

APPENDIX D

TRAFFIC IMPACT ANALYSIS

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SPOKANE TRIBE WEST PLAINS DEVELOPMENT

Spokane County, Washington

April 28, 2011

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DEA Project No.: SPTR0000-0001

This report has been prepared by the staff of David Evans and Associates, Inc. under the direction of the undersigned professional engineer whose seal and signature appears hereon.



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TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY	1
1.1	Technical Analyses Results, Conclusions and Recommendations	3
2.	INTRODUCTION	19
2.1	Site Location and Development Description	19
2.2	Land Use and Zoning	20
2.3	Phasing Plan of the Project	20
2.4	Purpose of Report and the Scope of Study	20
2.5	Methodology	26
2.6	Level of Service	26
2.6.1	Signalized Intersections	26
2.6.2	Unsignalized Intersections	26
2.7	Applicable Standards, Policies and Assumptions	28
2.8	Significance Criteria	29
3.	EXISTING CONDITIONS.....	30
3.1	Street Network	30
3.2	Intersection Geometry and Control.....	30
3.3	Transit	31
3.4	Bike and Pedestrian Facilities	31
3.5	Traffic Volumes	33
3.6	Operational Analysis and Level of Service - Existing Conditions	33
4.	FUTURE BASELINE CONDITIONS	35
4.1	General Assumptions	35
4.2	Pipeline Projects.....	35
4.3	Operational Analysis and Level of Service - 2012 Pipeline Conditions.....	38
4.4	Operational Analysis and Level of Service - 2015 Pipeline Conditions.....	40
4.5	Operational Analysis and Level of Service - 2019 Pipeline Conditions.....	42
5.	TRIP GENERATION and DISTRIBUTION	44
5.1	Trip Generation and Distribution.....	44
5.2	Trip Generation – Alternative 1	45
5.3	Trip Generation – Alternative 2	46
5.4	Trip Generation – Alternative 3	46
5.5	Trip Types.....	47
5.6	Trip Reductions and Net New Trips	48
5.7	Trip Distribution (Proposed Project).....	50
5.8	Trip Assignment.....	50
6.	FUTURE WITH PROJECT CONDITIONS.....	57
6.1.1	ALTERNATIVE 1 – 2012 Phase 1.....	57
6.1.2	ALTERNATIVE 1 – 2015 Phase 2.....	59
6.1.3	ALTERNATIVE 1 – 2019 Phase 3.....	61
6.1.4	ALTERNATIVE 1 – MITIGATION	63
6.1.5	ALTERNATIVE 2 – 2012 Buildout.....	67
6.1.6	ALTERNATIVE 2 – MITIGATION	69
6.1.7	ALTERNATIVE 3 – 2012 Buildout.....	71
6.1.8	ALTERNATIVE 3 – MITIGATION	73
6.2	Bike, Pedestrian and Transit Facilities.....	74
6.3	Connectivity.....	75

7.	CUMMULATIVE ANALYSIS	76
7.1.1	2032 Pipeline Conditions	76
7.1.2	2032 With Project (Alternatives 1, 2 & 3)	76
7.1.3	2032 With Project (Alternatives 1, 2 & 3) Mitigations and Descriptions	84
8.	CONCLUSIONS.....	87
9.	RECOMMENDATIONS.....	89

FIGURES

Figure 1.	Vicinity Map.....	22
Figure 2.	Site Plan Alt 1.....	23
Figure 3.	Existing Lane Geometries and Traffic Control	32
Figure 4.	Existing PM Peak Hour Traffic Volumes.....	34
Figure 5.	Pipeline Projects	37
Figure 6.	Year 2012 Pipeline Volumes.....	39
Figure 7.	Year 2015 Pipeline Volumes.....	41
Figure 8.	Year 2019 Pipeline Volumes.....	43
Figure 9.	Proposed Project – General Trip Distribution	51
Figure 10.	Proposed Project – 2012 Project Trip Assignment Alt. 1.....	52
Figure 11.	Proposed Project – 2015 Project Trip Assignment Alt. 1, PH2.....	53
Figure 12.	Proposed Project – 2019 Project Trip Assignment Alt. 1, PH3.....	54
Figure 13.	Proposed Project – 2012 Project Trip Assignment Alt. 2, Buildout.....	55
Figure 14.	Proposed Project – 2012 Project Trip Assignment Alt. 3, Buildout.....	56
Figure 15.	Alt 1 – Phase 1 Traffic Volumes	58
Figure 16.	Alt 1 – Phase 2 Traffic Volumes	60
Figure 17.	Alt 1 – Phase 3 Traffic Volumes	62
Figure 18.	Alt 2 – Buildout Traffic Volumes.....	68
Figure 19.	Alt 3 - Buildout Traffic Volumes	72
Figure 20.	2032 Base Traffic Volumes.....	77
Figure 21.	2032 Alt. 1 Traffic Volumes.....	78
Figure 22.	2032 Alt. 2 Traffic Volumes.....	79
Figure 23.	2032 Alt. 3 Traffic Volumes.....	80
Figure 24.	Alt 1 - Buildout Suggested Lane Geometry	94

TABLES

Table ES- 1.	Intersection Substandard Level of Service.....	3
Table ES- 2.	Operational Analysis Summary-Existing Conditions and Pipeline Project Scenarios	10
Table ES- 3.	Operational Analysis Summary-Alternative 1	11
Table ES- 4.	Operational Analysis Summary-Alternatives 2 & 3	12
Table ES- 5.	MITIGATION - ALTERNATIVE 1	13
Table ES- 6.	MITIGATION-ALT 2	15
Table ES- 7.	MITIGATION-ALT 3	17
Table 1.	Level of Service Criteria for Signalized Intersections	27
Table 2.	Level of Service Criteria for Unsignalized Intersections.....	27
Table 3.	Level of Service for Existing PM Peak Hour Conditions.....	33
Table 4.	Level of Service for Year 2012 Pipeline PM Peak Hour Conditions	38
Table 5.	Level of Service for Year 2015 Pipeline PM Peak Hour Conditions	40
Table 6.	Level of Service for Year 2019 Pipeline PM Peak Hour Conditions	42

