TRAFFIC REPORT

FOR THE PLEASANT VALLEY ROAD (STATE ROUTE 49)/PATTERSON DRIVE INTERSECTION

PROJECT STUDY REPORT

This report was prepared under my direction and responsible charge. I attest to the technical information contained herein and have judged the qualification of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

1/24/08

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EXECUTIVE SUMMARY

This report describes the traffic operations analysis conducted for the Pleasant Valley Road (SR 49)/ Patterson Drive intersection Project Study Report (PSR). The intersection is located in El Dorado County.

The following four alternatives have been evaluated for the study intersection:

- Alternative 1 – Maintain the existing intersection lane configurations and traffic control (multi-way stop).
- Alternative 2 – Modify the existing intersection to construct a fourth leg across from Patterson Drive (Harrington Business Park connection). The intersection control would remain multi-way stop controlled.
- Alternative 3 – Modify the existing intersection to install a traffic signal and add a left-turn lane on the southbound Pleasant Valley Road approach to the intersection.
- Alternative 4 – Modify the existing intersection to install a traffic signal, construct a fourth leg across from Patterson Drive (Harrington Business Park connection), and add left-turn lanes on all approaches to the intersection.

The project has two project design alternatives, each of which would widen the intersection.

The following summarizes the key findings of this study. Table ES-1 summarizes the intersection operations analysis.

Existing Conditions

- Under existing conditions, the study intersection operates at an unacceptable level of service (LOS).
- Under existing with project conditions, the intersection operations improve to LOS B during the AM peak hour and LOS C during the PM peak hour.

Year 2017 Conditions

- Under Alternative 1 conditions, the study intersection would operate at an unacceptable LOS during both the AM and PM peak hours (LOS F).
- Under Alternative 2 conditions, the intersection would operate at LOS F during both the AM and PM peak hour.
- Under Alternative 3 conditions, the intersection operation would improve to acceptable (LOS D) during the AM peak hour, but would remain at LOS F during the PM peak hour. The addition of exclusive right-turn lanes on the eastbound Pleasant Valley Road and northbound Patterson Drive intersection approaches would improve the intersection operations to LOS C during the AM peak hour and LOS D during the PM peak hour (see Table ES-2).
- Under Alternative 4 conditions, the intersection would improve to LOS D during the AM peak hour, but would remain at LOS F during the PM peak hour. The addition of a through lane on both Pleasant

Valley Road intersection approaches would improve the intersection operation to LOS C during the AM peak hour and LOS D during the PM peak hour (see Table ES-2).

Year 2025 Conditions

- Under Alternative 1 conditions, the study intersections would operate unacceptably.
- Under Alternative 2 conditions, the intersection would operate at LOS F during both the AM and PM peak hours.
- Under Alternative 3 conditions, the study intersection would operate at unacceptable levels of service (LOS F) during both the AM and PM peak hours. The addition of a second through lane on both Pleasant Valley Road approaches, an exclusive right-turn lane on the eastbound Pleasant Valley Road approach, and an exclusive right-turn lane on the northbound Patterson Drive approach would result in LOS B operations during the AM peak hour and LOS C during the PM peak hour (see Table ES-2).
- Under Alternative 4, the following intersection lane configuration would result in LOS C operations during the AM peak hour and LOS D during the PM peak hour (see Table ES-2):
  - Eastbound Pleasant Valley Road – one left-turn lane, two through lanes, and a right-turn lane
  - Westbound Pleasant Valley Road – one left-turn lane, one through lane, and a through/right-turn lane
  - Southbound Patterson Drive – one left-turn lane and one through/right-turn lane
  - Northbound Patterson Drive – one left-turn lane, one through lane, and one right-turn lane

TABLE ES-1 – PLEASANT VALLEY ROAD/PATTERSON ROAD INTERSECTION OPERATIONS

Condition	No Project				With Project			
	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Year 2017	**>80 / F**	**>80 / F**	**>80 / F**	**>80 / F**	54 / D	**>80 / F**	45 / D	**>80 / F**
Year 2025	**>80 / F**	**> 80 / F**	**>80 / F**	**> 80 / F**	**>80 / F**	**> 80 / F**	**>80 / F**	**> 80 / F**

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
Source: Fehr & Peers, 2007

TABLE ES-2 – PLEASANT VALLEY ROAD/PATTERSON ROAD INTERSECTION OPERATIONS WITH IMPROVEMENTS

Condition	No Improvements				With Improvements			
	Alternative 3		Alternative 4		Alternative 3		Alternative 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Year 2017	>54 / D	**>80 / F**	>45 / D	**>80 / F**	22 / C	49 / D	21 / C	39 / D
Year 2025	**>80 / F**	**> 80 / F**	**>80 / F**	**> 80 / F**	17 / B	24 / C	25 / C	46 / D

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
Source: Fehr & Peers, 2007

1. INTRODUCTION

This report describes the traffic operations analysis conducted for the Pleasant Valley Road (SR 49)/ Patterson Drive intersection Project Study Report (PSR). The intersection is located in El Dorado County. Two project alternatives have been proposed, both of which include improvements to the existing intersection and installation of a traffic signal.

The improved intersection will serve existing peak period traffic and additional traffic demand expected from growth in the Diamond Springs-El Dorado area.

The remainder of this report contains the following chapters.

- Chapter 2 – Traffic Operations Analysis Methodology
- Chapter 3 – Existing Conditions
- Chapter 4 – Project Description
- Chapter 5 – Year 2017 Conditions
- Chapter 6 – Year 2025 Conditions

Chapter 2 describes the methodology used to develop traffic volume forecasts and analyze freeway and local intersection traffic operations. Chapter 3 presents the existing traffic operations in the study area, and Chapter 4 describes the two proposed Pleasant Valley Road/Patterson Drive intersection alternatives. Chapters 5 and 6 present the results of the traffic operations analysis under year 2017 and year 2025 conditions, respectively.

2. TRAFFIC OPERATIONS ANALYSIS METHODOLOGY

TRAFFIC VOLUME FORECASTS

The traffic volume forecasts were generated for the proposed Pleasant Valley Road/Patterson Drive intersection using an annual growth rate of 2.5 percent. The growth rate was agreed upon by El Dorado County Department of Transportation and Caltrans staff. Using this growth rate, year 2017 and year 2025 AM and PM peak hour traffic volumes were developed. Additionally, the forecasted traffic from the proposed Harrington Business Park was added to the project traffic growth generated by the 2.5 percent growth rate. The year 2017 condition represents a 10-year design life for the proposed installation of a traffic signal at the Pleasant Valley Road/Patterson Drive intersection. The year 2025 condition represents the horizon year for the El Dorado County General Plan.

ANALYSIS METHODOLOGY AND KEY ASSUMPTIONS

The traffic operations analysis methodologies and key assumptions are described below. At the request of Caltrans staff, the following intersection operations methodology assumptions were made:

1. The saturation flow rate was changed from 1,900 vehicles per hour (vph) to 1,700 vph.
2. A 0.90 peak hour factor was used.
3. A 5 percent heavy vehicle factor was used.
4. The traffic signal cycle lengths between 60 seconds and 120 seconds were use.

Analysis Methodologies

All intersection operations analyses were conducted using procedures and methodologies contained in the *Highway Capacity Manual (HCM),* Transportation Research Board, 2000. These methodologies were applied using the TRAFFIX traffic analysis software for unsignalized intersection operations (multi-way stop control) and SYNCHRO traffic analysis software for signalized intersection operations.

The level of service (LOS) was calculated for the Pleasant Valley Road/Patterson Drive intersection for each alternative study facility to evaluate traffic operations. LOS is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. Table 1 displays the delay range associated with each LOS category for signalized and unsignalized intersections.

