	

Intersection Summary			
Average Delay	7.2	HCM Level of Service	A
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	16	132	117	29	407	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	143	127	32	442	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	159				305	127
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	159				305	127
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				35	86
cM capacity (veh/h)	1421				678	923

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	161	127	32	442	130
Volume Left	17	0	0	442	0
Volume Right	0	0	32	0	130
cSH	1421	1700	1700	678	923
Volume to Capacity	0.01	0.07	0.02	0.65	0.14
Queue Length 95th (ft)	1	0	0	121	12
Control Delay (s)	0.9	0.0	0.0	19.7	9.5
Lane LOS	A			C	A
Approach Delay (s)	0.9	0.0		17.4	
Approach LOS				C	

Intersection Summary			
Average Delay	11.3	HCM Level of Service	B
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	16	135	120	31	407	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	147	130	34	442	130
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			908			
pX, platoon unblocked						
vC, conflicting volume	164				312	130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	164				312	130
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				34	86
cM capacity (veh/h)	1414				672	919

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	164	130	34	442	130
Volume Left	17	0	0	442	0
Volume Right	0	0	34	0	130
cSH	1414	1700	1700	672	919
Volume to Capacity	0.01	0.08	0.02	0.66	0.14
Queue Length 95th (ft)	1	0	0	123	12
Control Delay (s)	0.9	0.0	0.0	20.0	9.6
Lane LOS	A			C	A
Approach Delay (s)	0.9	0.0		17.7	
Approach LOS				C	

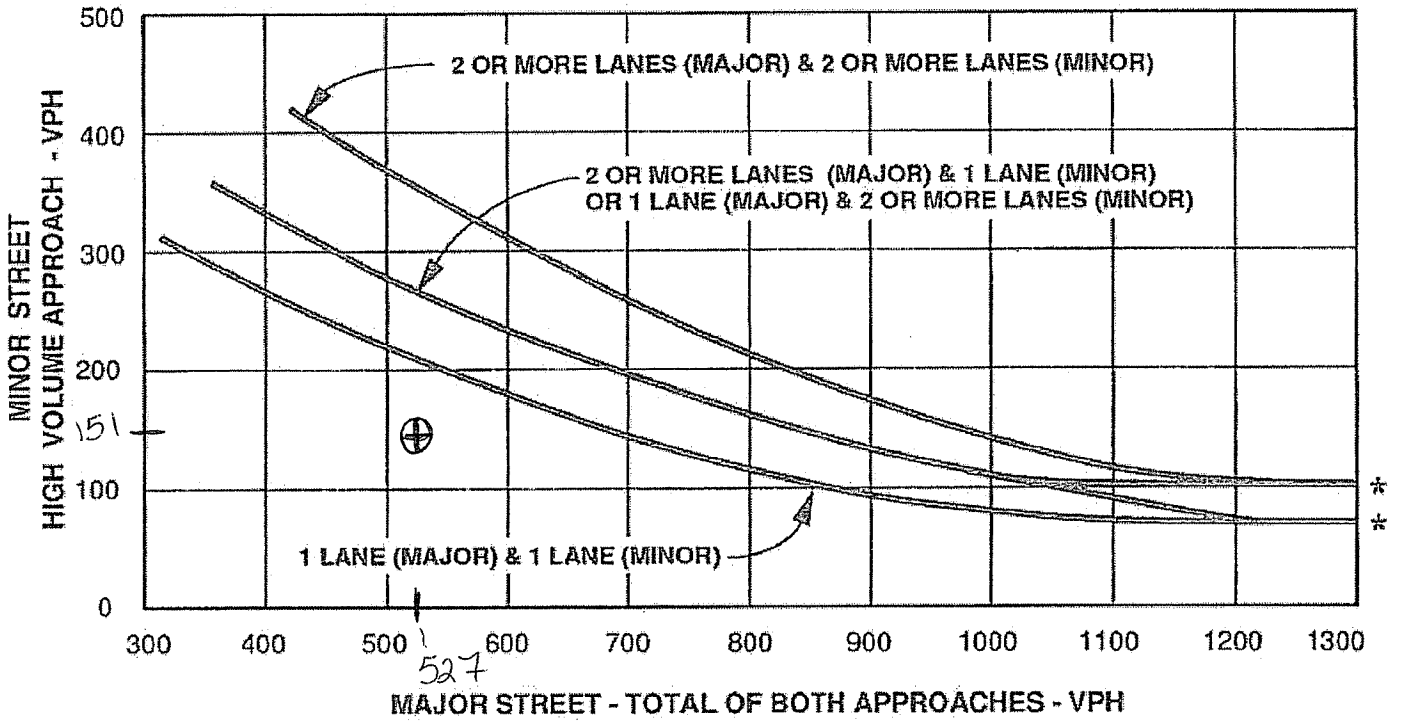
Intersection Summary			
Average Delay	11.4	HCM Level of Service	B
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 & Costajo St

2035 with Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & Costajo St - PM Peak
Count Date: 7/17/2007

Exist Peak Hour Volumes

U		
0	WBL	0
1	WBT	107
1	WBR	52
>	EBL	41
1	EBT	126
0	EBR	0
0	NBL	0
0	NBT	0
0	NBR	0
1	SBL	160
0	SBT	0
1	SBR	89
	TOTAL	575

Year 2035
Fut. Volumes w/o Proj

WBL	0
WBT	163
WBR	45
EBL	22
EBT	192
EBR	0
NBL	0
NBT	0
NBR	0
SBL	422
SBT	0
SBR	148
TOTAL	991

Year 2035 Fut. Vol
+ Project Traffic

WBL	0
WBT	167
WBR	47
EBL	22
EBT	192
EBR	0
NBL	0
NBT	0
NBR	0
SBL	422
SBT	0
SBR	165
TOTAL	1014

Year 2020
Fut. Volumes w/o Proj

WBL	0
WBT	133
WBR	49
EBL	32
EBT	156
EBR	0
NBL	0
NBT	0
NBR	0
SBL	281
SBT	0
SBR	116
TOTAL	768

Year 2020 Fut. Vol
+ Project Traffic

WBL	0
WBT	137
WBR	51
EBL	32
EBT	156
EBR	0
NBL	0
NBT	0
NBR	0
SBL	281
SBT	0
SBR	133
TOTAL	791

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	4	2	2
WBR	2	0	2
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	0	0	0
SBL	0	0	0
SBT	0	0	0
SBR	17	17	0
TOTAL	23	19	4

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & Costajo St - PM Peak						
	Count Date:	7/17/2007						
2006	ADT							
WB Approach (To)	0.51							
WB Approach (Away)	3.94							
EB Approach (To)	1.64							
EB Approach (Away)	1.99							
NB Approach (To)	*1*							
NB Approach (Away)	*1*							
SB Approach (To)	3.07							
SB Approach (Away)	0.35							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	1.3		WBL	1.75	WBT	1.72	WBR	1.39
WB Approach (Away)	9.9		1.61%	0	1.53%	163	-0.51%	45
EB Approach (To)	1.5		EBL	0.61	EBT	1.72	EBR	0.97
EB Approach (Away)	1.9		-2.23%	22	1.51%	192	-0.11%	0
NB Approach (To)	*1*		NBL	0.98	NBT	0.64	NBR	1.75
NB Approach (Away)	*1*		-0.08%	0	-2.12%	0	1.62%	0
SB Approach (To)	9.1		SBL	2.73	SBT	1.97	SBR	1.95
SB Approach (Away)	0.1		3.53%	422	1.91%	0	1.83%	148
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	1.2		WBL	1.68	WBT	1.64	WBR	2.58
WB Approach (Away)	9.3		1.51%	0	1.37%	156	3.33%	130
EB Approach (To)	1.5		EBL	1.86	EBT	1.63	EBR	0.96
EB Approach (Away)	1.8		1.67%	65	1.36%	184	-0.15%	0
NB Approach (To)	*1*		NBL	0.96	NBT	1.90	NBR	1.67
NB Approach (Away)	*1*		-0.14%	0	1.82%	0	1.50%	0
SB Approach (To)	8.5		SBL	2.55	SBT	1.88	SBR	1.84
SB Approach (Away)	1.0		3.29%	396	1.79%	0	1.65%	141

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	41	126	107	52	160	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	137	116	57	174	97
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	173				342	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	173				342	116
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				73	90
cM capacity (veh/h)	1404				633	936

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	182	116	57	174	97
Volume Left	45	0	0	174	0
Volume Right	0	0	57	0	97
cSH	1404	1700	1700	633	936
Volume to Capacity	0.03	0.07	0.03	0.27	0.10
Queue Length 95th (ft)	2	0	0	28	9
Control Delay (s)	2.1	0.0	0.0	12.8	9.3
Lane LOS	A			B	A
Approach Delay (s)	2.1	0.0		11.6	
Approach LOS				B	

Intersection Summary			
Average Delay	5.6	HCM Level of Service	A
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	32	156	133	49	281	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	170	145	53	305	126
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	198				384	145
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	198				384	145
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				49	86
cM capacity (veh/h)	1375				603	903

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	204	145	53	305	126
Volume Left	35	0	0	305	0
Volume Right	0	0	53	0	126
cSH	1375	1700	1700	603	903
Volume to Capacity	0.03	0.09	0.03	0.51	0.14
Queue Length 95th (ft)	2	0	0	71	12
Control Delay (s)	1.5	0.0	0.0	16.9	9.6
Lane LOS	A			C	A
Approach Delay (s)	1.5	0.0		14.8	
Approach LOS				B	

Intersection Summary			
Average Delay	8.0	HCM Level of Service	A
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	32	156	137	51	281	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	170	149	55	305	145
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	204				388	149
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	204				388	149
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				49	84
cM capacity (veh/h)	1367				600	898