Table 7. Alternative 1 - PM Peak Hour Trip Generation.....	45
Table 8. Alternative 2 - PM Peak Hour Trip Generation.....	46
Table 9. Alternative 3 - PM Peak Hour Trip Generation.....	46
Table 10. ALTERNATIVE 1- PM Peak Hour Trips by Land Use, Phase and Type.....	48
Table 11. ALTERNATIVE 2- PM Peak Hour Trips by Land Use, Phase and Type.....	49
Table 12. ALTERNATIVE 3- PM Peak Hour Trips by Land Use, Phase and Type.....	49
Table 13. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 1.....	57
Table 14. Level of Service for 2015 with Project PM Peak Hour Conditions-Alternative 1.....	59
Table 15. Level of Service for 2019 with Project PM Peak Hour Conditions-Alternative 1.....	61
Table 16. Mitigation Operational Analysis Results-Alternative 1	63
Table 17. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 2.....	67
Table 18. Mitigation Operational Analysis Results-Alternative 2.....	69
Table 19. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 3.....	71
Table 20. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 3.....	73
Table 21. Level of Service for 2032 Background with Pipeline PM Peak Hour Conditions.....	76
Table 22. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 1.....	81
Table 23. Level of Service for 2032 Alternative 1 with Mitigation.....	81
Table 24. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 2.....	82
Table 25. Level of Service for 2032 Alternative 2 with Mitigation.....	82
Table 26. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 3.....	83
Table 27. Level of Service for 2032 Alternative 3 with Mitigation.....	83
Table 28. Intersection Substandard Level of Service	87



1. EXECUTIVE SUMMARY

This traffic study was completed in support of the Spokane Tribe's proposed West Plains Development located west of Airway Heights and northwest of the Highway 2 & Craig Road intersection. This traffic impact analysis (TIA) is being submitted in support of the development process and acquisition of access permits and rights to Hwy 2 through the Washington Department of Transportation (WSDOT). This study and results are also to be included as part of and support of the Tribe's Environmental Impact Statement (EIS) to be submitted to the federal government for approval.

The purpose of this study was to review, assess and identify potential traffic related impacts which the proposed project may have on the surrounding transportation system. This study was completed in accordance with the standard practice for completing studies of this type in Spokane County and WSDOT and generally follows the guidelines developed by the Institute of Transportation Engineers (A Recommended Practice - Traffic Access and Impact Studies for Site Development, 1991).

The proposed project is a master planned mixed use development. As part of the EIS process three alternative site plans with different development characteristics were considered and are summarized below.

Alternative 1: Alternative 1 is a mixed use development including retail, casino/hotel, and commercial components. The components listed below were used to estimate the amount of traffic generated under Alternative 1. The trip generation for the central portion of the project was calculated based on the casino, the external restaurant space, and the specialty retail area. Components such as the hotel and food venues were considered incidental and ancillary uses to the primary casino components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Casino/Hotel Resort
 - 3,040-gaming-position casino
 - 300-room hotel with pool and spa
 - 3-venue food court, two bars, 250-seat café, retail restaurant, and a 150-seat specialty restaurant
 - 93,500-square-foot Convention/Banquet Room
- 205,000 square feet of specialty retail
 - Lifestyle retail
 - Specialty box retail
- 18,000 square feet of restaurants
 - 150-seat specialty restaurant
 - 120-seat steakhouse
- 155,145 square feet of site retail
- 41,633-square-foot commercial development
- 10,480-square-foot Tribal Cultural Center
- 14,036-square-foot Police and Fire Station

Alternative 2: Alternative 2 is similar to Alternative 1 but with a smaller casino component and no hotel or specialty retail. The components listed below were used to estimate the amount of traffic generated under Alternative 2. As with Alternative 1, the trip generation for the central portion of the project was calculated based on the casino, the external restaurant space, and the specialty retail area. Components such as the food venues were considered incidental and ancillary uses to the primary casino components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Casino/Hotel Resort
 - 1,878-gaming-position casino
 - 3-venue food court, two bars, and a 250-seat café
 - 12,600-square-foot multi-purpose bingo room
- 9,200-square-foot steakhouse
- 155,145 square feet of site retail
- 41,633-square-foot commercial development



- 10,480-square-foot Tribal Cultural Center
- 14, 036-square-foot Police and Fire Station

Alternative 3: Alternative 3 is a non-gaming option where the casino/hotel shown at the core of the site in Alternatives 1 is replaced with a hotel and general entertainment component. The components listed below were used to estimate the amount of traffic generated under Alternative 3. The trip generation rate for the central portion of the project was based on the hotel, the entertainment components (bowling alley and recreational space), the external restaurant space, and the specialty retail area. Components within the central building such as the lounge and conference space were considered incidental and ancillary uses to the primary hotel and entertainment components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Multi Purpose Recreational Facility
 - 55,850-square-foot children's arcade fun zone
 - 8,593-square-foot lounge
 - 10-venue food court; coffee shop; 100-seat specialty restaurant; retail restaurant
- 300-room hotel
 - Indoor swimming pool
 - 20,000-square-foot spa/wellness center
 - 93,500-square-foot Convention/Banquet Center
- 45,020-square-foot bowling alley
- 96,634 square feet of specialty retail
- 19,900 square feet of restaurants
 - 150-seat specialty restaurant
 - 120-seat steakhouse
- 155,145 square feet of site retail
- 41,633-square-foot commercial development
- 10,480-square-foot Tribal Cultural Center
- 14, 036-square-foot Police and Fire Station

See **Figure 1** for a vicinity map and **Figures 2a through 2c** for a site plans for the three alternatives.