Intersections controlled by stop signs on the minor street approaches (two-way stop control) and on all four-way approaches (all-way stop control) were analyzed using the procedures and methodologies described in the *HCM.* This methodology computes the intersection LOS based on the control delay for each minor movement for minor-street stop-controlled intersections and the weighted average of control delay for all approaches for all-way stop-controlled intersections. Table 1 shows the LOS criteria at stop sign–controlled intersections.

TABLE 1 – INTERSECTION LOS CRITERIA

LOS	Average Control Delay (seconds per vehicle)	
	Signalized Intersections	**Unsignalized Intersections**
A	≤ 10	≤ 10
B	> 10 to 20	> 10 and ≤ 15
C	> 20 to 35	> 15 and ≤ 25
D	> 35 to 55	> 25 and ≤ 35
E	> 55 to 80	> 35 and ≤ 50
F	> 80	> 50

Notes: The average delay reported for signalized intersections is for all vehicles passing through the intersection, whereas the average delay reported for unsignalized intersections is for the minor street movement with the greatest delay.

Source: *Highway Capacity Manual* (Transportation Research Board, 2000)

ANALYSIS EVALUATION CRITERIA

The analysis evaluation criteria described below were used to determine acceptable traffic operating conditions and are based on the level of service (LOS) policies of the two jurisdictions responsible for the study locations: Caltrans and El Dorado County.

The Transportation Concept Report for US 49 (Caltrans, District 3, April 1998) shows LOS E as the 20-year concept LOS in the study area.

The Guidelines for the Preparation of Traffic Impact Analysis Studies (El Dorado County DOT, November 2005) specifies the following significance criteria for signalized and unsignalized intersections in the County.

1. An impact to the intersections is considered significant if the Project causes the LOS of the intersections to degrade from LOS E or better to LOS F.
2. For intersections that are already operating at LOS F without the Project, an impact is significant if the implementation of the Project increases the average delay by five seconds or more at an intersection.

Based on the above criteria, LOS E is considered the minimum acceptable LOS for all freeway mainline sections, freeway ramp junctions, and study intersections.

ANALYSIS SCENARIOS

The following scenarios were analyzed for the traffic report.

1. Existing Conditions (based on traffic data collected in 2007)
2. Existing Plus Project Conditions (Traffic signal and left-turn lane on the southbound Pleasant Valley Road approach)
3. 2017 No Project Conditions – Alternative 1
4. 2017 No Project Conditions – Alternative 2 (A new fourth leg to the intersection – Harrington Business Park connection)

5. 2017 With Project Conditions – Alternative 3 (Traffic signal and left-turn lane on the southbound Pleasant Valley Road intersection approach)
6. 2017 With Project Conditions – Alternative 4 (Traffic signal, new fourth leg to the intersection, and left-turn lanes on all intersection approaches)
7. 2025 No Project Conditions – Alternative 1
8. 2025 No Project Conditions – Alternative 2 (A new fourth leg to the intersection – Harrington Business Park connection)
9. 2025 With Project Conditions – Alternative 3 (Traffic signal and left-turn lane on the southbound Pleasant Valley Road intersection approach)
10. 2025 With Project Conditions – Alternative 4 (Traffic signal, new fourth leg to the intersection, and left-turn lanes on all intersection approaches)

3. EXISTING CONDITIONS

The existing conditions analysis presents the physical and operational characteristics of the roadway system near the proposed project. This information provides a context for the purpose and need to construct improvements.

STUDY AREA

The proposed project is the installation of a traffic signal at the intersection of Pleasant Valley Road and Patterson Drive in El Dorado County. The study intersection is currently controlled by stop signs on all approaches.

The following section provides a brief description of the key roadways in the study area.

Pleasant Valley Road (SR 49) is an east-west arterial roadway that extends from Mother Lode Drive to Sly Park Road. It serves residential, commercial, and office uses near the project site. It is a main route to and from Union Mine High School. High school traffic has a significant impact on operating conditions on Pleasant Valley Road in the period before and after school. The traffic results in long vehicle queues on the Pleasant Valley Road approaches to the Pleasant Valley Road/Patterson Drive intersection. Pleasant Valley Road serves as State Route 49 from the community of El Dorado to Diamond Springs.

Patterson Drive is a north-south two-lane roadway that extends southerly from Pleasant Valley Road. It serves mostly residential uses.

DATA COLLECTION

The following data was collected to complete the existing conditions analysis.

- El Dorado County collected existing morning and evening peak period traffic volumes at the study intersection in May 2007.
- Fehr & Peers conducted field observations to verify intersection lane configurations and vehicle queuing (observing the extent of existing queues for critical movements).

Figure 1 displays the existing AM and PM peak hour traffic volumes and lane configurations at the study intersections.

INTERSECTION OPERATIONS

Table 2 summarizes the AM and PM peak hour delay and LOS under existing conditions (see Appendix A for technical calculations). As shown in Table 2, the study intersection currently operates at unacceptable levels of service (LOS E during the AM peak hour and LOS F during the PM peak hour).

TABLE 2 – INTERSECTION OPERATIONS FOR EXISTING CONDITIONS

Intersection	Control	LOS	AM Peak Hour		PM Peak Hour	
			Delay[1]	LOS	Delay[1]	LOS
Pleasant Valley Rd./ Patterson Dr.	AWSC[2]	Total Intersection	50	E	**63**	**F**
		Worst Approach	**>80**	**F**	**75**	**F**

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
[1] Average delay reported in seconds per vehicle
[2] AWSC = All Way Stop Control
LOS = Level of Service
Source: Fehr & Peers, 2007

Table 3 presents the results of the intersection operations analysis with the installation of a traffic signal and left-turn lane on the southbound Pleasant Valley Road approach at the Pleasant Valley Road/Patterson Drive intersection.