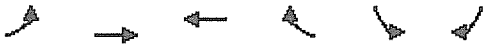
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	204	149	55	305	145
Volume Left	35	0	0	305	0
Volume Right	0	0	55	0	145
cSH	1367	1700	1700	600	898
Volume to Capacity	0.03	0.09	0.03	0.51	0.16
Queue Length 95th (ft)	2	0	0	72	14
Control Delay (s)	1.5	0.0	0.0	17.1	9.8
Lane LOS	A			C	A
Approach Delay (s)	1.5	0.0		14.7	
Approach LOS				B	

Intersection Summary			
Average Delay	8.1	HCM Level of Service	A
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	22	192	163	45	422	148
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	209	177	49	459	161
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	226				434	177
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	226				434	177
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				19	81
cM capacity (veh/h)	1342				569	866

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	233	177	49	459	161
Volume Left	24	0	0	459	0
Volume Right	0	0	49	0	161
cSH	1342	1700	1700	569	866
Volume to Capacity	0.02	0.10	0.03	0.81	0.19
Queue Length 95th (ft)	1	0	0	198	17
Control Delay (s)	0.9	0.0	0.0	32.5	10.1
Lane LOS	A			D	B
Approach Delay (s)	0.9	0.0		26.7	
Approach LOS				D	

Intersection Summary			
Average Delay	15.5	HCM Level of Service	C
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	22	192	167	47	422	165
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	209	182	51	459	179
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			908			
pX, platoon unblocked						
vC, conflicting volume	233				438	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	233				438	182
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				19	79
cM capacity (veh/h)	1335				566	861

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	233	182	51	459	179
Volume Left	24	0	0	459	0
Volume Right	0	0	51	0	179
cSH	1335	1700	1700	566	861
Volume to Capacity	0.02	0.11	0.03	0.81	0.21
Queue Length 95th (ft)	1	0	0	201	20
Control Delay (s)	0.9	0.0	0.0	33.1	10.3
Lane LOS	A			D	B
Approach Delay (s)	0.9	0.0		26.7	
Approach LOS				D	

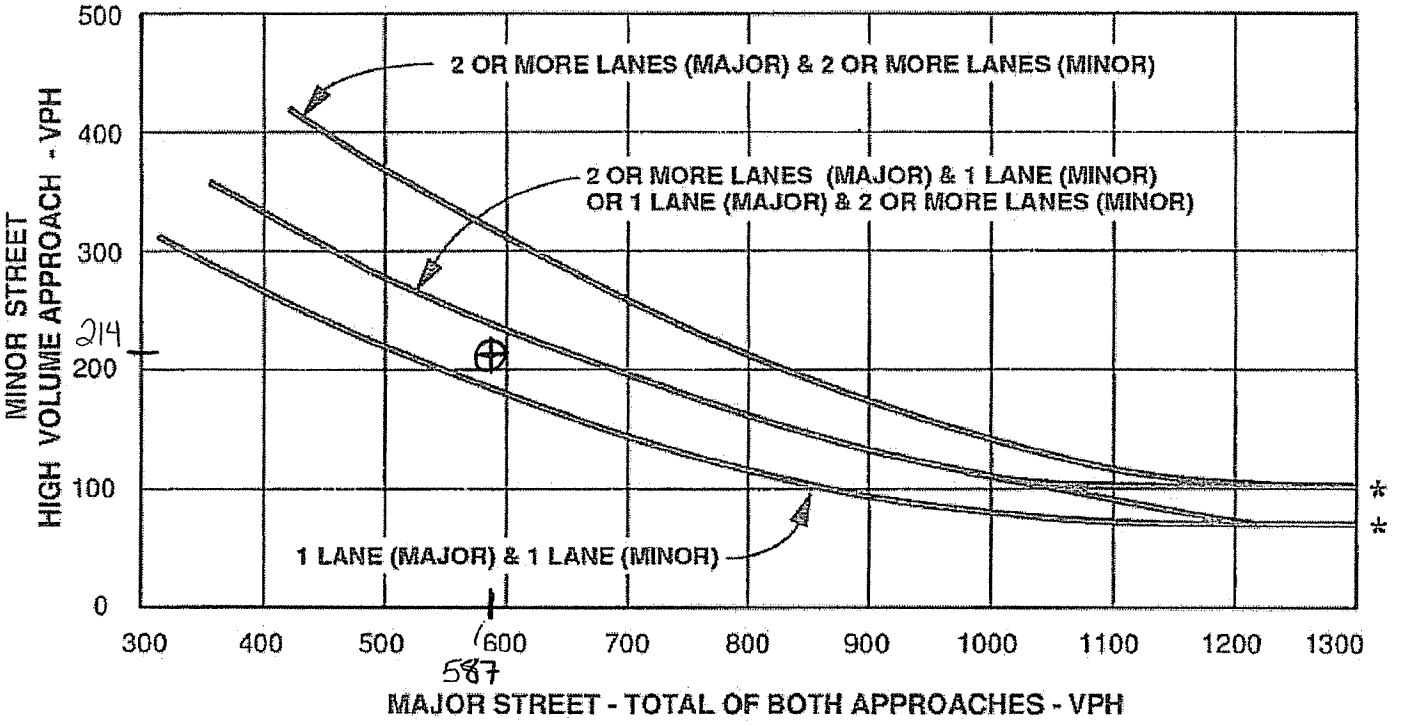
Intersection Summary			
Average Delay	15.6	HCM Level of Service	C
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 & Costajo St

2035 with Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☐ NO ☒

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X.....

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....	2 or More.....
1.....5870.....	2 or More.....2140.....

Minimum Requirements EADT			
Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
8,000	5,600	2,400	1,680
9,600	6,720	2,400	1,680
9,600	6,720	3,200	2,240
8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied _____ Not Satisfied ___X___

Number of lanes for moving traffic on each approach

Major Street	Minor Street
1.....	1.....
2 or More.....	1.....
2 or More.....	2 or More.....
1.....5870.....	2 or More.....2140.....

Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Urban	Rural	Urban	Rural
12,000	8,400	1,200	850
14,400	10,080	1,200	850
14,400	10,080	1,600	1,120
12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied ___X___

No one condition satisfied, but following conditions fulfilled 80% or more..... 96% (A) 70% (B)

2 CONDITIONS 80%	2 CONDITIONS 80%

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & SR 99 Northbound Ramp - AM Peak
Count Date: 7/19/2007

Exist Peak Hour Volumes

U		
>	WBL	115
1	WBT	70
0	WBR	0
0	EBL	0
1	EBT	152
1	EBR	36
1	NBL	22
0	NBT	0
1	NBR	7
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	402

Year 2035
Fut. Volumes w/o Proj

WBL	532
WBT	276
WBR	0
EBL	0
EBT	581
EBR	135
NBL	86
NBT	0
NBR	33
SBL	0
SBT	0
SBR	0
TOTAL	1642

Year 2035 Fut. Vol
+ Project Traffic

WBL	532
WBT	280
WBR	0
EBL	0
EBT	584
EBR	135
NBL	86
NBT	0
NBR	39
SBL	0
SBT	0
SBR	0
TOTAL	1655

Year 2020
Fut. Volumes w/o Proj

WBL	308
WBT	165
WBR	0
EBL	0
EBT	351
EBR	82
NBL	51
NBT	0
NBR	19
SBL	0
SBT	0
SBR	0
TOTAL	976

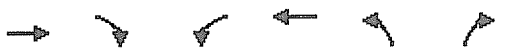
Year 2020 Fut. Vol
+ Project Traffic

WBL	308
WBT	169
WBR	0
EBL	0
EBT	354
EBR	82
NBL	51
NBT	0
NBR	25
SBL	0
SBT	0
SBR	0
TOTAL	989

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	4	2	2
WBR	0	0	0
EBL	0	0	0
EBT	3	1	2
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	6	5	1
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	13	8	5

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & SR 99 Northbound Ramp - AM Peak						
	Count Date:	7/19/2007						
2007	ADT							
WB Approach (To)	2.20							
WB Approach (Away)	2.10							
EB Approach (To)	3.10							
EB Approach (Away)	0.40							
NB Approach (To)	0.02							
NB Approach (Away)	2.23							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	10.7		WBL	4.63	WBT	4.03	WBR	2.94
WB Approach (Away)	9.6		5.63%	532	5.03%	276	2.91%	0
EB Approach (To)	9.9		EBL	2.09	EBT	3.89	EBR	3.78
EB Approach (Away)	1.3		2.11%	0	4.91%	581	4.83%	135
NB Approach (To)	0.1		NBL	3.97	NBT	2.88	NBR	4.67
NB Approach (Away)	9.8		4.98%	86	2.86%	0	5.66%	33
SB Approach (To)	*1*		SBL	2.79	SBT	2.69	SBR	2.09
SB Approach (Away)	*1*		2.80%	0	2.71%	0	2.11%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	9.4		WBL	4.06	WBT	3.65	WBR	2.64
WB Approach (Away)	9.0		5.14%	467	4.68%	252	2.67%	0
EB Approach (To)	9.3		EBL	1.99	EBT	3.64	EBR	3.41
EB Approach (Away)	1.2		1.99%	0	4.67%	544	4.46%	122
NB Approach (To)	0.1		NBL	3.83	NBT	2.83	NBR	4.47
NB Approach (Away)	8.6		4.83%	82	2.82%	0	5.50%	31
SB Approach (To)	*1*		SBL	2.65	SBT	2.42	SBR	2.01
SB Approach (Away)	*1*		2.67%	0	2.46%	0	2.01%	0



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	152	36	115	70	22	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	165	39	125	76	24	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			204		491	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			204		491	165
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		95	99
cM capacity (veh/h)			1367		487	879