Access to the site is proposed to be provided via three driveways along the Highway 2 frontage (1 full movement; 2 right-in/right-out) and three driveways along Craig Road.

The project study area for this Traffic Impact Analysis was determined through discussions with WSDOT, City of Airway Heights and Spokane County. The study intersections include:

- Highway 2/ Craig Road
- Highway 2/Lundstrom Street
- Highway 2/Lawson Street
- Highway 2/Garfield Street
- Highway 2/Hayford Road
- Craig Road/Deno Road
- Craig Road/6th Avenue
- Craig Road/McFarlane Street
- Craig Road/Thorpe Road
- Craig Road/State Route 902
- Highway 2/ Fairchild AFB
- Site access driveways

The study focused on the traffic operations characteristics of the above intersections. The traffic study was scoped to include analysis of PM peak hour conditions and includes various analysis scenarios plus mitigation analysis. The analysis scenario conditions include:

- Existing Conditions



- Three Without Project Background Conditions (Years 2012, 2015, 2019)
- With Project Conditions:
 - 2012 With Project Phase 1 (Alternatives 1, 2 & 3)
 - 2015 With Project (Alternative 1, Phase 2)
 - 2019 With Project (Alternative 1, Phase 3)
- Cumulative Impact Analysis for 2032
 - 2032 Without Project
 - 2032 With Project (Alternatives 1, 2 & 3)

Future conditions traffic volumes were derived from information contained in the individual traffic studies prepared for proposed developments on the West Plains.

Trip generation for the various development types contemplated in the project was based on typical ITE Trip Generation rates with the exception of the casino/hotel component included in Alternatives 1 and the casino component in Alternative 2. Casino related traffic was estimated based on information provided in *Recalibration of Trip Generation Model for Las Vegas Hotel/Casinos. May, 2002 ITE Journal pp. 26-33. Rowe, Kaseko, Ackeret.*

Traffic from the project site is expected to be distributed in the following manner:

- 10% will go to/come from areas north and east of the site using northerly Craig Rd. and Deno Rd.
- 10% will go to/come from areas east of the site using 6th Ave.
- 45% will go to/come from areas east of the site using Hwy 2
- 15% will go to/come from areas west of the site using Hwy 2
- 20% will go to/come from areas south of the site using southerly Craig Rd.

1.1 Technical Analyses Results, Conclusions and Recommendations

Analysis Results and Conclusions

Based upon the technical analysis and mitigation/recommendations presented herein, sufficient capacity will be available to accommodate Spokane Tribe's West Plains development provided that certain roadway and intersection improvements are made.

The operational analysis performed for the three project alternatives and various phases within alternative 1 indicate that there are study intersections that experience an unacceptable delay and Level of Service (LOS) without improvements.

The table below indicates intersections that are experiencing substandard LOS and vehicular delay; under each Alternative listed the 1st phase and year during the course of project buildout where the intersection LOS drops to substandard levels is indicated.

Table ES- 1. Intersection Substandard Level of Service

INTERSECTION (S) Signalized (U) Unsignalized (R) Roundabout		PROJECT ALTERNATIVE		
		Alternative 1	Alternative 2	Alternative 3
Hwy. 2 / Craig Rd.	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy. 2 / Lundstrom St.	U	2015 – Phase 2	+	+
Hwy. 2 / Lawson St.	S	+	+	+
Hwy. 2 / Garfield St.	S	2019 – Phase 3	+	+



Hwy. 2 / Hayford Rd.	S	2012 – Phase 1	2012 – Buildout	+
Craig Rd. / Deno Rd.	U	+	+	+
Craig Rd. / McFarlane St.	U	+	+	+
Craig Rd. / Thorpe Rd. East	U	+	+	+
Craig Rd. / Thorpe Rd. West	U	+	+	+
Craig Rd. / SR 902	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy. 2 / Fairchild AFB	S	+	+	+
Craig Rd. / 6 th Ave.	U	2019 – Phase 3	+	+
Hwy 2 / Driveway West	U	+	+	+
Hwy 2 / Driveway Middle	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy 2 / Driveway East	U	+	+	+
Craig Rd. / Driveway North	U	+	+	+
Craig Rd. / Driveway Middle	U	+	+	+
Craig Rd. / Driveway South	U	+	+	+

+ *Acceptable LOS for alternative analyzed*

Mitigation improvements for congested intersections are discussed in the following Recommendations section.

Regarding bike and pedestrian facilities, there are limited facilities in the immediate vicinity of the project site. Pedestrian facilities are provided and bikes are accommodated via the paved shoulder along Hwy 2 east of Craig Rd. Pedestrian and bike facilities are provided along much of the roadway network within the developed portions of Airway Heights to the east of the project site.

Transit service is provided to Airway Heights by Spokane Transit Authority (STA) via Route 61. This route terminates within the City of Spokane at the downtown transit plaza and makes stops at the Airway Heights Park & Ride west of Hwy 2/Lawson and within Fairchild Air Force Base, seven days a week. During peak period busses operate with one-half hour headways and off peak periods have one-hour headways.

Operational analysis results for the various scenarios analyzed are summarized in the tables at the end of the Executive Summary.

Recommendations

Mitigation recommendations are summarized below for each project alternative. At locations where traffic signalization is recommended, a signal warrant analysis was performed to aid in determining if signalization was an appropriate improvement alternative to consider.

The off-site improvements not contiguous with the project site should be constructed in a phased manner so that they are installed at the appropriate time and roughly corresponding to the phase of project development being undertaken.