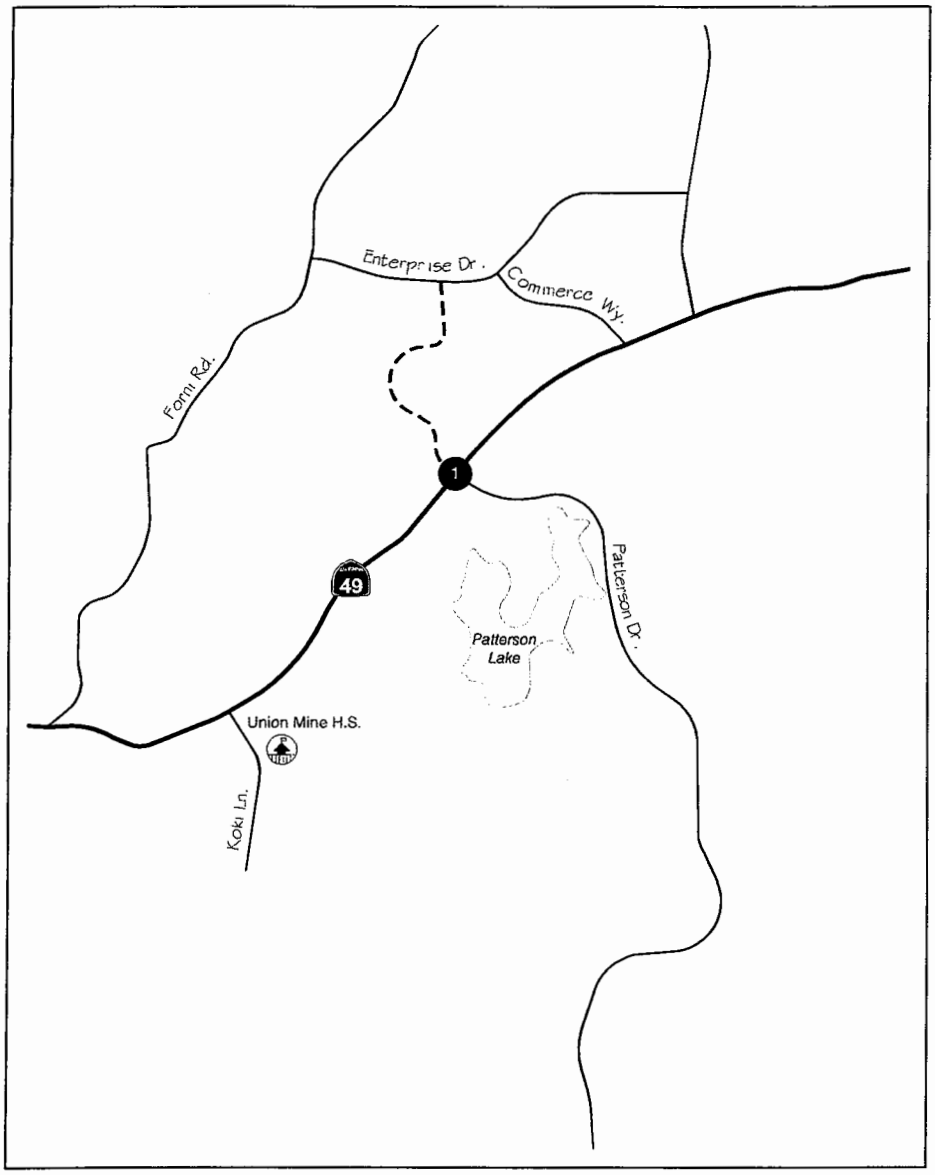
TABLE 3 – INTERSECTION OPERATIONS FOR EXISTING PLUS PROJECT CONDITIONS

Intersection	LOS	Existing Conditions (Alternative 1)				Existing Plus Project Conditions (Alternative 3)			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay[1]	LOS	Delay[1]	LOS	Delay[2]	LOS	Delay[2]	LOS
Pleasant Valley Rd. / Patterson Dr.	Total[3]	50	E	**63**	**F**	14	B	22	C
	Worst[4]	**>80**	**F**	**>80**	**F**	24	C	47	D

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
[1] Average delay reported in seconds per vehicle for all way stop-controlled intersections
[2] Average delay reported in seconds per vehicle for signalized intersections
LOS = Level of Service
Source: Fehr & Peers, 2007

The intersection was evaluated using the peak hour volume warrant (Warrant 3) published in the *Manual on Uniform Traffic Control Devices* (2004) to determine if signal control is warranted under existing conditions[1]. The intersection meets the peak hour volume warrant during both the AM and PM peak hours.

[1] This analysis is intended to examine the general need to install a traffic signal. It estimates future development-generated traffic compared against a subset of the standard traffic signal warrants recommended in the Federal Highway Administration *Manual on Uniform Traffic Control Devices* and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured, rather than forecast, traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals can lead to certain types of collisions.



LEGEND

- Turn Lane
- XX (YY) AM (PM) Peak Hour Traffic Volume
- 1 Study Intersection
- Stop Sign
- Future Road

N

NOT TO SCALE

Existing Conditions (2007)

1. Pleasant Valley Rd./Patterson Dr.

505 (425)
90 (190)
Pleasant Valley Rd.
400 (490)
40 (130)
85 (80)
235 (110)

2017 Conditions Without Harrington Connection

1. Pleasant Valley Rd./Patterson Dr.

705 (905)
130 (305)
Pleasant Valley Rd.
705 (805)
50 (175)
115 (105)
345 (175)

2017 Conditions With Harrington Connection

1. Pleasant Valley Rd./Patterson Dr.

20 (200)
5 (35)
5 (15)
5 (5)
685 (705)
125 (280)
Pleasant Valley Rd.
150 (25)
555 (780)
50 (175)
115 (105)
25 (5)
320 (170)

2025 Conditions Without Harrington Connection

1. Pleasant Valley Rd./Patterson Dr.

845 (1,025)
155 (365)
Pleasant Valley Rd.
815 (935)
60 (205)
115 (105)
415 (255)

2025 Conditions With Harrington Connection

1. Pleasant Valley Rd./Patterson Dr.

20 (200)
5 (35)
5 (15)
5 (5)
825 (825)
150 (340)
Pleasant Valley Rd.
150 (25)
665 (910)
60 (205)
135 (125)
25 (5)
390 (250)

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PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS

FIGURE 1

4. PROJECT DESCRIPTION

Improvements to the existing Pleasant Valley Road/Patterson Drive intersection are intended to serve the anticipated growth surrounding the study area. Following is a detailed description of the project alternatives.

NO PROJECT ALTERNATIVE

For comparison purposes, this study includes a "do-nothing" or No Project Alternative. The alternatives are analyzed under year 2017 and year 2025 conditions and assume the following traffic control and lane configurations.

Alternative 1

No intersection improvements are constructed at the Pleasant Valley Road/Patterson Drive intersection. The intersection control remains a multi-way stop.

Alternative 2

A fourth leg is added to the intersection across from Patterson Drive. This leg would provide access to the proposed Harrington Business Park. The intersection control remains a multi-way stop.

PROPOSED PROJECT

The "With Project" alternatives propose to install a traffic signal and reconstruct the Pleasant Valley Road/Patterson Drive intersection. Two signalized intersection alternatives are proposed (see Figure 2).

Alternative 3

Alternative 1 proposes to modify the existing intersection by adding a traffic signal and installing a left-turn lane on the southbound Pleasant Valley Road approach.

Alternative 4

Alternative 2 proposes to modify the existing intersection by adding a traffic signal, constructing a new fourth leg across from Patterson Drive (Harrington Business Park connector), and adding left-turn lanes to all approaches.