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	165	39	201	24	8
Volume Left	0	0	125	24	0
Volume Right	0	39	0	0	8
cSH	1700	1700	1367	487	879
Volume to Capacity	0.10	0.02	0.09	0.05	0.01
Queue Length 95th (ft)	0	0	8	4	1
Control Delay (s)	0.0	0.0	5.2	12.8	9.1
Lane LOS			A	B	A
Approach Delay (s)	0.0		5.2	11.9	
Approach LOS				B	

Intersection Summary			
Average Delay	3.2	HCM Level of Service	A
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	351	82	308	165	51	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	382	89	335	179	55	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			471		1230	382
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			471		1230	382
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		59	97
cM capacity (veh/h)			1091		136	666

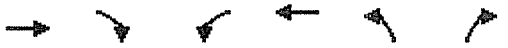
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	382	89	514	55	21
Volume Left	0	0	335	55	0
Volume Right	0	89	0	0	21
cSH	1700	1700	1091	136	666
Volume to Capacity	0.22	0.05	0.31	0.41	0.03
Queue Length 95th (ft)	0	0	33	44	2
Control Delay (s)	0.0	0.0	7.5	48.7	10.6
Lane LOS			A	E	B
Approach Delay (s)	0.0		7.5	38.3	
Approach LOS				E	

Intersection Summary			
Average Delay	6.4	HCM Level of Service	A
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	354	82	308	169	51	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	385	89	335	184	55	27
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			474		1238	385
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			474		1238	385
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			69		59	96
cM capacity (veh/h)			1088		134	663

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	385	89	518	55	27
Volume Left	0	0	335	55	0
Volume Right	0	89	0	0	27
cSH	1700	1700	1088	134	663
Volume to Capacity	0.23	0.05	0.31	0.41	0.04
Queue Length 95th (ft)	0	0	33	45	3
Control Delay (s)	0.0	0.0	7.5	49.5	10.7
Lane LOS			A	E	B
Approach Delay (s)	0.0		7.5	36.7	
Approach LOS				E	

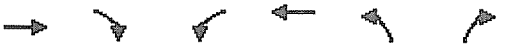
Intersection Summary			
Average Delay	6.4	HCM Level of Service	A
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	581	135	532	276	86	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	632	147	578	300	93	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			778		2088	632
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			778		2088	632
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			31		0	93
cM capacity (veh/h)			838		18	481

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	632	147	878	93	36
Volume Left	0	0	578	93	0
Volume Right	0	147	0	0	36
cSH	1700	1700	838	18	481
Volume to Capacity	0.37	0.09	0.69	5.20	0.07
Queue Length 95th (ft)	0	0	142	Err	6
Control Delay (s)	0.0	0.0	17.2	Err	13.1
Lane LOS			C	F	B
Approach Delay (s)	0.0		17.2	7229.8	
Approach LOS				F	

Intersection Summary			
Average Delay	532.1	HCM Level of Service	F
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	581	135	532	276	86	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	632	147	578	300	93	36

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total (vph)	632	147	878	93	36
Volume Left (vph)	0	0	578	93	0
Volume Right (vph)	0	147	0	0	36
Hadj (s)	0.03	-0.57	0.17	0.23	-0.57
Departure Headway (s)	5.1	3.2	5.2	7.1	3.2
Degree Utilization, x	0.90	0.13	1.28	0.18	0.03
Capacity (veh/h)	695	1121	688	493	1121
Control Delay (s)	36.9	6.7	154.0	11.7	6.3
Approach Delay (s)	31.2		154.0	10.2	
Approach LOS	D		F	B	

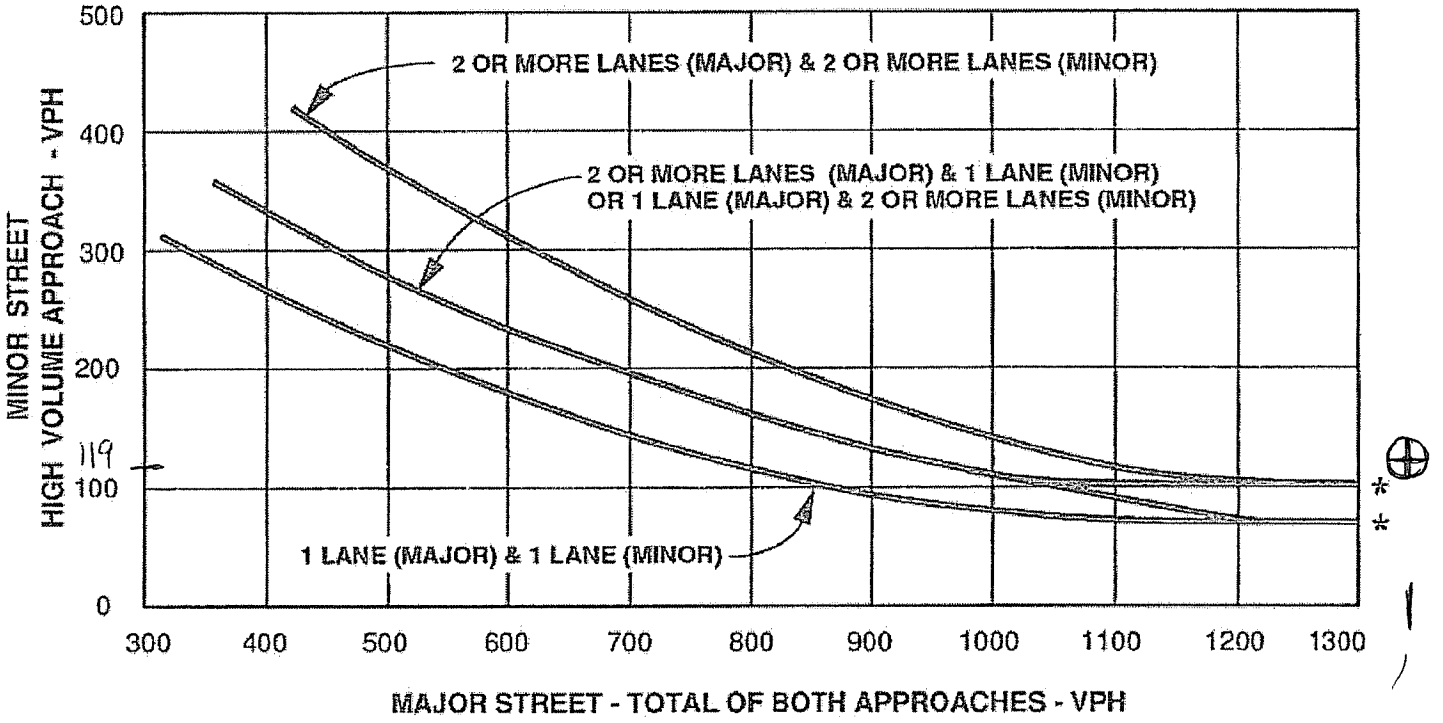
Intersection Summary			
Delay	90.0		
HCM Level of Service	F		
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 & SR 99 Northbound On/Off Ramp

2035 without Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

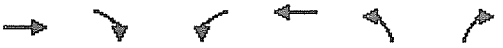
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h OR ABOVE 40 mph ON MAJOR STREET)



1524

*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.

SATISFIED YES ☒ NO ☐



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	3433	1863	1770	1583
Volume (vph)	581	135	532	276	86	33
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	632	147	578	300	93	36
RTOR Reduction (vph)	0	82	0	0	0	31
Lane Group Flow (vph)	632	65	578	300	93	5
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	28.3	28.3	16.6	48.9	8.9	8.9
Effective Green, g (s)	30.3	30.3	16.6	50.9	9.9	9.9
Actuated g/C Ratio	0.44	0.44	0.24	0.74	0.14	0.14
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	820	697	828	1378	255	228
v/s Ratio Prot	c0.34		c0.17	0.16	c0.05	
v/s Ratio Perm		0.04				0.00
v/c Ratio	0.77	0.09	0.70	0.22	0.36	0.02
Uniform Delay, d1	16.3	11.2	23.8	2.8	26.6	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.5	0.1	2.6	0.1	0.9	0.0
Delay (s)	20.8	11.3	26.4	2.9	27.5	25.3
Level of Service	C	B	C	A	C	C
Approach Delay (s)	19.0			18.4	26.9	
Approach LOS	B			B	C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰↰	↑	↰	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	3433	1863	1770	1583
Volume (vph)	584	135	532	280	86	39
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	635	147	578	304	93	42
RTOR Reduction (vph)	0	82	0	0	0	36
Lane Group Flow (vph)	635	65	578	304	93	6
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	28.3	28.3	16.6	48.9	8.9	8.9
Effective Green, g (s)	30.3	30.3	16.6	50.9	9.9	9.9
Actuated g/C Ratio	0.44	0.44	0.24	0.74	0.14	0.14
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	820	697	828	1378	255	228
v/s Ratio Prot	c0.34		c0.17	0.16	c0.05	
v/s Ratio Perm		0.04				0.00
v/c Ratio	0.77	0.09	0.70	0.22	0.36	0.03
Uniform Delay, d1	16.3	11.2	23.8	2.8	26.6	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.6	0.1	2.6	0.1	0.9	0.0
Delay (s)	20.9	11.3	26.4	2.9	27.5	25.4
Level of Service	C	B	C	A	C	C
Approach Delay (s)	19.1			18.3	26.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & SR 99 Northbound Ramp - PM Peak
Count Date: 7/18/2007