For off-site improvements that are not contiguous with the project site or related to site access, the Spokane Tribe should contribute its proportional share of the cost required to construct the identified improvements; the project proportional share was calculated by dividing the project generated traffic volume by the total intersection traffic volume.



Alternative 1

2012 (Phase 1) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): A/9.8

2015 (Phase 2) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 36.0%
Resulting LOS & Delay (sec): D/44.7 / B/12.4
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.8%
Resulting LOS & Delay (sec): F/63.3
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Restripe the wide paved median for a 2nd WB left turn lane. Alternatively, widen the EB and NB approaches for exclusive right turn lanes along with adding the 2nd WB left turn lane.
Project Proportional Share: 17.7%
Resulting LOS & Delay (sec): E/60.4 / D/54.0 (alternative)
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 27.7%
Resulting LOS & Delay (sec): B/16.4 / A/9.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/38.8 / B/18.6 (roundabout)

2019 (Phase 3) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.3%
Resulting LOS & Delay (sec): D/52.7 / D/47.4 (roundabout)



- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.4%
Resulting LOS & Delay (sec): F/179.6
- Hwy 2 / Garfield: Optimize signal timing.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): D/52.5
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Widen the EB and NB approaches for exclusive right turn lanes. Restripe the wide paved median for a 2nd WB left turn lane. Add 2nd NB left turn lane. Alternatively, add a 2nd NB left turn lane and a WB auxiliary lane.
Project Proportional Share: 18.0%
Resulting LOS & Delay (sec): F/97.1 / D/51.3 (alternative)
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 31.1%
Resulting LOS & Delay (sec): B/17.6 / B/10.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/45.4 / E/61.3 (roundabout)
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 38.0%
Resulting LOS & Delay (sec): D/28.8

Suggested intersection lane geometry for Alt. 1, PH3 (buildout conditions) at Middle Dwy./Hwy.2 and Craig Rd./Hwy.2 can be seen on **Figure 24**. Note that at the design stage consideration of or accommodation for a future 4th leg (southerly leg) of the Middle Dwy./Hwy 2 should be examined.

Alternative 2

Recommended improvements are summarized below along with the estimated proportional fair share contribution.

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8
- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/31.1 / A/9.8 (roundabout)



Alternative 3

Recommended improvements are summarized below along with the estimated proportional fair share contribution.

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 30.2%
Resulting LOS & Delay (sec): C/28.2 / A/7.1 (roundabout)
- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 13.6%
Resulting LOS & Delay (sec): D/40.6
- Craig / SR 902: Install traffic signal; alternatively, consider installation of a roundabout
Project Proportional Share: 20.6%
Resulting LOS & Delay (sec): B/15.1 / A/8.2
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/29.3 / A/9.2 (roundabout)

2032 Cumulative Mitigation Improvements

The improvements identified below in addition to the improvements identified above are required to mitigate 2032 Cumulative With Project conditions.

2032 Alternative 1 Mitigations (in addition to Alt. 1 Ph. 3 2019 mitigations above):

- Hwy 2 / Lundstrom: Consider restriction of NB and SB left turn movements and installation of EB/WB right turn lanes.
Project Proportional Share: 25.5%
Resulting LOS & Delay (sec): E/42.3
- Hwy 2 / Lawson: Modify the signal timing. Modify and widen NB and SB approaches as necessary to provide dedicated left turn lanes.
Project Proportional Share: 25.1%
Resulting LOS & Delay (sec): D/40.6
- Hwy 2 / Garfield: Add 3rd EB and WB auxiliary through lanes.
Project Proportional Share: 20.4%
Resulting LOS & Delay (sec): C/25.0
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 11.6%
Resulting LOS & Delay (sec): D/50.5
- Craig Rd./Sixth Ave.: Consider installation of a roundabout in lieu of mitigation identified for 2019 condition.
Project Proportional Share: 33.5%
Resulting LOS & Delay (sec): C/20.5
- Craig / North Driveway.: Consider adding a 2nd NB thru lane. If this improvement is chosen it is recommended that the 2nd NB thru lane be continuous from Highway 2 to 6th Ave. Alternatively, consider installation of a roundabout which would also achieve a satisfactory level of service.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): E.37.3 / B/11.4 (roundabout)



2032 Alternative 2 Mitigations (in addition to Alt. 2 2012 mitigations above):

- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.
Project Proportional Share: 18.9%
Resulting LOS & Delay (sec): D/34.1
- Hwy 2 / Lawson: Modify the signal timing. Add EB/WB right turn lanes, reconfigure N/S approaches.
Project Proportional Share: 18.6%
Resulting LOS & Delay (sec): D/37.4
- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.
Project Proportional Share: 14.8%
Resulting LOS & Delay (sec): E/57.2
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 25.6%
Resulting LOS & Delay (sec): D/28.5
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 8.2%
Resulting LOS & Delay (sec): D/50.6

2032 Alternative 3 Mitigations (in addition to Alt. 3 mitigations above):

- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.
Project Proportional Share: 16.3%
Resulting LOS & Delay (sec): D/32.4
- Hwy 2 / Lawson: Modify the signal timing. Reconfigure N/S approaches.
Project Proportional Share: 16.0%
Resulting LOS & Delay (sec): D/37.0
- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.
Project Proportional Share: 12.7%
Resulting LOS & Delay (sec): D/49.4
- Hwy 2 / Hayford: Convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 9.3%
Resulting LOS & Delay (sec): F/141.4
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 17.4%
Resulting LOS & Delay (sec): B/17.2 / B/10.7 (roundabout)
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 6.9%
Resulting LOS & Delay (sec): D/48.9

Operational analysis results for all three alternatives for the improvements identified above are summarized in the ‘mitigation’ tables included at the end of this Executive Summary.