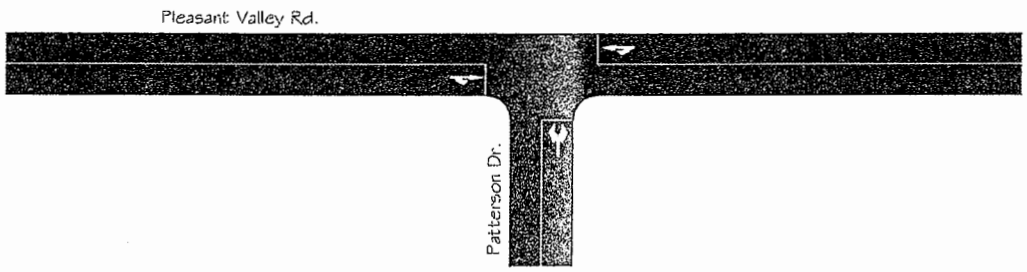
Alternative 1 - Exisitng Conditions

LEGEND

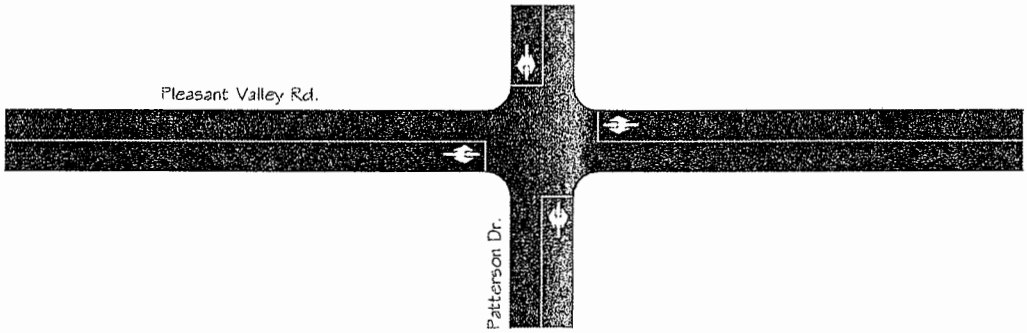
→ Traffic Signal Direction

N

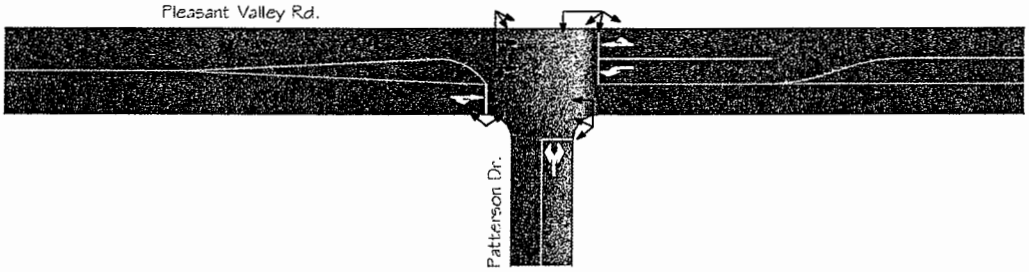
NOT TO SCALE



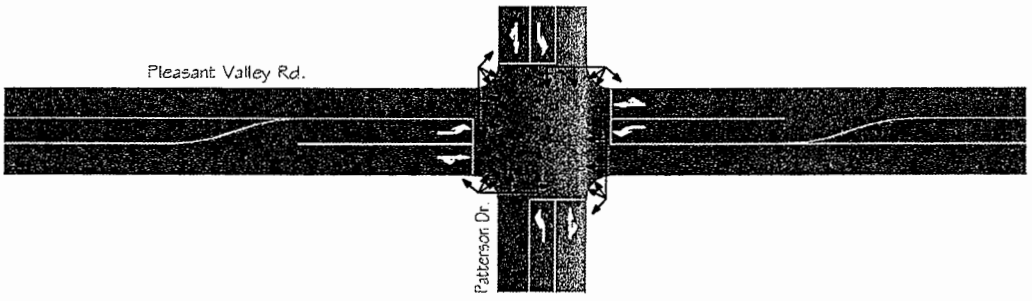
Alternative 2 - Install Fourth Leg (Harrington Connection)



Alternative 3 - Install Traffic Signal and Southbound Left-Turn Lane



Alternative 4 - Install Traffic Signal, Fourth Leg (Harrington Connection), and Left-Turn on All Approaches



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PROJECT DESIGN ALTERNATIVES

FIGURE 2

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5. YEAR 2017 CONDITIONS

The year 2017 analysis presents the operational characteristics of the roadway system 10 years after opening the project.

ANALYSIS SCENARIOS

Four scenarios were analyzed for the Pleasant Valley Road/Patterson Drive intersection project under year 2017 conditions – two "No Project" alternatives and two "With Project" alternatives.

INTERSECTION OPERATIONS

Figure 1 shows the projected traffic volumes under year 2017 "no project" conditions. Although the lane configurations and traffic control vary between "no project" and "with project" conditions, the projected intersection traffic volumes are the same.

Table 4 shows the level of service and delay for the study intersections under 2017 AM and PM peak conditions (see Appendix B for technical calculations).

As shown on Table 4, the intersection would operate at LOS F under the No Project Alternative during both peak hours under 2017 conditions. Lengthy vehicle delays would occur on the northbound and southbound Pleasant Valley Road approaches.

Construction of either of the project alternatives would improve intersection operations during the AM Peak hour to an acceptable level; however, the operational conditions during the PM peak hour would remain at LOS F.

To achieve acceptable operating conditions at the Pleasant Valley Road/Patterson Drive intersection, the following lanes would need to be added to the proposed project lane configuration (see Figure 2):

- Alternative 3 Add an exclusive right-turn lane on the eastbound Pleasant Valley Road approach and on the northbound Patterson Drive approach. With these improvements, the intersection will operate at LOS C (22 seconds of delay) during the AM peak hour and LOS D (49 seconds of delay) during the PM peak hour.

- Alternative 4 Add a second through lane on both Pleasant Valley Road approaches/departures. With these improvements, the intersection will operate at LOS C (21 seconds of delay) during the AM peak hour and LOS D (39 seconds of delay) during the PM peak hour.

Table 5 presents the results of the intersection LOS analysis with the proposed intersection improvements.

TABLE 4 – INTERSECTION OPERATIONS FOR YEAR 2017 CONDITIONS

Intersection	LOS	No Project				With Project			
		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
		AM	PM	AM	PM	AM	PM	AM	PM
Pleasant Valley Rd. / Patterson Dr.	Total[3]	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	54 / D[2]	**>80 / F[2]**	45 / D[2]	**>80 / F[2]**
	Worst[4]	**>80 / F**	**>80 / F**	**>80 / F**	**>80 / F**	**>80 / F**	**> 80 / F**	51 / D	**> 80 / F**

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
[1] All way stop control
[2] Traffic signal
[3] Total intersection delay and LOS
[4] Worst movement delay and LOS
Source: Fehr & Peers, 2007

TABLE 5 – INTERSECTION OPERATIONS FOR YEAR 2017 CONDITIONS WITH IMPROVEMENTS

Intersection	LOS	No Improvements				With Improvements			
		Alternative 3		Alternative 4		Alternative 3		Alternative 4	
		AM	PM	AM	PM	AM	PM	AM	PM
Pleasant Valley Rd. / Patterson Dr.	Total[1]	54 / D	**>80 / F**	45 / D	**>80 / F**	22 / C	49 / D	21 / C	39 / D
	Worst[2]	**>80 / F**	**>80 / F**	51 / D	**>80 / F**	25 / C	61 / E	26 / C	40 / D

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
[1] Total intersection delay and LOS
[2] Worst movement delay and LOS
Source: Fehr & Peers, 2007

6. YEAR 2025 CONDITIONS

The year 2025 analysis presents the operational characteristics of the roadway system under conditions expected at the horizon year for the current El Dorado County General Plan.

ANALYSIS SCENARIOS

Four scenarios were analyzed for the Pleasant Valley Road/Patterson Drive intersection project under 2025 conditions – two "No Project" alternatives and two "With Project" alternatives.

INTERSECTION OPERATIONS

Figure 1 shows the projected traffic volumes under year 2025 "no project" conditions. Although the lane configurations and traffic control vary between year 2025 "no project" and "with project" conditions, the projected intersection traffic volumes are the same.

Table 6 shows the level of service and delay for the study intersections under year 2025 conditions for the AM and PM peak hours for the four project alternatives (see Appendix C for technical calculations). The table shows that for all alternatives, the intersection operating conditions would be LOS F.