Exist Peak Hour Volumes

U		
>	WBL	142
1	WBT	92
0	WBR	0
0	EBL	0
1	EBT	235
1	EBR	87
1	NBL	17
0	NBT	0
1	NBR	18
0	SBL	0
0	SBT	0
0	SBR	0
	TOTAL	591

Year 2035 Fut. Volumes w/o Proj

WBL	570
WBT	305
WBR	0
EBL	0
EBT	762
EBR	271
NBL	48
NBT	0
NBR	64
SBL	0
SBT	0
SBR	0
TOTAL	2021

Year 2035 Fut. Vol + Project Traffic

WBL	570
WBT	310
WBR	0
EBL	0
EBT	762
EBR	271
NBL	48
NBT	0
NBR	65
SBL	0
SBT	0
SBR	0
TOTAL	2027

Year 2020 Fut. Volumes w/o Proj

WBL	341
WBT	191
WBR	0
EBL	0
EBT	479
EBR	172
NBL	31
NBT	0
NBR	40
SBL	0
SBT	0
SBR	0
TOTAL	1254

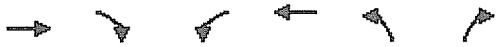
Year 2020 Fut. Vol + Project Traffic

WBL	341
WBT	196
WBR	0
EBL	0
EBT	479
EBR	172
NBL	31
NBT	0
NBR	41
SBL	0
SBT	0
SBR	0
TOTAL	1260

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	5	2	3
WBR	0	0	0
EBL	0	0	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	0	0	0
NBR	1	1	0
SBL	0	0	0
SBT	0	0	0
SBR	0	0	0
TOTAL	6	3	3

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & SR 99 Northbound Ramp - PM Peak						
	Count Date:	7/18/2007						
2007	ADT							
WB Approach (To)	2.49							
WB Approach (Away)	2.38							
EB Approach (To)	3.81							
EB Approach (Away)	0.50							
NB Approach (To)	0.03							
NB Approach (Away)	2.61							
SB Approach (To)	*1*							
SB Approach (Away)	*1*							
2035	ADT w/o Proj		2007	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	10.7		WBL	4.03	WBT	3.43	WBR	2.65
WB Approach (Away)	9.6		5.10%	570	4.38%	305	2.68%	0
EB Approach (To)	9.9		EBL	1.80	EBT	3.32	EBR	3.17
EB Approach (Away)	1.3		1.73%	0	4.29%	762	4.15%	271
NB Approach (To)	0.1		NBL	2.86	NBT	2.08	NBR	3.61
NB Approach (Away)	9.8		3.80%	48	2.10%	0	4.67%	64
SB Approach (To)	*1*		SBL	2.52	SBT	2.37	SBR	1.77
SB Approach (Away)	*1*		2.56%	0	2.42%	0	1.70%	0
2035	ADT with Proj		2007	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	9.4		WBL	3.54	WBT	3.10	WBR	2.39
WB Approach (Away)	9.0		4.61%	501	4.04%	278	2.44%	0
EB Approach (To)	9.3		EBL	1.71	EBT	3.11	EBR	2.85
EB Approach (Away)	1.2		1.61%	0	4.05%	713	3.78%	246
NB Approach (To)	0.1		NBL	2.75	NBT	2.05	NBR	3.44
NB Approach (Away)	8.6		3.66%	46	2.06%	0	4.50%	62
SB Approach (To)	*1*		SBL	2.39	SBT	2.14	SBR	1.70
SB Approach (Away)	*1*		2.44%	0	2.17%	0	1.60%	0



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	235	87	142	92	17	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	255	95	154	100	18	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			350		664	255
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			350		664	255
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		95	98
cM capacity (veh/h)			1209		371	783

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	255	95	254	18	20
Volume Left	0	0	154	18	0
Volume Right	0	95	0	0	20
cSH	1700	1700	1209	371	783
Volume to Capacity	0.15	0.06	0.13	0.05	0.02
Queue Length 95th (ft)	0	0	11	4	2
Control Delay (s)	0.0	0.0	5.6	15.2	9.7
Lane LOS			A	C	A
Approach Delay (s)	0.0		5.6	12.4	
Approach LOS				B	

Intersection Summary			
Average Delay	2.9	HCM Level of Service	A
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	479	172	341	191	31	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	521	187	371	208	34	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			708		1470	521
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			708		1470	521
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			58		59	92
cM capacity (veh/h)			891		82	556

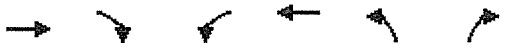
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	521	187	578	34	43
Volume Left	0	0	371	34	0
Volume Right	0	187	0	0	43
cSH	1700	1700	891	82	556
Volume to Capacity	0.31	0.11	0.42	0.41	0.08
Queue Length 95th (ft)	0	0	52	41	6
Control Delay (s)	0.0	0.0	9.6	76.7	12.0
Lane LOS			A	F	B
Approach Delay (s)	0.0		9.6	40.3	
Approach LOS				E	

Intersection Summary			
Average Delay	6.4	HCM Level of Service	A
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	479	172	341	196	31	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	521	187	371	213	34	45
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			708		1475	521
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			708		1475	521
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			58		59	92
cM capacity (veh/h)			891		81	556

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	521	187	584	34	45
Volume Left	0	0	371	34	0
Volume Right	0	187	0	0	45
cSH	1700	1700	891	81	556
Volume to Capacity	0.31	0.11	0.42	0.41	0.08
Queue Length 95th (ft)	0	0	52	42	7
Control Delay (s)	0.0	0.0	9.6	77.6	12.0
Lane LOS			A	F	B
Approach Delay (s)	0.0		9.6	40.3	
Approach LOS				E	

Intersection Summary			
Average Delay	6.4	HCM Level of Service	A
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	762	271	570	305	48	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	828	295	620	332	52	70
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1123		2399	828
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1123		2399	828
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	81
cM capacity (veh/h)			622		0	371

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	828	295	951	52	70
Volume Left	0	0	620	52	0
Volume Right	0	295	0	0	70
cSH	1700	1700	622	0	371
Volume to Capacity	0.49	0.17	1.00	347.79	0.19
Queue Length 95th (ft)	0	0	377	Err	17
Control Delay (s)	0.0	0.0	65.8	Err	16.9
Lane LOS			F	F	C
Approach Delay (s)	0.0		65.8	4295.0	
Approach LOS				F	

Intersection Summary			
Average Delay	266.7	HCM Level of Service	F
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	762	271	570	305	48	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	828	295	620	332	52	70

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total (vph)	828	295	620	332	52	70
Volume Left (vph)	0	0	620	0	52	0
Volume Right (vph)	0	295	0	0	0	70
Hadj (s)	0.03	-0.57	0.53	0.03	0.23	-0.57
Departure Headway (s)	5.1	3.2	5.8	5.3	7.2	3.2
Degree Utilization, x	1.17	0.26	1.00	0.49	0.10	0.06
Capacity (veh/h)	715	1112	620	675	493	1121
Control Delay (s)	110.3	7.3	57.7	12.0	11.0	6.4
Approach Delay (s)	83.3		41.8		8.4	
Approach LOS	F		E		A	

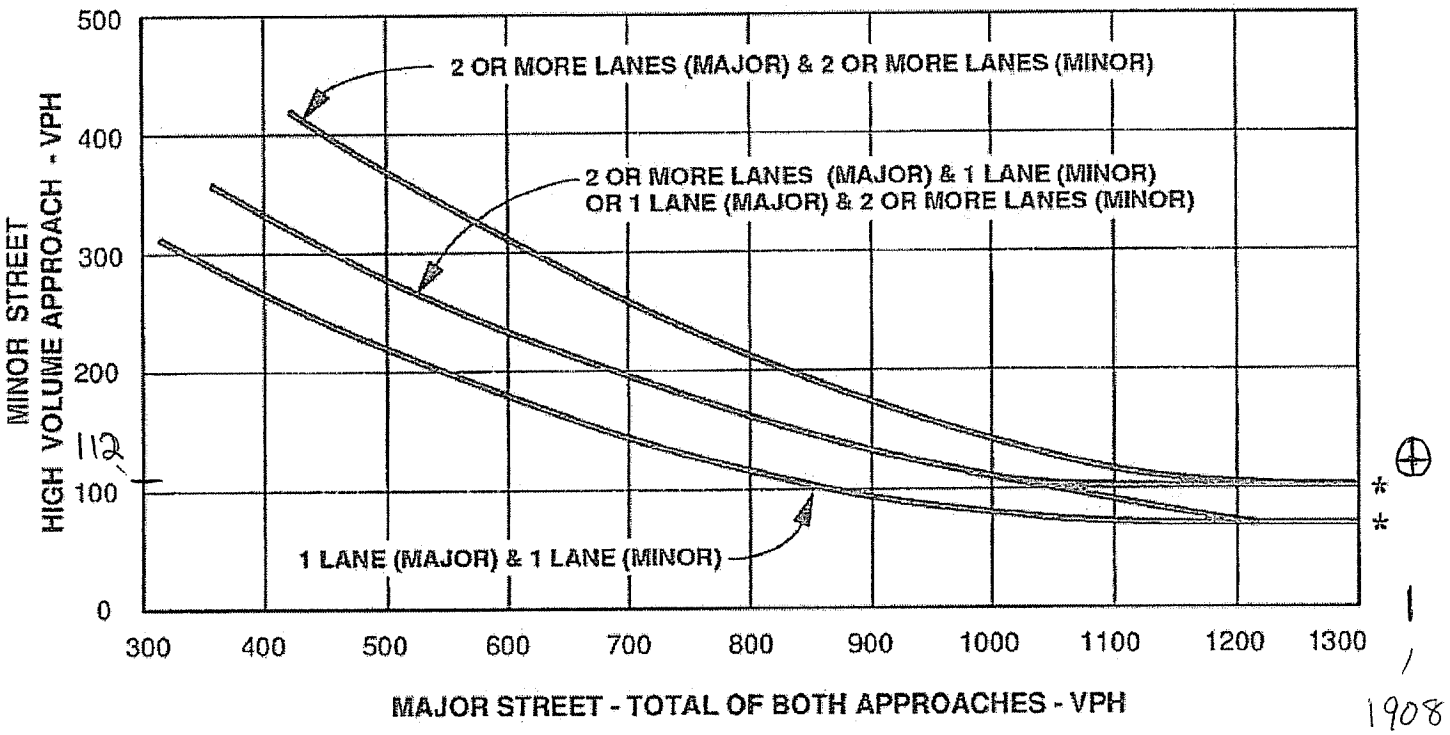
Intersection Summary			
Delay	61.2		
HCM Level of Service	F		
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 & SR 99 Northbound Ramps