General Recommendations Applying to All Project Alternatives

Roadway frontage improvements and driveway approaches including curb & gutter and sidewalks or shared use pathways should be constructed along the site frontages and should comply with current



County, WSDOT and/or City of Airway Heights roadway standards. Said improvements should be constructed as adjacent areas of the subject site are developed.

The Spokane Tribe should work with the Spokane Transit Authority to identify opportunities to provide transit access near the project site. Furthermore, the Tribe should look to reduce vehicular trips to/from the site through employee trip reductions programs, employee shuttles and other similar means of achieving commute trip reduction.



Table ES- 2. Operational Analysis Summary-Existing Conditions and Pipeline Project Scenarios

INTERSECTION	Existing PM Peak	2012 PM Peak Pipeline	2015 PM Peak Pipeline	2019 PM Peak Pipeline	2032 PM Peak Pipeline
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = D Delay = 27.3	CM = SBLTR LOS = F Delay = 75.0	CM = SBLTR LOS = F Delay = 806.7	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = C Delay = 21.0	CM = NBLTR LOS = C Delay = 23.7	CM = NBLTR LOS = D Delay = 28.7	CM = NBLTR LOS = E Delay = 42.8	CM = NBLTR LOS = F Delay = 109.6
Hwy. 2 / Lawson St.	LOS = B Delay = 15.1	LOS = B Delay = 18.9	LOS = B Delay = 20.1	LOS = C Delay = 23.1	LOS = C Delay = 29.9
Hwy. 2 / Garfield St.	LOS = B Delay = 15.5	LOS = B Delay = 16.9	LOS = C Delay = 21.9	LOS = C Delay = 29.6	LOS = E Delay = 58.7
Hwy. 2 / Hayford Rd.	LOS = D Delay = 38.9	LOS = D Delay = 41.4	LOS = D Delay = 44.5	LOS = E Delay = 66.6	LOS = F Delay = 150.3
Craig Rd. / Deno Rd.	CM = EBLTR LOS = A Delay = 9.3	CM = EBLTR LOS = A Delay = 9.4	CM = EBLTR LOS = A Delay = 9.4	CM = EBLTR LOS = A Delay = 9.4	CM = EBLTR LOS = A Delay = 9.5
Craig Rd. / McFarlane St.	CM = WBLTR LOS = B Delay = 10.8	CM = WBLTR LOS = B Delay = 10.8	CM = WBLTR LOS = B Delay = 10.9	CM = WBLTR LOS = B Delay = 10.9	CM = WBLTR LOS = B Delay = 11.8
Craig Rd. / Thorpe Rd. East	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = A Delay = 9.1	CM = SBLR LOS = A Delay = 9.3
Craig Rd. / Thorpe Rd. West	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = A Delay = 9.3
Craig Rd. / SR 902	CM = SBLTR LOS = D Delay = 34.5	CM = SBLTR LOS = D Delay = 34.5	CM = SBLTR LOS = E Delay = 36.4	CM = SBLTR LOS = E Delay = 37.8	CM = SBLTR LOS = F Delay = 155.4
Hwy. 2 / Fairchild AFB.	LOS = B Delay = 14.6	LOS = B Delay = 15.8	LOS = B Delay = 17.4	LOS = C Delay = 21.4	LOS = D Delay = 40.4
Craig Rd. / 6 th Ave.	--	CM = WBL LOS = B Delay = 10.1	CM = WBL LOS = B Delay = 11.6	CM = WBL LOS = C Delay = 24.3	CM = WBL LOS = C Delay = 18.1