TABLE 6 – INTERSECTION OPERATIONS FOR YEAR 2025 CONDITIONS

Intersection	LOS	No Project				With Project			
		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
		AM	PM	AM	PM	AM	PM	AM	PM
Pleasant Valley Rd. / Patterson Dr.	Total[3]	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[2]**	**>80 / F[2]**	**>80 / F[2]**	**>80 / F[2]**
	Worst[4]	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[1]**	**>80 / F[2]**	**>80 / F[2]**	**>80 / F[2]**	**>80 / F[2]**

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
[1] All way stop control
[2] Traffic signal
[3] Total intersection delay and LOS
[4] Worst movement delay and LOS
Source: Fehr & Peers, 2007

To achieve acceptable operating conditions at the Pleasant Valley Road/Patterson Drive intersection, the following lanes would need to be added to the proposed project lane configuration (see Figure 2):

- Alternative 3 The addition of a second through lane on both Pleasant Valley Road approaches, an exclusive right-turn lane on the eastbound Pleasant Valley Road approach, and an exclusive right-turn lane on the northbound Patterson Drive approach would result in LOS B (17 seconds of delay) operations during the AM peak hour and LOS C (24 seconds of delay) during the PM peak hour. The westbound Pleasant Valley Road left-turn lane should be designed accommodate the projected peak hour volume of 365 vehicles.

- Alternative 4 The following intersection lane configuration would result in LOS C (25 seconds of delay) operations during the AM Peak hour and LOS D (46 seconds of delay) during the PM peak hour. The westbound Pleasant Valley Road left-turn lane should be designed accommodate the projected peak hour volume of 340 vehicles.

  Eastbound Pleasant Valley Road – one left-turn lane, two through lanes, and a right-turn lane

  Westbound Pleasant Valley Road – one left-turn lane, one through lane, and a through/right-turn lane

  Southbound Patterson Drive – one left-turn lane and one through/right-turn lane

  Northbound Patterson Drive – one left-turn lane, one through lane, and one right-turn lane

Table 7 presents the results of the intersection LOS analysis with the proposed intersection improvements.

TABLE 7 – INTERSECTION OPERATIONS FOR YEAR 2025 CONDITIONS WITH IMPROVEMENTS

Intersection	LOS	No Improvements				With Improvements			
		Alternative 3		Alternative 4		Alternative 3		Alternative 4	
		AM	PM	AM	PM	AM	PM	AM	PM
Pleasant Valley Rd. / Patterson Dr.	Total[1]	**>80 / F**	**>80 / F**	**>80 / F**	**>80 / F**	17 / B	24 / C	25 / C	46 / D
	Worst[2]	**>80 / F**	**>80 / F**	**>80 / F**	**>80 / F**	27 / C	28 / C	31 / C	54 / D

Notes: **Bold and underline** font indicate unacceptable operations based on analysis evaluation criteria.
Level of service (LOS) and control delay (in seconds per vehicle) are reported.
[1] Total intersection delay and LOS
[2] Worst movement delay and LOS
Source: Fehr & Peers, 2007

APPENDIX A:
EXISTING CONDITIONS ANALYSIS

AM PEAK - ALTERNATIVE

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

****

Intersection #1 Pleasant Valley Rd/Patterson Dr

****

Cycle (sec):	100	Critical Vol./Cap.(X):	1.074
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	49.5
Optimal Cycle:	0	Level Of Service:	E

****

Street Name:	Patterson Dr						Pleasant Valley Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 0	0 0	0	0 0	0 1	0	0 1	0 0	0
Volume Module:AM Peak Hour												
Base Vol:	85	0	235	0	0	0	0	400	40	90	505	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	85	0	235	0	0	0	0	400	40	90	505	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	85	0	235	0	0	0	0	400	40	90	505	0
User Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	94	0	261	0	0	0	0	444	44	100	561	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	94	0	261	0	0	0	0	444	44	100	561	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	94	0	261	0	0	0	0	444	44	100	561	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.27	0.00	0.73	0.00	0.00	0.00	0.00	0.91	0.09	0.15	0.85	0.00
Final Sat.:	152	0	420	0	0	0	0	546	55	93	522	0
Capacity Analysis Module:												
Vol/Sat:	0.62	xxxx	0.62	xxxx	xxxx	xxxx	xxxx	0.81	0.81	1.07	1.07	xxxx
Crit Moves:			****					****			****	
Delay/Veh:	18.3	0.0	18.3	0.0	0.0	0.0	0.0	29.3	29.3	81.3	81.3	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	18.3	0.0	18.3	0.0	0.0	0.0	0.0	29.3	29.3	81.3	81.3	0.0
LOS by Move:	C	*	C	*	*	*	*	D	D	F	F	*
ApproachDel:		18.3			xxxxxx			29.3			81.3	
Delay Adj:		1.00			xxxxx			1.00			1.00	
ApprAdjDel:		18.3			xxxxxx			29.3			81.3	
LOS by Appr:		C			*			D			F	
A11WayAvgQ:	1.5	1.5	1.5	0.0	0.0	0.0	3.4	3.4	3.4	12.4	12.4	12.4

****

Note: Queue reported is the number of cars per lane.

****

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	488	100	561	355
v/c Ratio	0.67	0.43	0.60	0.74
Control Delay	18.7	31.3	9.9	15.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.7	31.3	9.9	15.7
Queue Length 50th (ft)	137	31	93	58
Queue Length 95th (ft)	342	103	265	193
Internal Link Dist (ft)	832		816	711
Turn Bay Length (ft)				
Base Capacity (vph)	917	332	1156	693
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.30	0.49	0.51

Intersection Summary

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	688	211	472	211
v/c Ratio	0.82	0.76	0.37	0.73
Control Delay	24.4	42.4	5.0	28.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.4	42.4	5.0	28.9
Queue Length 50th (ft)	293	106	73	72
Queue Length 95th (ft)	#553	#226	135	151
Internal Link Dist (ft)	832		816	711
Turn Bay Length (ft)				
Base Capacity (vph)	903	333	1290	366
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.76	0.63	0.37	0.58

Intersection Summary

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

APPENDIX B:
YEAR 2017 CONDITIONS ANALYSIS

NO PROJECT WITHOUT HARRINGTON AM PEAK - ALT 1

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

****

Intersection #1 Pleasant Valley Rd/Patterson Dr

****

Cycle (sec): 100 Critical Vol./Cap.(X): 1.719
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 250.8
Optimal Cycle: 0 Level Of Service: F

****

Street Name:	Patterson Dr						Pleasant Valley Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 0	0 0	0 0	0 0	0 1	0	0 1	0 0	0
Volume Module: AM Peak Hour												
Base Vol:	115	0	345	0	0	0	0	705	50	130	705	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	115	0	345	0	0	0	0	705	50	130	705	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	115	0	345	0	0	0	0	705	50	130	705	0
User Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	128	0	383	0	0	0	0	783	56	144	783	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	128	0	383	0	0	0	0	783	56	144	783	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	128	0	383	0	0	0	0	783	56	144	783	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.25	0.00	0.75	0.00	0.00	0.00	0.00	0.93	0.07	0.16	0.84	0.00
Final Sat.:	141	0	424	0	0	0	0	509	36	84	456	0
Capacity Analysis Module:												
Vol/Sat:	0.90	xxxx	0.90	xxxx	xxxx	xxxx	xxxx	1.54	1.54	1.72	1.72	xxxx
Crit Moves:	****								****	****		
Delay/Veh:	42.9	0.0	42.9	0.0	0.0	0.0	0.0	269	269.4	348.6	349	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	42.9	0.0	42.9	0.0	0.0	0.0	0.0	269	269.4	348.6	349	0.0
LOS by Move:	E	*	E	*	*	*	*	F	F	F	F	*
ApproachDel:	42.9			xxxxxx			269.4			348.6		
Delay Adj:	1.00			xxxxx			1.00			1.00		
ApprAdjDel:	42.9			xxxxxx			269.4			348.6		
LOS by Appr:	E			*			F			F		
AllWayAvgQ:	5.3	5.3	5.3	0.0	0.0	0.0	39.4	39.4	39.4	50.8	50.8	50.8

****

Note: Queue reported is the number of cars per lane.