2035 without Project - PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street	Minimum Requirements EADT: Vehicles Per Day on Major Street (Total of Both Approaches) Urban	Rural	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only) Urban	Rural
1	1	8,000	5,600	2,400	1,680
2 or More	1	9,600	6,720	2,400	1,680
2 or More	2 or More	9,600	6,720	3,200	2,240
1	2 or More	8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied __X__ Not Satisfied _____

Number of lanes for moving traffic on each approach

Major Street	Minor Street	Vehicles Per Day on Major Street (Total of Both Approaches) Urban	Rural	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only) Urban	Rural
1	1	12,000	8,400	1,200	850
2 or More	1	14,400	10,080	1,200	850
2 or More	2 or More	14,400	10,080	1,600	1,120
1	2 or More	12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

2 CONDITIONS 80%

2 CONDITIONS 80%

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	3433	1863	1770	1583
Volume (vph)	762	271	570	305	48	64
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	828	295	620	332	52	70
RTOR Reduction (vph)	0	144	0	0	0	62
Lane Group Flow (vph)	828	151	620	332	52	8
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	37.4	37.4	16.6	58.0	7.8	7.8
Effective Green, g (s)	39.4	39.4	16.6	60.0	8.8	8.8
Actuated g/C Ratio	0.51	0.51	0.22	0.78	0.11	0.11
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	956	812	742	1455	203	181
v/s Ratio Prot	c0.44		c0.18	0.18	c0.03	
v/s Ratio Perm		0.10				0.01
v/c Ratio	0.87	0.19	0.84	0.23	0.26	0.04
Uniform Delay, d1	16.4	10.1	28.8	2.2	31.0	30.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.1	8.1	0.1	0.7	0.1
Delay (s)	24.7	10.2	36.9	2.3	31.7	30.4
Level of Service	C	B	D	A	C	C
Approach Delay (s)	20.9			24.8	30.9	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1863	1583	3433	1863	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1863	1583	3433	1863	1770	1583
Volume (vph)	762	271	570	310	48	65
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	828	295	620	337	52	71
RTOR Reduction (vph)	0	144	0	0	0	62
Lane Group Flow (vph)	828	151	620	337	52	9
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	38.1	38.1	16.7	58.8	7.8	7.8
Effective Green, g (s)	40.1	40.1	16.7	60.8	9.8	9.8
Actuated g/C Ratio	0.51	0.51	0.21	0.77	0.12	0.12
Clearance Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	950	808	729	1441	221	197
v/s Ratio Prot	c0.44		c0.18	0.18	c0.03	
v/s Ratio Perm		0.10				0.01
v/c Ratio	0.87	0.19	0.85	0.23	0.24	0.04
Uniform Delay, d1	17.0	10.4	29.7	2.5	31.0	30.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.8	0.1	9.4	0.1	0.6	0.1
Delay (s)	25.8	10.5	39.1	2.5	31.6	30.4
Level of Service	C	B	D	A	C	C
Approach Delay (s)	21.8			26.2	30.9	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & South Union Ave - AM Peak
Count Date: 9/30/2008

Exist Peak Hour Volumes

AWS		
>	WBL	4
1	WBT	182
1	WBR	12
>	EBL	11
1	EBT	188
1	EBR	2
1	NBL	12
2	NBT	18
1	NBR	3
1	SBL	25
2	SBT	19
<	SBR	25
	TOTAL	501

Year 2035
Fut. Volumes w/o Proj

WBL	19
WBT	748
WBR	47
EBL	40
EBT	733
EBR	9
NBL	57
NBT	81
NBR	14
SBL	98
SBT	87
SBR	97
TOTAL	2031

Year 2035 Fut. Vol
+ Project Traffic

WBL	19
WBT	748
WBR	57
EBL	48
EBT	733
EBR	9
NBL	57
NBT	94
NBR	14
SBL	100
SBT	102
SBR	101
TOTAL	2083

Year 2020
Fut. Volumes w/o Proj

WBL	11
WBT	430
WBR	27
EBL	24
EBT	427
EBR	5
NBL	32
NBT	46
NBR	8
SBL	57
SBT	49
SBR	57
TOTAL	1173

Year 2020 Fut. Vol
+ Project Traffic

WBL	11
WBT	430
WBR	37
EBL	32
EBT	427
EBR	5
NBL	32
NBT	59
NBR	8
SBL	59
SBT	64
SBR	61
TOTAL	1225

Project Generated Trips - Year 2035

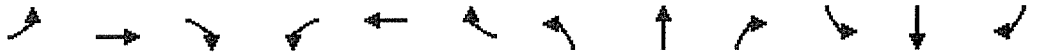
	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	10	6	4
EBL	8	6	2
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	13	6	7
NBR	0	0	0
SBL	2	0	2
SBT	15	11	4
SBR	4	2	2
TOTAL	52	31	21

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & South Union Ave - AM Peak						
	Count Date:	9/30/2008						
2008	ADT							
WB Approach (To)	2.64							
WB Approach (Away)	2.53							
EB Approach (To)	2.56							
EB Approach (Away)	2.69							
NB Approach (To)	0.35							
NB Approach (Away)	0.37							
SB Approach (To)	0.70							
SB Approach (Away)	0.68							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	11.2		WBL	4.89	WBT	4.11	WBR	3.92
WB Approach (Away)	10.2		6.07%	19	5.42%	748	5.22%	47
EB Approach (To)	9.6		EBL	3.68	EBT	3.90	EBR	4.65
EB Approach (Away)	10.7		4.99%	40	5.22%	733	5.84%	9
NB Approach (To)	2.0		NBL	4.82	NBT	4.63	NBR	4.85
NB Approach (Away)	2.1		5.99%	57	5.79%	81	6.02%	14
SB Approach (To)	2.7		SBL	3.91	SBT	4.66	SBR	3.89
SB Approach (Away)	2.4		5.23%	98	5.85%	87	5.20%	97
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	10.6		WBL	4.07	WBT	3.77	WBR	3.90
WB Approach (Away)	10.2		5.39%	16	5.07%	684	5.21%	47
EB Approach (To)	9.0		EBL	3.64	EBT	3.78	EBR	3.82
EB Approach (Away)	9.4		4.95%	40	5.08%	708	5.12%	8
NB Approach (To)	1.4		NBL	3.82	NBT	3.95	NBR	4.08
NB Approach (Away)	1.5		5.12%	46	5.26%	71	5.39%	12
SB Approach (To)	2.6		SBL	3.89	SBT	3.93	SBR	3.62
SB Approach (Away)	2.6		5.20%	97	5.24%	75	4.93%	91

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.

Channelized right turn lanes are not counted.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	11	188	2	4	182	12	12	18	3	25	19	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	204	2	4	198	13	13	20	3	27	21	27

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	216	2	202	13	13	20	3	27	48
Volume Left (vph)	12	0	4	0	13	0	0	27	0
Volume Right (vph)	0	2	0	13	0	0	3	0	27
Hadj (s)	0.05	-0.57	0.04	-0.57	0.53	0.03	-0.67	0.53	-0.36
Departure Headway (s)	4.5	3.2	4.5	3.2	6.1	5.6	3.2	6.1	5.2
Degree Utilization, x	0.27	0.00	0.25	0.01	0.02	0.03	0.00	0.05	0.07
Capacity (veh/h)	783	1121	778	1121	543	588	1121	554	644
Control Delay (s)	9.1	6.2	9.0	6.2	8.1	7.6	5.0	8.2	7.3
Approach Delay (s)	9.1		8.8		7.5			7.6	
Approach LOS	A		A		A			A	

Intersection Summary			
Delay	8.7		
HCM Level of Service	A		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	24	427	5	11	430	27	32	46	8	57	49	57
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	464	5	12	467	29	35	50	9	62	53	62

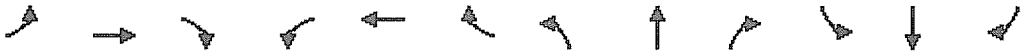
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	490	5	479	29	35	50	9	62	115
Volume Left (vph)	26	0	12	0	35	0	0	62	0
Volume Right (vph)	0	5	0	29	0	0	9	0	62
Hadj (s)	0.04	-0.57	0.04	-0.57	0.53	0.03	-0.67	0.53	-0.34
Departure Headway (s)	5.7	3.2	5.7	3.2	8.2	7.7	3.2	8.0	7.1
Degree Utilization, x	0.77	0.00	0.76	0.03	0.08	0.11	0.01	0.14	0.23
Capacity (veh/h)	619	1121	617	1121	398	420	1121	417	464
Control Delay (s)	25.1	6.2	24.1	6.3	10.8	10.5	5.0	11.0	10.9
Approach Delay (s)	24.9		23.0		10.1			11.0	
Approach LOS	C		C		B			B	

Intersection Summary			
Delay	21.1		
HCM Level of Service	C		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	32	427	5	11	430	37	32	59	8	59	64	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	464	5	12	467	40	35	64	9	64	70	66