CM = Critical Movement

* = Delay is Excessive, software does not attempt to present a value



Table ES- 3. Operational Analysis Summary-Alternative 1

INTERSECTION	2012 PM Peak Pipeline	2012 PM Peak BG + Alt1-Ph1	2015 PM Peak Pipeline	2015 PM Peak BG + Alt1-Ph2	2019 PM Peak Pipeline	2019 PM Peak BG + Alt1-Ph3
Hwy. 2 / Craig Rd.	CM = SBLTR LOS = F Delay = 75.0	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = 806.7	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = C Delay = 23.7	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = D Delay = 28.7	CM = NBLTR LOS = F Delay = 76.6	CM = NBLTR LOS = E Delay = 42.8	CM = NBLTR LOS = F Delay = 217.2
Hwy. 2 / Lawson St.	LOS = B Delay = 18.9	LOS = B Delay = 18.8	LOS = B Delay = 20.1	LOS = C Delay = 22.8	LOS = C Delay = 23.1	LOS = D Delay = 39.4
Hwy. 2 / Garfield St.	LOS = B Delay = 16.9	LOS = B Delay = 19.3	LOS = C Delay = 21.9	LOS = C Delay = 27.9	LOS = C Delay = 29.6	LOS = E Delay = 69.2
Hwy. 2 / Hayford Rd.	LOS = D Delay = 41.4	LOS = E Delay = 59.8	LOS = D Delay = 44.5	LOS = E Delay = 80.0	LOS = E Delay = 66.6	LOS = F Delay = 140.9
Craig Rd. / Deno Rd.	CM = EBLTR LOS = A Delay = 9.4	CM = WBLTR LOS = B Delay = 10.7	CM = EBLTR LOS = A Delay = 9.4	CM = WBLTR LOS = B Delay = 11.2	CM = EBLTR LOS = A Delay = 9.4	CM = WBLTR LOS = B Delay = 11.7
Craig Rd. / McFarlane St.	CM = WBLTR LOS = B Delay = 10.8	CM = WBLTR LOS = C Delay = 15.7	CM = WBLTR LOS = B Delay = 10.9	CM = WBLTR LOS = C Delay = 18.0	CM = WBLTR LOS = B Delay = 10.9	CM = WBLTR LOS = C Delay = 20.5
Craig Rd. / Thorpe Rd. East	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = B Delay = 11.3	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = B Delay = 12.5	CM = SBLR LOS = A Delay = 9.1	CM = SBLR LOS = B Delay = 13.9
Craig Rd. / Thorpe Rd. West	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = B Delay = 10.1	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = B Delay = 10.5	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = B Delay = 10.9
Craig Rd. / SR 902	CM = SBLTR LOS = D Delay = 34.5	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = E Delay = 36.4	CM = SBLTR LOS = F Delay = 671.9	CM = SBLTR LOS = E Delay = 37.8	CM = SBLTR LOS = F Delay = *
Hwy. 2 / Fairchild AFB.	LOS = B Delay = 15.8	LOS = B Delay = 19.0	LOS = B Delay = 17.4	LOS = C Delay = 22.1	LOS = C Delay = 21.4	LOS = C Delay = 31.9
Craig Rd. / 6th Ave.	CM = WBL LOS = B Delay = 10.1	CM = WBL LOS = B Delay = 12.0	CM = WBL LOS = B Delay = 11.6	CM = WBL LOS = B Delay = 15.0	CM = WBL LOS = C Delay = 24.3	CM = WBL LOS = E Delay = 44.0
Hwy. 2 / Dwy. West	--	CM = SBR LOS = C Delay = 16.1	--	CM = SBR LOS = C Delay = 18.9	--	CM = SBR LOS = D Delay = 25.8
Hwy. 2 / Dwy. Middle	--	CM = SBL LOS = F Delay = *	--	CM = SBL LOS = F Delay = *	--	CM = SBL LOS = F Delay = *
Hwy. 2 / Dwy. East	--	CM = SBR LOS = C Delay = 16.4	--	CM = SBR LOS = C Delay = 19.6	--	CM = SBR LOS = D Delay = 25.8
Craig Rd. / Dwy. North	--	CM = EBL LOS = B Delay = 12.8	--	CM = EBL LOS = C Delay = 16.3	--	CM = EBL LOS = E Delay = 47.4
Craig Rd. / Dwy. Middle	--	CM = EBL LOS = B Delay = 11.9	--	CM = EBL LOS = B Delay = 14.0	--	CM = EBL LOS = C Delay = 22.3
Craig Rd. / Dwy. South	--	CM = EBL LOS = B Delay = 14.9	--	CM = EBL LOS = C Delay = 20.2	--	CM = EBL LOS = E Delay = 48.6

CM = Critical Movement

* = Delay is Excessive, software does not attempt to present a value



Table ES- 4. Operational Analysis Summary-Alternatives 2 & 3

INTERSECTION	2012 PM Peak Pipeline	2012 PM Peak BG + Alt2	2012 PM Peak BG + Alt3
Hwy. 2 / Craig Rd.	CM = SBLTR LOS = F Delay = 75.0	CM = NBLTR LOS = F Delay = *	CM = NBLTR LOS = F Delay = *
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = C Delay = 23.7	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = E Delay = 42.0
Hwy. 2 / Lawson St.	LOS = B Delay = 18.9	LOS = B Delay = 18.8	LOS = B Delay = 18.2
Hwy. 2 / Garfield St.	LOS = B Delay = 16.9	LOS = B Delay = 19.3	LOS = B Delay = 18.8
Hwy. 2 / Hayford Rd.	LOS = D Delay = 41.4	LOS = E Delay = 59.8	LOS = E Delay = 56.0
Craig Rd. / Deno Rd.	CM = EBLTR LOS = A Delay = 9.4	CM = WBLTR LOS = B Delay = 10.7	CM = WBLTR LOS = B Delay = 10.4
Craig Rd. / McFarlane St.	CM = WBLTR LOS = B Delay = 10.8	CM = WBLTR LOS = C Delay = 15.7	CM = WBLTR LOS = B Delay = 14.7
Craig Rd. / Thorpe Rd. East	CM = SBLR LOS = A Delay = 9.0	CM = SBLR LOS = B Delay = 11.3	CM = SBLR LOS = B Delay = 10.8
Craig Rd. / Thorpe Rd. West	CM = NBLR LOS = A Delay = 9.0	CM = NBLR LOS = B Delay = 10.1	CM = NBLR LOS = A Delay = 9.8
Craig Rd. / SR 902	CM = SBLTR LOS = D Delay = 34.5	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = F Delay = 319.6
Hwy. 2 / Fairchild AFB.	LOS = B Delay = 15.8	LOS = B Delay = 19.0	LOS = B Delay = 18.5
Craig Rd. / 6 th Ave.	CM = WBL LOS = B Delay = 10.1	CM = WBL LOS = B Delay = 12.0	CM = WBL LOS = B Delay = 11.5
Hwy. 2 / Dwy. West		CM = SBR LOS = C Delay = 16.1	CM = SBR LOS = C Delay = 15.9
Hwy. 2 / Dwy. Middle		CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *
Hwy. 2 / Dwy. East		CM = SBR LOS = C Delay = 16.4	CM = SBR LOS = C Delay = 15.6
Craig Rd. / Dwy. North		CM = EBL LOS = B Delay = 12.8	CM = EBL LOS = B Delay = 12.3
Craig Rd. / Dwy. Middle		CM = EBL LOS = B Delay = 11.9	CM = EBL LOS = B Delay = 11.2
Craig Rd. / Dwy. South		CM = EBL LOS = B Delay = 14.9	CM = EBL LOS = B Delay = 12.8