****

NO PROJECT WITH HARRINGTON AM PEAK - ALT 2

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

****

Intersection #1 Pleasant Valley Rd/Patterson Dr

****

Cycle (sec):	100	Critical Vol./Cap.(X):	1.746
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	265.4
Optimal Cycle:	0	Level Of Service:	F

****

Street Name:	Patterson Dr						Pleasant Valley Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1!	0 0	0 0	1!	0 0	0 0	1!	0 0	0 0	1!	0 0
Volume Module: AM Peak Hour												
Base Vol:	115	25	320	5	5	20	150	555	50	125	685	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	115	25	320	5	5	20	150	555	50	125	685	5
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	115	25	320	5	5	20	150	555	50	125	685	5
User Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	128	28	356	6	6	22	167	617	56	139	761	6
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	128	28	356	6	6	22	167	617	56	139	761	6
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	128	28	356	6	6	22	167	617	56	139	761	6
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.25	0.05	0.70	0.17	0.17	0.66	0.20	0.73	0.07	0.15	0.84	0.01
Final Sat.:	135	29	376	68	68	274	103	383	34	80	436	3
Capacity Analysis Module:												
Vol/Sat:	0.95	0.95	0.95	0.08	0.08	0.08	1.61	1.61	1.61	1.75	1.75	1.75
Crit Moves:		****			****			****			****	
Delay/Veh:	52.1	52.1	52.1	12.4	12.4	12.4	302.1	302	302.1	361.1	361	361.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	52.1	52.1	52.1	12.4	12.4	12.4	302.1	302	302.1	361.1	361	361.1
LOS by Move:	F	F	F	B	B	B	F	F	F	F	F	F
ApproachDel:		52.1			12.4			302.1			361.1	
Delay Adj:		1.00			1.00			1.00			1.00	
ApprAdjDel:		52.1			12.4			302.1			361.1	
LOS by Appr:		F			B			F			F	
AllWayAvgQ:	6.4	6.4	6.4	0.1	0.1	0.1	42.3	42.3	42.3	50.6	50.6	50.6

****

Note: Queue reported is the number of cars per lane.

****

	→	↙	←	↖
Lane Group Flow (vph)	839	144	783	511
v/c Ratio	1.04	0.94	0.75	1.02
Control Delay	67.5	100.2	16.8	68.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	67.5	100.2	16.8	68.7
Queue Length 50th (ft)	~521	83	274	~223
Queue Length 95th (ft)	#749	#197	434	#431
Internal Link Dist (ft)	832		816	711
Turn Bay Length (ft)				
Base Capacity (vph)	805	154	1043	503
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.04	0.94	0.75	1.02

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

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1088	339	1006	311
v/c Ratio	1.30	1.41	0.85	0.93
Control Delay	165.2	238.7	18.5	58.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	165.2	238.7	18.5	58.6
Queue Length 50th (ft)	~804	~262	351	131
Queue Length 95th (ft)	#1048	#428	#738	#289
Internal Link Dist (ft)	832		816	711
Turn Bay Length (ft)				
Base Capacity (vph)	839	241	1177	342
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.30	1.41	0.85	0.91

Intersection Summary

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

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	167	673	139	767	128	384	6	28
v/c Ratio	1.04	0.83	0.87	0.94	0.54	0.70	0.07	0.19
Control Delay	120.5	29.0	81.0	41.2	31.7	7.6	39.0	18.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	120.5	29.0	81.0	41.2	31.7	7.6	39.0	18.1
Queue Length 50th (ft)	66	188	54	238	46	12	2	2
Queue Length 95th (ft)	#228	#572	#189	#684	110	96	15	27
Internal Link Dist (ft)		832		816		711		757
Turn Bay Length (ft)								
Base Capacity (vph)	160	810	160	817	327	710	83	312
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.83	0.87	0.94	0.39	0.54	0.07	0.09

Intersection Summary

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

Lane Group Flow (vph)	28	1061	311	789	117	195	17	261
v/c Ratio	0.36	1.54	1.66	0.85	0.55	0.38	0.22	0.71
Control Delay	53.4	272.9	348.1	30.9	36.0	5.5	48.2	12.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.4	272.9	348.1	30.9	36.0	5.5	48.2	12.8
Queue Length 50th (ft)	13	~731	~220	266	52	2	8	17
Queue Length 95th (ft)	#49	#1179	#440	#773	113	49	31	92
Internal Link Dist (ft)		832		816		711		757
Turn Bay Length (ft)								
Base Capacity (vph)	77	689	187	923	299	605	76	467
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	1.54	1.66	0.85	0.39	0.32	0.22	0.56

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

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

Lane Group Flow (vph)	783	56	144	783	128	383
v/c Ratio	0.89	0.07	0.77	0.67	0.48	0.79
Control Delay	28.0	3.5	64.2	10.8	30.7	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	3.5	64.2	10.8	30.7	13.3
Queue Length 50th (ft)	281	0	69	144	58	38
Queue Length 95th (ft)	#672	18	#197	434	108	136
Internal Link Dist (ft)	832			816	711	
Turn Bay Length (ft)						
Base Capacity (vph)	920	806	188	1186	432	600
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.07	0.77	0.66	0.30	0.64

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

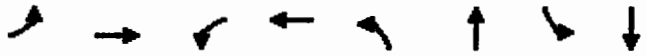
	→	↘	↙	←	↖	↗
Lane Group Flow (vph)	894	194	339	1006	117	194
v/c Ratio	0.99	0.23	1.33	0.81	0.55	0.54
Control Delay	50.2	2.4	205.5	14.1	38.2	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.2	2.4	205.5	14.1	38.2	9.1
Queue Length 50th (ft)	440	0	~238	253	59	0
Queue Length 95th (ft)	#792	31	#428	#738	111	56
Internal Link Dist (ft)	832			816	711	
Turn Bay Length (ft)						
Base Capacity (vph)	899	851	255	1244	291	417
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.23	1.33	0.81	0.40	0.47

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

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

Lane Group Flow (vph)	167	673	139	767	128	384	6	28
v/c Ratio	0.74	0.61	0.61	0.70	0.48	0.66	0.05	0.14
Control Delay	52.8	15.4	44.4	16.4	26.1	6.4	35.0	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	15.4	44.4	16.4	26.1	6.4	35.0	17.2
Queue Length 50th (ft)	41	67	33	81	29	8	1	1
Queue Length 95th (ft)	#221	180	#183	213	107	93	15	26
Internal Link Dist (ft)		832		816		711		757
Turn Bay Length (ft)								
Base Capacity (vph)	227	1570	227	1582	402	797	111	412
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.43	0.61	0.48	0.32	0.48	0.05	0.07

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



Lane Group Flow (vph)	28	1061	311	789	117	195	17	261
v/c Ratio	0.25	0.97	1.01	0.45	0.55	0.41	0.22	0.72
Control Delay	44.2	47.6	90.1	14.5	36.4	6.0	47.1	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	47.6	90.1	14.5	36.4	6.0	47.1	13.5
Queue Length 50th (ft)	13	255	~164	96	53	2	8	18
Queue Length 95th (ft)	43	#501	#379	249	113	50	31	94
Internal Link Dist (ft)		832		816		711		757
Turn Bay Length (ft)								
Base Capacity (vph)	113	1097	308	1744	296	583	76	453
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.97	1.01	0.45	0.40	0.33	0.22	0.58

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

APPENDIX C:
YEAR 2025 CONDITIONS ANALYSIS

NO PROJECT WITHOUT HARRINGTON AMPEAK - ALT 1

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

****

Intersection #1 Pleasant Valley Rd/Patterson Dr

****

Cycle (sec):	100	Critical Vol./Cap.(X):	2.126
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	381.7
Optimal Cycle:	0	Level Of Service:	F