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	499	5	479	40	35	64	9	64	136
Volume Left (vph)	35	0	12	0	35	0	0	64	0
Volume Right (vph)	0	5	0	40	0	0	9	0	66
Hadj (s)	0.05	-0.57	0.04	-0.57	0.53	0.03	-0.67	0.53	-0.31
Departure Headway (s)	5.9	3.2	5.9	3.2	8.5	7.9	3.2	8.1	7.3
Degree Utilization, x	0.81	0.00	0.79	0.04	0.08	0.14	0.01	0.15	0.27
Capacity (veh/h)	599	1121	595	1121	394	416	1121	415	458
Control Delay (s)	29.5	6.2	27.0	6.3	11.0	11.0	5.0	11.3	11.8
Approach Delay (s)	29.2		25.4		10.5			11.6	
Approach LOS	D		D		B			B	

Intersection Summary			
Delay	23.6		
HCM Level of Service	C		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	47	733	9	19	748	56	57	93	14	100	100	101
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	797	10	21	813	61	62	101	15	109	109	110

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	848	10	834	61	62	101	15	109	218
Volume Left (vph)	51	0	21	0	62	0	0	109	0
Volume Right (vph)	0	10	0	61	0	0	15	0	110
Hadj (s)	0.05	-0.57	0.04	-0.57	0.53	0.03	-0.67	0.53	-0.32
Departure Headway (s)	7.0	3.2	7.0	3.2	9.4	8.9	3.2	8.9	8.0
Degree Utilization, x	1.65	0.01	1.62	0.05	0.16	0.25	0.01	0.27	0.49
Capacity (veh/h)	524	1121	520	1121	374	395	1121	400	443
Control Delay (s)	318.9	6.2	306.2	6.4	13.0	13.6	5.0	13.9	17.2
Approach Delay (s)	315.3		285.8		12.6			16.1	
Approach LOS	F		F		B			C	

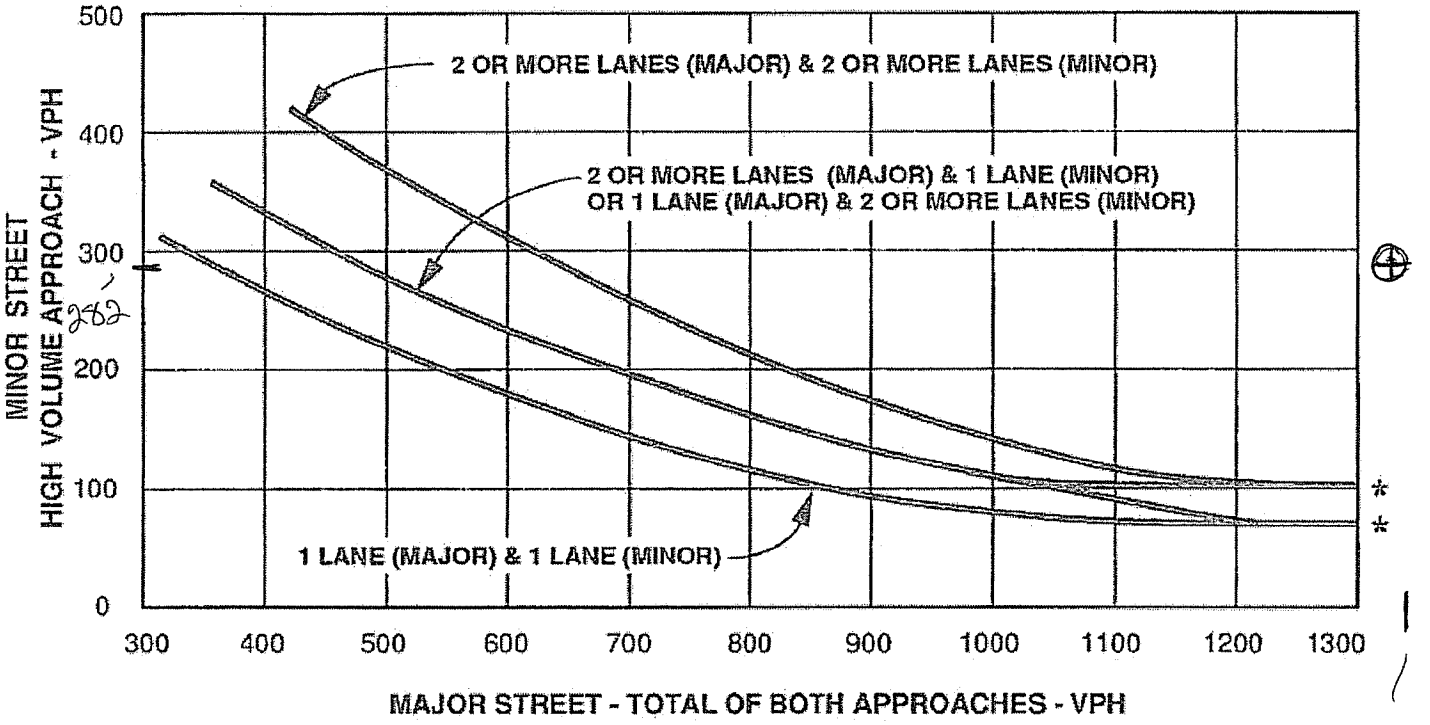
Intersection Summary			
Delay	236.4		
HCM Level of Service	F		
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 & South Union Ave/SR 99 Business

2035 without Project - AM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1857	1583		1860	1583	1770	1863	1583	1770	1722	
Flt Permitted		0.77	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1439	1583		1811	1583	1770	1863	1583	1770	1722	
Volume (vph)	47	733	9	19	748	56	57	93	14	100	100	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	797	10	21	813	61	62	101	15	109	109	110
RTOR Reduction (vph)	0	0	4	0	0	23	0	0	12	0	41	0
Lane Group Flow (vph)	0	848	6	0	834	38	62	101	3	109	178	0
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		52.1	52.1		52.1	52.1	3.9	12.9	12.9	6.0	15.0	
Effective Green, g (s)		54.1	54.1		54.1	54.1	3.9	14.9	14.9	6.0	17.0	
Actuated g/C Ratio		0.62	0.62		0.62	0.62	0.04	0.17	0.17	0.07	0.20	
Clearance Time (s)		6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		895	984		1126	984	79	319	271	122	336	
v/s Ratio Prot							0.04	0.05		c0.06	c0.10	
v/s Ratio Perm		c0.59	0.00		0.46	0.02			0.00			
v/c Ratio		0.95	0.01		0.74	0.04	0.78	0.32	0.01	0.89	0.53	
Uniform Delay, d1		15.1	6.2		11.5	6.4	41.1	31.6	29.9	40.2	31.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		18.4	0.0		2.7	0.0	38.7	0.6	0.0	49.9	1.5	
Delay (s)		33.6	6.2		14.2	6.4	79.8	32.2	29.9	90.1	32.9	
Level of Service		C	A		B	A	E	C	C	F	C	
Approach Delay (s)		33.3			13.7			48.6			51.9	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1857	1583		1860	1583	1770	1863	1583	1770	1724	
Flt Permitted		0.77	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1426	1583		1811	1583	1770	1863	1583	1770	1724	
Volume (vph)	48	733	9	19	748	57	57	94	14	100	102	101
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	797	10	21	813	62	62	102	15	109	111	110
RTOR Reduction (vph)	0	0	4	0	0	23	0	0	12	0	40	0
Lane Group Flow (vph)	0	849	6	0	834	39	62	102	3	109	181	0
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		52.1	52.1		52.1	52.1	3.9	13.0	13.0	6.0	15.1	
Effective Green, g (s)		54.1	54.1		54.1	54.1	3.9	15.0	15.0	6.0	17.1	
Actuated g/C Ratio		0.62	0.62		0.62	0.62	0.04	0.17	0.17	0.07	0.20	
Clearance Time (s)		6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		886	983		1125	983	79	321	273	122	338	
v/s Ratio Prot							0.04	0.05		c0.06	c0.10	
v/s Ratio Perm		c0.60	0.00		0.46	0.02			0.00			
v/c Ratio		0.96	0.01		0.74	0.04	0.78	0.32	0.01	0.89	0.53	
Uniform Delay, d1		15.4	6.3		11.6	6.4	41.2	31.6	29.9	40.2	31.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		20.5	0.0		2.7	0.0	38.7	0.6	0.0	49.9	1.6	
Delay (s)		36.0	6.3		14.3	6.4	79.9	32.1	29.9	90.2	33.1	
Level of Service		D	A		B	A	E	C	C	F	C	
Approach Delay (s)		35.6			13.7			48.5			51.9	
Approach LOS		D			B			D			D	

Intersection Summary			
HCM Average Control Delay	30.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Project: 99 Houghton, LLC
Job No: 06-012
Intersection: Bear Mountain Blvd/ SR 223 & South Union Ave - PM Peak
Count Date: 10/2/2008

Exist Peak Hour Volumes

AWS		
>	WBL	6
1	WBT	256
1	WBR	27
>	EBL	41
1	EBT	281
1	EBR	13
1	NBL	14
2	NBT	43
1	NBR	7
1	SBL	35
2	SBT	12
<	SBR	16
	TOTAL	751