CM = Critical Movement

* = Delay is Excessive, software does not attempt to present a value



Table ES- 5. MITIGATION - ALTERNATIVE 1

INTERSECTION	2012 PM Peak BG + Alt1-Ph1	2015 PM Peak BG + Alt1-Ph2	2019 PM Peak BG + Alt1-Ph3	2032 PM Peak BG + Alt1-Ph3
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 31.6	LOS = D Delay = 44.7	LOS = F Delay = 121.8	--
Add Dual EB, NB, SB Lt. turn lanes and NB through lane	--	--	LOS = D Delay = 52.7	LOS = F Delay = 101.5
Roundabout	LOS = A Delay = 7.8	LOS = B Delay = 12.4	LOS = D Delay = 47.4	LOS = F Delay = 94.9
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = F Delay = 76.6	CM = NBLTR LOS = F Delay = 217.2	CM = NBLTR LOS = F Delay = *
NB/SB Right turn lanes	--	CM = NBLT R LOS = F Delay = 63.3	CM = NBLT R LOS = F Delay = 179.6	CM = NBLTR LOS = F Delay = *
Add EB/WB Right turn bays, eliminate N/S left turns	--	--	--	CM = NBR LOS = E Delay = 42.3
Hwy. 2 / Lawson St.	--	--	--	LOS = F Delay = 89.1
Modify Signal Timing/Phasing, Add NB & SB Lt. turn bays	--	--	--	LOS = D Delay = 40.6
Hwy. 2 / Garfield St.	--	--	LOS = E Delay = 69.2	LOS = F Delay = 160.9
Optimized Signal Timing (NB/SB Left turn lanes)	--	--	LOS = D Delay = 52.5	LOS = F Delay = 131.5
Modify Signal Timing/Phasing, Add EB & WB Auxilliary Lanes	--	--	--	LOS = C Delay = 25.0
Hwy. 2 / Hayford Rd.	LOS = E Delay = 59.8	LOS = E Delay = 80.0	LOS = F Delay = 140.9	LOS = F Delay = 243.7
Optimized Signal Timing, Add SB Left turn lane	LOS = D Delay = 45.9	LOS = E Delay = 60.4	--	--
Add WB Lt. Turn Lane; Add EB and NB Rt. Turn Lanes	--	LOS = D Delay = 54.0	LOS = F Delay = 97.1	--
Add NB Lt. turn bay, WB auxilliary lane	--	--	LOS = D Delay = 51.3	LOS = F Delay = 95.4



MITIGATION - ALTERNATIVE 1, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt1-Ph1	2015 PM Peak BG + Alt1-Ph2	2019 PM Peak BG + Alt1-Ph3	2032 PM Peak BG + Alt1-Ph3
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = F Delay = 671.9	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
<i>Signalized</i>	LOS = B Delay = 15.6	LOS = B Delay = 16.4	LOS = B Delay = 17.6	LOS = C Delay = 20.5
<i>Roundabout</i>	LOS = A Delay = 8.6	LOS = A Delay = 9.4	LOS = B Delay = 10.4	LOS = B Delay = 16.1
Hwy. 2 / Fairchild AFB	--	--	--	LOS = F Delay = 90.6
<i>Modify Signal Timing, Add NB Lt. turn bay and WB through lane</i>	--	--	--	LOS = D Delay = 50.5
Craig Rd. / Sixth Ave.	--	--	CM = WB Lt LOS = E Delay = 44.0	CM = WB Lt LOS = F Delay = 89.9
<i>Add NB Right turn bay</i>	--	--	CM = WB Lt LOS = D Delay = 28.8	CM = WB Lt LOS = E Delay = 47.3
<i>Roundabout</i>	--	--	--	LOS = C Delay = 20.5
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *	CM = SB Lt LOS = F Delay = *
<i>Signalize, Add EB & SB Left turn lanes</i>	LOS = C Delay = 31.1	LOS = D Delay = 38.8	LOS = D Delay = 45.4	LOS = E Delay = 62.3
<i>Modify Signal Timing, Channelize WB Rt. Turn as 'Free' movement</i>	--	--	--	LOS = D Delay = 51.0
<i>Roundabout</i>	LOS = A Delay = 9.8	LOS = B Delay = 18.6	LOS = E Delay = 61.3	LOS = F Delay = 110.0
Craig Rd / Dwy. North	--	--	--	CM = EB Lt LOS = F Delay = 68.2
<i>Add NB Thru Lane</i>	--	--	--	CM = EB Lt LOS = E Delay = 37.3
<i>Roundabout</i>	--	--	--	LOS = B Delay = 11.4



Table ES- 6. MITIGATION-ALT 2

INTERSECTION	2012 PM Peak BG + Alt2- Buildout	2032 PM Peak BG + Alt2- Buildout
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = NBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 31.6	LOS = F Delay = 109.7
Roundabout	LOS = A Delay = 7.8	LOS = D Delay = 54.3
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = F Delay = 574.9
NB/SB Right turn bays	CM = NBLT R LOS = E Delay = 40.7	CM = NBLTR LOS = F Delay = 500.9
Add EB/WB Right Turn Lanes Eliminate N/S left turns	--	CM = NBRt LOS = D Delay = 34.1
Hwy. 2 / Lawson St.	--	LOS = E Delay = 63.0
Modify Signal Timing/Phasing, Add EB/WB Rt turn bays, Reconfigure N/S app.	--	LOS = D Delay = 37.4
Hwy. 2 / Garfield St.	--	LOS = F Delay = 123.6
Modify Signal Timing/Phasing, Add EB Rt. And NB Lt turn bays, Reconfigure SB app.	--	LOS = E Delay = 57.2
Hwy. 2 / Hayford Rd.	LOS = E Delay = 59.8	LOS = F Delay = 217.2
Convert Thru Lane to 2nd SB Lt Turn Lane	LOS = D Delay = 42.2	LOS = F Delay = 147.0
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = F Delay = *
Signalized	LOS = B Delay = 15.6	LOS = B Delay = 18.2
Roundabout	LOS = A Delay = 8.6	LOS = B Delay = 11.6