****

Street Name:	Patterson Dr						Pleasant Valley Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 0	0 0	0	0 0	0 1	0	0 1	0 0	0
Volume Module: AM Peak Hour												
Base Vol:	115	0	415	0	0	0	0	815	60	155	845	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	115	0	415	0	0	0	0	815	60	155	845	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	115	0	415	0	0	0	0	815	60	155	845	0
User Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	128	0	461	0	0	0	0	906	67	172	939	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	128	0	461	0	0	0	0	906	67	172	939	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	128	0	461	0	0	0	0	906	67	172	939	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.22	xxxx	0.78	0.00	0.00	0.00	0.00	0.93	0.07	0.15	0.85	0.00
Final Sat.:	123	-0	445	0	0	0	0	492	36	81	442	0
Capacity Analysis Module:												
Vol/Sat:	1.04	0.00	1.04	xxxx	xxxx	xxxx	xxxx	1.84	1.84	2.13	2.13	xxxx
Crit Moves:	****							****			****	
Delay/Veh:	72.6	72.6	72.6	0.0	0.0	0.0	0.0	402	401.5	528.1	528	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	72.6	72.6	72.6	0.0	0.0	0.0	0.0	402	401.5	528.1	528	0.0
LOS by Move:	F	F	F	*	*	*	*	F	F	F	F	*
ApproachDel:		72.6			xxxxxx			401.5			528.1	
Delay Adj:		1.00			xxxxx			1.00			1.00	
ApprAdjDel:		72.6			xxxxxx			401.5			528.1	
LOS by Appr:		F			*			F			F	
AllWayAvgQ:	10.0	10.0	10.0	0.0	0.0	0.0	57.5	57.5	57.5	75.3	75.3	75.3

****

Note: Queue reported is the number of cars per lane.

****

NO PROJECT WITH HARRINGTON AM PEAK - ALT 2

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Future Volume Alternative)

****

Intersection #1 Pleasant Valley Rd/Patterson Dr

****

Cycle (sec):	100	Critical Vol./Cap.(X):	2.136
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	392.5
Optimal Cycle:	0	Level Of Service:	F

****

Street Name:	Patterson Dr						Pleasant Valley Rd					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 0	1! 0	0	0 0	1! 0	0	0 0	1! 0	0
Volume Module: AM Peak Hour												
Base Vol:	135	25	390	5	5	20	150	665	60	150	825	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	135	25	390	5	5	20	150	665	60	150	825	5
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	135	25	390	5	5	20	150	665	60	150	825	5
User Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Adj:	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
PHF Volume:	150	28	433	6	6	22	167	739	67	167	917	6
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	150	28	433	6	6	22	167	739	67	167	917	6
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	150	28	433	6	6	22	167	739	67	167	917	6
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.24	0.05	0.71	0.17	0.17	0.66	0.17	0.76	0.07	0.15	0.84	0.01
Final Sat.:	133	25	383	69	69	274	88	389	35	78	429	3
Capacity Analysis Module:												
Vol/Sat:	1.13	1.13	1.13	0.08	0.08	0.08	1.90	1.90	1.90	2.14	2.14	2.14
Crit Moves:			****		****			****				****
Delay/Veh:	104.0	104	104.0	12.5	12.5	12.5	428.3	428	428.3	534.1	534	534.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	104.0	104	104.0	12.5	12.5	12.5	428.3	428	428.3	534.1	534	534.1
LOS by Move:	F	F	F	B	B	B	F	F	F	F	F	F
ApproachDel:	104.0			12.5			428.3			534.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	104.0			12.5			428.3			534.1		
LOS by Appr:	F			B			F			F		
AllWayAvgQ:	14.2	14.2	14.2	0.1	0.1	0.1	59.5	59.5	59.5	74.2	74.2	74.2

****

Note: Queue reported is the number of cars per lane.

****

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	973	172	939	589
v/c Ratio	1.24	1.12	0.92	1.09
Control Delay	141.6	147.5	30.1	87.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	141.6	147.5	30.1	87.3
Queue Length 50th (ft)	~696	~114	420	~292
Queue Length 95th (ft)	#934	#239	#740	#497
Internal Link Dist (ft)	832		816	711
Turn Bay Length (ft)				
Base Capacity (vph)	787	154	1025	542
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.24	1.12	0.92	1.09

Intersection Summary

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

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

Lane Configurations						
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.98		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	1580		1538	1619	1443	
Flt Permitted	1.00		0.95	1.00	0.99	
Satd. Flow (perm)	1580		1538	1619	1443	
Volume (vph)	935	205	365	1025	105	255
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1039	228	406	1139	117	283
RTOR Reduction (vph)	9	0	0	0	97	0
Lane Group Flow (vph)	1258	0	406	1139	303	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type			Prot			
Protected Phases	4		3	8	2	
Permitted Phases						
Actuated Green, G (s)	46.0		15.0	65.0	17.0	
Effective Green, g (s)	46.0		15.0	65.0	17.0	
Actuated g/C Ratio	0.51		0.17	0.72	0.19	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	808		256	1169	273	
v/s Ratio Prot	c0.80		c0.26	0.70	c0.21	
v/s Ratio Perm						
v/c Ratio	1.56		1.59	0.97	1.11	
Uniform Delay, d1	22.0		37.5	11.7	36.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	256.8		281.5	20.2	87.8	
Delay (s)	278.8		319.0	31.9	124.3	
Level of Service	F		F	C	F	
Approach Delay (s)	278.8			107.4	124.3	
Approach LOS	F			F	F	

HCM Average Control Delay	177.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	125.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
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	0.99		1.00	1.00		1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1538	1599		1538	1617		1538	1391		1538	1428	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1538	1599		1538	1617		1538	1391		1538	1428	
Volume (vph)	150	665	60	150	825	5	135	25	390	5	5	20
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	739	67	167	917	6	150	28	433	6	6	22
RTOR Reduction (vph)	0	3	0	0	0	0	0	246	0	0	20	0
Lane Group Flow (vph)	167	803	0	167	923	0	150	215	0	6	8	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.2	34.9		7.2	34.9		10.4	15.8		0.6	6.0	
Effective Green, g (s)	7.2	34.9		7.2	34.9		10.4	15.8		0.6	6.0	
Actuated g/C Ratio	0.10	0.47		0.10	0.47		0.14	0.21		0.01	0.08	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	149	749		149	757		215	295		12	115	
v/s Ratio Prot	c0.11	0.50		0.11	c0.57		c0.10	c0.15		0.00	0.01	
v/s Ratio Perm												
v/c Ratio	1.12	1.07		1.12	1.22		0.70	0.73		0.50	0.07	
Uniform Delay, d1	33.6	19.8		33.6	19.8		30.6	27.4		36.8	31.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	109.8	53.9		109.8	110.5		9.5	8.7		29.2	0.2	
Delay (s)	143.5	73.7		143.5	130.3		40.0	36.1		66.0	31.9	
Level of Service	F	E		F	F		D	D		E	C	
Approach Delay (s)		85.6			132.3			37.0			37.9	
Approach LOS		F			F			D			D	