Year 2035
Fut. Volumes w/o Proj

WBL	23
WBT	888
WBR	86
EBL	123
EBT	927
EBR	47
NBL	53
NBT	151
NBR	27
SBL	112
SBT	43
SBR	51
TOTAL	2531

Year 2035 Fut. Vol
+ Project Traffic

WBL	23
WBT	888
WBR	88
EBL	124
EBT	927
EBR	47
NBL	53
NBT	168
NBR	27
SBL	125
SBT	67
SBR	56
TOTAL	2593

Year 2020
Fut. Volumes w/o Proj

WBL	14
WBT	534
WBR	53
EBL	77
EBT	564
EBR	28
NBL	31
NBT	90
NBR	16
SBL	69
SBT	25
SBR	31
TOTAL	1533

Year 2020 Fut. Vol
+ Project Traffic

WBL	14
WBT	534
WBR	55
EBL	78
EBT	564
EBR	28
NBL	31
NBT	107
NBR	16
SBL	82
SBT	49
SBR	36
TOTAL	1595

Project Generated Trips - Year 2035

	Total	Indus.	Commer.
WBL	0	0	0
WBT	0	0	0
WBR	2	1	1
EBL	1	1	0
EBT	0	0	0
EBR	0	0	0
NBL	0	0	0
NBT	17	8	9
NBR	0	0	0
SBL	13	6	7
SBT	24	10	14
SBR	5	2	3
TOTAL	62	28	34

	Project:	99 Houghton, LLC						
	Job No:	06-012						
	Intersection:	Bear Mountain Blvd/ SR 223 & South Union Ave - PM Peak						
	Count Date:	10/2/2008						
2008	ADT							
WB Approach (To)	3.13							
WB Approach (Away)	2.99							
EB Approach (To)	3.03							
EB Approach (Away)	3.18							
NB Approach (To)	0.46							
NB Approach (Away)	0.49							
SB Approach (To)	0.88							
SB Approach (Away)	0.86							
2035	ADT w/o Proj		2008	TO	2035	ADT w/o Proj	ADJUSTMENTS	
WB Approach (To)	11.2		WBL	3.88	WBT	3.47	WBR	3.21
WB Approach (Away)	10.2		5.18%	23	4.76%	888	4.43%	86
EB Approach (To)	9.6		EBL	3.01	EBT	3.30	EBR	3.68
EB Approach (Away)	10.7		4.20%	123	4.56%	927	4.96%	47
NB Approach (To)	2.0		NBL	3.84	NBT	3.57	NBR	3.86
NB Approach (Away)	2.1		5.13%	53	4.80%	151	5.15%	27
SB Approach (To)	2.7		SBL	3.21	SBT	3.60	SBR	3.19
SB Approach (Away)	2.4		4.45%	112	4.85%	43	4.43%	51
2035	ADT with Proj		2008	TO	2035	ADT with Proj	ADJUSTMENTS	
WB Approach (To)	10.6		WBL	3.25	WBT	3.18	WBR	3.19
WB Approach (Away)	10.2		4.50%	20	4.41%	813	4.42%	86
EB Approach (To)	9.0		EBL	2.98	EBT	3.19	EBR	3.04
EB Approach (Away)	9.4		4.16%	122	4.42%	895	4.24%	40
NB Approach (To)	1.4		NBL	3.05	NBT	3.06	NBR	3.27
NB Approach (Away)	1.5		4.26%	43	4.26%	131	4.53%	23
SB Approach (To)	2.6		SBL	3.19	SBT	3.04	SBR	2.97
SB Approach (Away)	2.6		4.43%	112	4.24%	36	4.15%	48

Intersection has too many lanes per leg.

HCM All-Way analysis is limited to two lanes per leg.
Channelized right turn lanes are not counted.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	41	281	13	6	256	27	14	43	7	35	12	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	305	14	7	278	29	15	47	8	38	13	17

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	350	14	285	29	15	47	8	38	30
Volume Left (vph)	45	0	7	0	15	0	0	38	0
Volume Right (vph)	0	14	0	29	0	0	8	0	17
Hadj (s)	0.10	-0.67	0.05	-0.67	0.53	0.03	-0.67	0.53	-0.37
Departure Headway (s)	5.3	4.5	5.3	4.6	6.8	6.3	3.2	6.8	5.9
Degree Utilization, x	0.51	0.02	0.42	0.04	0.03	0.08	0.01	0.07	0.05
Capacity (veh/h)	659	763	660	755	485	521	1121	487	555
Control Delay (s)	12.5	6.4	10.8	6.5	8.8	8.6	5.0	9.1	8.0
Approach Delay (s)	12.3		10.4		8.3			8.6	
Approach LOS	B		B		A			A	

Intersection Summary				
Delay	10.9			
HCM Level of Service	B			
Intersection Capacity Utilization	49.5%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	77	564	28	14	534	53	31	90	16	69	25	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	84	613	30	15	580	58	34	98	17	75	27	34

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total (vph)	697	30	596	58	34	98	17	75	61
Volume Left (vph)	84	0	15	0	34	0	0	75	0
Volume Right (vph)	0	30	0	58	0	0	17	0	34
Hadj (s)	0.09	-0.67	0.05	-0.67	0.53	0.03	-0.67	0.53	-0.35
Departure Headway (s)	6.5	5.7	6.4	5.7	8.6	8.1	3.2	8.6	7.7
Degree Utilization, x	1.25	0.05	1.06	0.09	0.08	0.22	0.02	0.18	0.13
Capacity (veh/h)	546	615	556	620	411	436	1121	412	457
Control Delay (s)	148.8	7.8	78.5	8.1	11.1	12.1	5.1	12.2	10.6
Approach Delay (s)	142.9		72.3		11.1			11.5	
Approach LOS	F		F		B			B	

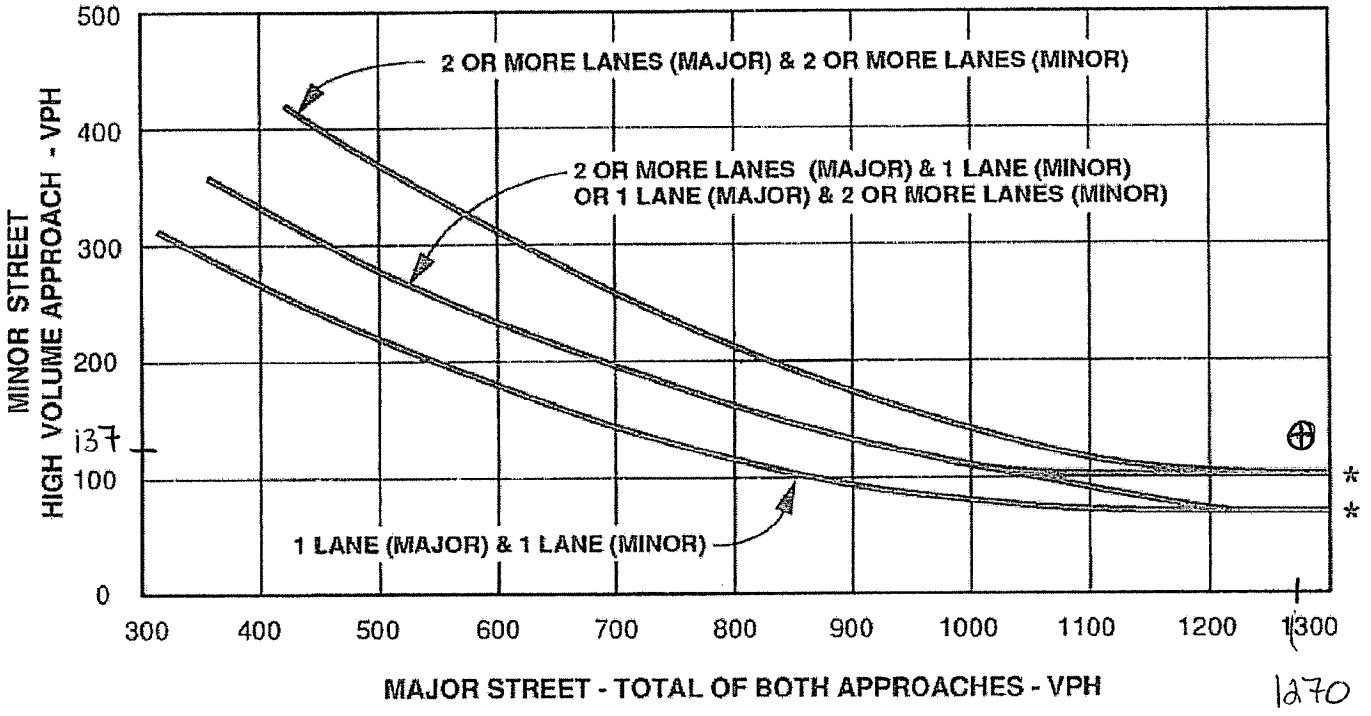
Intersection Summary			
Delay	92.7		
HCM Level of Service	F		
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

Bear Mountain Blvd/SR 223 + South Union Ave/SR 99 Business

2020 without Project- PM Peak

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE ~~70~~ 64 km/h 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.

SATISFIED YES ☒ NO ☐

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)

(Based on Estimated Average Daily Traffic - See Note)

URBAN..... RURAL..X..

CONDITION A - Minimum Vehicular Volume

Satisfied _____ Not Satisfied __X__

Number of lanes for moving traffic on each approach

Major Street	Minor Street	Minimum Requirements EADT: Vehicles Per Day on Major Street (Total of Both Approaches) Urban	Rural	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only) Urban	Rural
1	1	8,000	5,600	2,400	1,680
2 or More	1	9,600	6,720	2,400	1,680
2 or More...12700...	2 or More...1370...	9,600	6,720	3,200	2,240
1	2 or More	8,000	5,600	3,200	2,240

CONDITION B - Interruption of Continuous Traffic

Satisfied __X__ Not Satisfied _____

Number of lanes for moving traffic on each approach

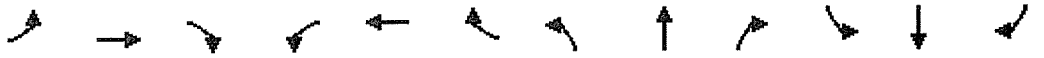
Major Street	Minor Street	Vehicles Per Day on Major Street (Total of Both Approaches) Urban	Rural	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only) Urban	Rural
1	1	12,000	8,400	1,200	850
2 or More	1	14,400	10,080	1,200	850
2 or More...12700...	2 or More...1370...	14,400	10,080	1,600	1,120
1	2 or More	12,000	8,400	1,600	1,120

Combination of CONDITIONS A + B

Satisfied _____ Not Satisfied _____

	Vehicles Per Day on Major Street (Total of Both Approaches)	Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)
2 CONDITIONS 80%	2 CONDITIONS 80%	2 CONDITIONS 80%

No one condition satisfied, but following conditions fulfilled 80% or more..... _____ A _____ B

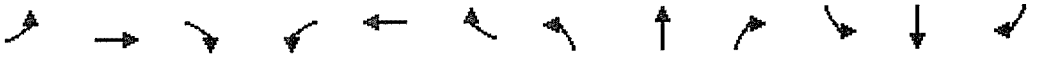


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected		0.99	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1852	1583		1860	1583	1770	3539	1583	1770	3243	
Flt Permitted		0.83	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1539	1583		1826	1583	1770	3539	1583	1770	3243	
Volume (vph)	77	564	28	14	534	53	31	90	16	69	25	31
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	613	30	15	580	58	34	98	17	75	27	34
RTOR Reduction (vph)	0	0	13	0	0	25	0	0	14	0	27	0
Lane Group Flow (vph)	0	697	17	0	595	33	34	98	3	75	34	0
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)		32.9	32.9		32.9	32.9	1.7	9.2	9.2	3.6	11.1	
Effective Green, g (s)		34.9	34.9		34.9	34.9	1.7	11.2	11.2	3.6	13.1	
Actuated g/C Ratio		0.57	0.57		0.57	0.57	0.03	0.18	0.18	0.06	0.21	
Clearance Time (s)		6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		871	895		1033	895	49	642	287	103	689	
v/s Ratio Prot							0.02	c0.03		c0.04	0.01	
v/s Ratio Perm		c0.45	0.01		0.33	0.02			0.00			
v/c Ratio		0.80	0.02		0.58	0.04	0.69	0.15	0.01	0.73	0.05	
Uniform Delay, d1		10.6	5.9		8.6	5.9	29.7	21.3	20.7	28.6	19.3	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.3	0.0		0.8	0.0	34.8	0.1	0.0	22.5	0.0	
Delay (s)		15.9	5.9		9.4	6.0	64.6	21.4	20.7	51.0	19.4	
Level of Service		B	A		A	A	E	C	C	D	B	
Approach Delay (s)		15.5			9.1			31.2			36.8	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

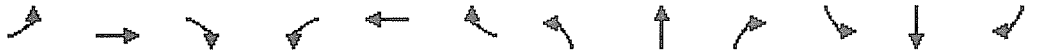
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected		0.99	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1851	1583		1860	1583	1770	3539	1583	1770	3314	
Flt Permitted		0.82	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1530	1583		1826	1583	1770	3539	1583	1770	3314	
Volume (vph)	78	564	28	14	534	55	31	107	16	82	49	36
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	613	30	15	580	60	34	116	17	89	53	39
RTOR Reduction (vph)	0	0	13	0	0	26	0	0	14	0	31	0
Lane Group Flow (vph)	0	698	17	0	595	34	34	116	3	89	61	0
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)		33.4	33.4		33.4	33.4	1.7	9.5	9.5	3.6	11.4	
Effective Green, g (s)		35.4	35.4		35.4	35.4	1.7	11.5	11.5	3.6	13.4	
Actuated g/C Ratio		0.57	0.57		0.57	0.57	0.03	0.18	0.18	0.06	0.21	
Clearance Time (s)		6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		867	897		1034	897	48	651	291	102	711	
v/s Ratio Prot							0.02	c0.03		c0.05	0.02	
v/s Ratio Perm		c0.46	0.01		0.33	0.02			0.00			
v/c Ratio		0.81	0.02		0.58	0.04	0.71	0.18	0.01	0.87	0.09	
Uniform Delay, d1		10.8	5.9		8.7	6.0	30.2	21.5	20.8	29.2	19.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.5	0.0		0.8	0.0	38.1	0.1	0.0	50.8	0.1	
Delay (s)		16.3	5.9		9.5	6.0	68.3	21.6	20.9	80.0	19.7	
Level of Service		B	A		A	A	E	C	C	E	B	
Approach Delay (s)		15.9			9.2			31.1			49.3	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected		0.99	1.00		1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1852	1583		1860	1583	1770	3539	1583	1770	3253	
Flt Permitted		0.54	1.00		0.83	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1010	1583		1551	1583	1770	3539	1583	1770	3253	
Volume (vph)	123	927	47	23	888	86	53	151	27	112	43	51
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	1008	51	25	965	93	58	164	29	122	47	55
RTOR Reduction (vph)	0	0	11	0	0	22	0	0	26	0	49	0
Lane Group Flow (vph)	0	1142	40	0	990	71	58	164	3	122	53	0
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)		110.0	110.0		110.0	110.0	5.6	12.9	12.9	8.0	15.3	
Effective Green, g (s)		112.0	112.0		112.0	112.0	5.6	14.9	14.9	8.0	17.3	
Actuated g/C Ratio		0.76	0.76		0.76	0.76	0.04	0.10	0.10	0.05	0.12	
Clearance Time (s)		6.0	6.0		6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		770	1207		1183	1207	67	359	161	96	383	
v/s Ratio Prot							0.03	c0.05		c0.07	0.02	
v/s Ratio Perm		c1.13	0.03		0.64	0.04			0.00			
v/c Ratio		1.48	0.03		0.84	0.06	0.87	0.46	0.02	1.27	0.14	
Uniform Delay, d1		17.5	4.3		11.5	4.3	70.3	62.2	59.4	69.4	58.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		224.4	0.0		5.3	0.0	64.8	0.9	0.0	181.1	0.2	
Delay (s)		241.8	4.3		16.8	4.4	135.1	63.1	59.5	250.5	58.3	
Level of Service		F	A		B	A	F	E	E	F	E	
Approach Delay (s)		231.7			15.7			79.3			163.0	
Approach LOS		F			B			E			F	

Intersection Summary			
HCM Average Control Delay	127.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	146.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3253	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3253	
Volume (vph)	123	927	47	23	888	86	53	151	27	112	43	51
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	134	1008	51	25	965	93	58	164	29	122	47	55
RTOR Reduction (vph)	0	0	19	0	0	29	0	0	26	0	47	0
Lane Group Flow (vph)	134	1008	32	25	965	64	58	164	3	122	55	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	13.2	68.4	68.4	4.7	59.9	59.9	4.7	11.2	11.2	8.0	14.5	
Effective Green, g (s)	13.2	70.4	70.4	4.7	61.9	61.9	4.7	13.2	13.2	8.0	16.5	
Actuated g/C Ratio	0.12	0.63	0.63	0.04	0.55	0.55	0.04	0.12	0.12	0.07	0.15	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	208	2219	992	74	1027	873	74	416	186	126	478	
v/s Ratio Prot	c0.08	0.28		0.01	c0.52		0.03	c0.05		c0.07	c0.02	
v/s Ratio Perm			0.02			0.04			0.00			
v/c Ratio	0.64	0.45	0.03	0.34	0.94	0.07	0.78	0.39	0.02	0.97	0.12	
Uniform Delay, d1	47.3	10.9	8.0	52.3	23.5	11.8	53.3	45.9	43.8	52.0	41.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.7	0.1	0.0	2.7	15.4	0.0	40.6	0.6	0.0	69.5	0.1	
Delay (s)	54.0	11.1	8.0	55.0	38.9	11.8	93.9	46.5	43.9	121.5	41.7	
Level of Service	D	B	A	D	D	B	F	D	D	F	D	
Approach Delay (s)		15.8			37.0			57.1			85.2	
Approach LOS		B			D			E			F	

Intersection Summary			
HCM Average Control Delay	33.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	112.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3298	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	1863	1583	1770	3539	1583	1770	3298	
Volume (vph)	124	927	47	23	888	88	53	168	27	125	67	56
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	1008	51	25	965	96	58	183	29	136	73	61
RTOR Reduction (vph)	0	0	19	0	0	29	0	0	26	0	52	0
Lane Group Flow (vph)	135	1008	32	25	965	67	58	183	3	136	82	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	13.7	72.8	72.8	4.7	63.8	63.8	6.8	12.2	12.2	10.0	15.4	
Effective Green, g (s)	13.7	74.8	74.8	4.7	65.8	65.8	6.8	14.2	14.2	10.0	17.4	
Actuated g/C Ratio	0.11	0.62	0.62	0.04	0.55	0.55	0.06	0.12	0.12	0.08	0.15	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	203	2212	989	69	1024	870	101	420	188	148	479	
v/s Ratio Prot	c0.08	0.28		0.01	c0.52		0.03	c0.05		c0.08	c0.02	
v/s Ratio Perm			0.02			0.04			0.00			
v/c Ratio	0.67	0.46	0.03	0.36	0.94	0.08	0.57	0.44	0.02	0.92	0.17	
Uniform Delay, d1	50.8	11.8	8.6	56.0	25.2	12.7	55.0	49.0	46.6	54.4	44.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.0	0.1	0.0	3.2	16.1	0.0	7.7	0.7	0.0	49.9	0.2	
Delay (s)	58.8	11.9	8.6	59.3	41.2	12.7	62.7	49.8	46.6	104.3	45.0	
Level of Service	E	B	A	E	D	B	E	D	D	F	D	
Approach Delay (s)		17.1			39.1			52.2			74.9	
Approach LOS		B			D			D			E	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	119.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			