HCM Average Control Delay	92.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
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	0.97		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1538	1574		1538	1617		1538	1381		1538	1412	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1538	1574		1538	1617		1538	1381		1538	1412	
Volume (vph)	25	910	205	340	825	5	125	5	250	15	35	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	1011	228	378	917	6	139	6	278	17	39	222
RTOR Reduction (vph)	0	8	0	0	0	0	0	165	0	0	192	0
Lane Group Flow (vph)	28	1231	0	378	923	0	139	119	0	17	69	0
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	1.4	35.4		9.2	43.2		9.9	19.4		1.4	10.9	
Effective Green, g (s)	1.4	35.4		9.2	43.2		9.9	19.4		1.4	10.9	
Actuated g/C Ratio	0.02	0.43		0.11	0.53		0.12	0.24		0.02	0.13	
Clearance Time (s)	4.0	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	3.0	
Lane Grp Cap (vph)	26	685		174	858		187	329		26	189	
v/s Ratio Prot	0.02	c0.78		c0.25	0.57		c0.09	c0.09		0.01	0.05	
v/s Ratio Perm												
v/c Ratio	1.08	1.80		2.17	1.08		0.74	0.36		0.65	0.36	
Uniform Delay, d1	40.0	23.0		36.1	19.1		34.5	25.8		39.8	32.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	201.3	364.6		546.1	53.2		14.7	0.7		46.4	1.2	
Delay (s)	241.3	387.6		582.2	72.3		49.3	26.5		86.1	33.3	
Level of Service	F	F		F	E		D	C		F	C	
Approach Delay (s)		384.3			220.4			34.0			36.5	
Approach LOS		F			F			C			D	

HCM Average Control Delay	244.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	125.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	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)	3076	1376	1538	3076	1538	1376
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3076	1376	1538	3076	1538	1376
Volume (vph)	815	60	155	845	115	415
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	906	67	172	939	128	461
RTOR Reduction (vph)	0	41	0	0	0	195
Lane Group Flow (vph)	906	26	172	939	128	266
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	24.7	24.7	9.7	38.4	16.2	16.2
Effective Green, g (s)	24.7	24.7	9.7	38.4	16.2	16.2
Actuated g/C Ratio	0.39	0.39	0.15	0.61	0.26	0.26
Clearance Time (s)	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
Lane Grp Cap (vph)	1214	543	238	1887	398	356
v/s Ratio Prot	c0.29		c0.11	0.31	0.08	
v/s Ratio Perm		0.02				c0.19
v/c Ratio	0.75	0.05	0.72	0.50	0.32	0.75
Uniform Delay, d1	16.3	11.7	25.2	6.7	18.8	21.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.0	10.3	0.2	0.5	8.3
Delay (s)	18.8	11.7	35.5	6.9	19.2	29.6
Level of Service	B	B	D	A	B	C
Approach Delay (s)	18.3			11.4	27.4	
Approach LOS	B			B	C	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	62.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	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)	3076	1376	1538	3076	1538	1376
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3076	1376	1538	3076	1538	1376
Volume (vph)	935	205	365	1025	105	255
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	1039	228	406	1139	117	283
RTOR Reduction (vph)	0	130	0	0	0	241
Lane Group Flow (vph)	1039	98	406	1139	117	42
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Actuated Green, G (s)	30.5	30.5	17.6	52.1	10.6	10.6
Effective Green, g (s)	30.5	30.5	17.6	52.1	10.6	10.6
Actuated g/C Ratio	0.43	0.43	0.25	0.74	0.15	0.15
Clearance Time (s)	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
Lane Grp Cap (vph)	1327	594	383	2267	231	206
v/s Ratio Prot	c0.34		c0.26	0.37	c0.08	
v/s Ratio Perm		0.07				0.03
v/c Ratio	0.78	0.17	1.06	0.50	0.51	0.21
Uniform Delay, d1	17.3	12.3	26.6	3.9	27.6	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.1	62.8	0.2	1.7	0.5
Delay (s)	20.4	12.4	89.3	4.1	29.4	26.9
Level of Service	C	B	F	A	C	C
Approach Delay (s)	18.9			26.5	27.6	
Approach LOS	B			C	C	

HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	70.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.0%	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)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
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	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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)	1538	3076	1376	1538	3073		1538	1619	1376	1538	1619	1376
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)	1538	3076	1376	1538	3073		1538	1619	1376	1538	1619	1376
Volume (vph)	150	665	60	150	825	5	135	25	390	5	5	20
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	167	739	67	167	917	6	150	28	433	6	6	22
RTOR Reduction (vph)	0	0	42	0	1	0	0	0	239	0	0	20
Lane Group Flow (vph)	167	739	25	167	922	0	150	28	194	6	6	2
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	7.9	22.8	22.8	7.9	22.8		9.1	14.3	14.3	0.5	5.7	5.7
Effective Green, g (s)	7.9	22.8	22.8	7.9	22.8		9.1	14.3	14.3	0.5	5.7	5.7
Actuated g/C Ratio	0.13	0.37	0.37	0.13	0.37		0.15	0.23	0.23	0.01	0.09	0.09
Clearance Time (s)	4.0	4.0	4.0	4.0	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	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	198	1140	510	198	1139		228	376	320	13	150	128
v/s Ratio Prot	c0.11	0.24		0.11	c0.30		c0.10	0.02		0.00	0.00	
v/s Ratio Perm			0.02						c0.14			0.00
v/c Ratio	0.84	0.65	0.05	0.84	0.81		0.66	0.07	0.60	0.46	0.04	0.02
Uniform Delay, d1	26.2	16.0	12.4	26.2	17.4		24.7	18.4	21.1	30.4	25.4	25.4
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	26.5	1.3	0.0	26.5	4.4		6.7	0.1	3.2	23.8	0.1	0.1
Delay (s)	52.7	17.3	12.4	52.7	21.8		31.4	18.5	24.3	54.1	25.5	25.4
Level of Service	D	B	B	D	C		C	B	C	D	C	C
Approach Delay (s)		23.0			26.5			25.8			30.5	
Approach LOS		C			C			C			C	

HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
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	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		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)	1538	3076	1376	1538	3073		1538	1619	1376	1538	1619	1376
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)	1538	3076	1376	1538	3073		1538	1619	1376	1538	1619	1376
Volume (vph)	25	910	205	340	825	5	125	5	250	15	35	200
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	28	1011	228	378	917	6	139	6	278	17	39	222
RTOR Reduction (vph)	0	0	152	0	0	0	0	0	210	0	0	193
Lane Group Flow (vph)	28	1011	76	378	923	0	139	6	68	17	39	29
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.4	27.1	27.1	17.3	43.0		9.9	19.8	19.8	0.7	10.6	10.6
Effective Green, g (s)	1.4	27.1	27.1	17.3	43.0		9.9	19.8	19.8	0.7	10.6	10.6
Actuated g/C Ratio	0.02	0.33	0.33	0.21	0.53		0.12	0.24	0.24	0.01	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	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	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	27	1030	461	329	1633		188	396	337	13	212	180
v/s Ratio Prot	0.02	c0.33		c0.25	0.30		c0.09	0.00		0.01	0.02	
v/s Ratio Perm			0.06						c0.05			0.02
v/c Ratio	1.04	0.98	0.17	1.15	0.56		0.74	0.02	0.20	1.31	0.18	0.16
Uniform Delay, d1	39.8	26.7	18.9	31.8	12.7		34.3	23.2	24.3	40.1	31.3	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
Incremental Delay, d2	184.9	23.5	0.2	96.4	0.5		14.1	0.0	0.3	363.0	0.4	0.4
Delay (s)	224.7	50.2	19.1	128.2	13.1		48.4	23.2	24.6	403.1	31.7	31.6
Level of Service	F	D	B	F	B		D	C	C	F	C	C
Approach Delay (s)		48.4			46.6			32.4			54.4	
Approach LOS		D			D			C			D	

HCM Average Control Delay	46.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	80.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group