MITIGATION-ALT 2, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt2- Buildout	2032 PM Peak BG + Alt2- Buildout
Hwy. 2 / Fairchild AFB	--	LOS = E Delay = 75.8
<i>Optimized Signal Timing, Add NB Lt turn bay and WB through lane</i>	--	LOS = D Delay = 50.6
Craig Rd. / 6th Ave.	--	CM = WB Lt LOS = E Delay = 42.6
<i>Add NB Right turn bay</i>	--	CM = WB Lt LOS = D Delay = 28.5
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *
<i>Signalized</i>	LOS = C Delay = 31.1	LOS = D Delay = 46.8
<i>Roundabout</i>	LOS = A Delay = 9.8	LOS = E Delay = 65.8



Table ES- 7. MITIGATION-ALT 3

INTERSECTION	2012 PM Peak BG + Alt3	2032 PM Peak BG + Alt3
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = NBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 28.2	LOS = F Delay = 90.3
Roundabout	LOS = A Delay = 7.1	LOS = D Delay = 42.8
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 42.0	CM = NBLTR LOS = F Delay = 406.5
Add NB/SB Right turn lanes	CM = NBLT R LOS = E Delay = 37.2	CM = NBLTR LOS = F Delay = 246.7
Add EB/WB Right Turn Lanes Eliminate N/S left turns	--	CM = NB Rt LOS = D Delay = 32.4
Hwy. 2 / Lawson St.	--	LOS = E Delay = 57.0
Modify Signal Timing/Phasing, Reconfigure N/S app.	--	LOS = D Delay = 37.0
Hwy. 2 / Garfield St.	--	Delay = 111.1 Delay = 111.1
Modify Signal Timing/Phasing, Add NB Lt. turn bay, Reconfigure SB app.	--	LOS = D Delay = 49.4
Hwy. 2 / Hayford Rd.	LOS = E Delay = 56.0	LOS = F Delay = 202.7
Convert Thru Lane to 2nd SB Lt. Turn Lane	LOS = D Delay = 40.6	LOS = F Delay = 141.4
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 319.6	CM = SBLTR LOS = F Delay = 846.5
Signalized	LOS = B Delay = 15.1	LOS = B Delay = 17.2
Roundabout	LOS = A Delay = 8.2	LOS = B Delay = 10.7



MITIGATION-ALT 3, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt3	2032 PM Peak BG + Alt3
Hwy. 2 / Fairchild AFB	--	LOS = E Delay = 71.4
<i>Optimized Signal Timing, Add NB Lt turn bay and WB through lane</i>	--	LOS = D Delay = 48.9
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *
Signalized	LOS = C Delay = 29.3	LOS = D Delay = 40.3
Roundabout	LOS = A Delay = 9.2	LOS = D Delay = 60.0



2. INTRODUCTION

This traffic impact analysis (TIA) is being submitted in support of the Environmental Impact Statement (EIS) for the Spokane Tribe's West Plains Development project to comply with the National Environmental Policy Act (NEPA), as well as local agency development procedures and the Washington Department of Transportation's (WSDOT) access permit requirements. The purpose of this study is to review, assess and identify potential traffic related impacts which the proposed project may have on the surrounding transportation system. This study was completed in accordance with the standard practice for completing studies of this type in Spokane County and generally follows the guidelines developed by the Institute of Transportation Engineers (A Recommended Practice - Traffic Access and Impact Studies for Site Development, 1991).

2.1 Site Location and Development Description

This traffic study was completed for the proposed Spokane Tribe's West Plains Development located northwest of the Hwy 2 & Craig Rd. intersection just west of the City of Airway Heights. As part of the federal EIS process three site plan alternatives are being considered on the approximately 145 acre site; all mixed use commercial developments. The following summarizes the three alternatives being considered.

Alternative 1: Alternative 1 is a mixed use development including retail, casino/hotel, and commercial components. The components listed below were used to estimate the amount of traffic generated under Alternative 1. The trip generation for the central portion of the project was calculated based on the casino, the external restaurant space, and the specialty retail area. Components such as the hotel and food venues were considered incidental and ancillary uses to the primary casino components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Casino/Hotel Resort
 - 3,040-gaming-position casino
 - 300-room hotel with pool and spa
 - 3-venue food court, two bars, 250-seat café, retail restaurant, and a 150-seat specialty restaurant
 - 93,500-square-foot Convention/Banquet Room
- 205,000 square feet of specialty retail
 - Lifestyle retail
 - Specialty box retail
- 18,000 square feet of restaurants
 - 150-seat specialty restaurant
 - 120-seat steakhouse
- 155,145 square feet of site retail
- 41,633-square-foot commercial development
- 10,480-square-foot Tribal Cultural Center
- 14,036-square-foot Police and Fire Station

Alternative 2: Alternative 2 is similar to Alternative 1 but with a smaller casino component and no hotel or specialty retail. The components listed below were used to estimate the amount of traffic generated under Alternative 2. As with Alternative 1, the trip generation for the central portion of the project was calculated based on the casino, the external restaurant space, and the specialty retail area. Components such as the food venues were considered incidental and ancillary uses to the primary casino components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Casino/Hotel Resort
 - 1,878-gaming-position casino
 - 3-venue food court, two bars, and a 250-seat café
 - 12,600-square-foot multi-purpose bingo room
- 9,200-square-foot steakhouse
- 155,145 square feet of site retail



- 41,633-square-foot commercial development
- 10,480-square-foot Tribal Cultural Center
- 14,036-square-foot Police and Fire Station

Alternative 3: Alternative 3 is a non-gaming option where the casino/hotel shown at the core of the site in Alternatives 1 is replaced with a hotel and general entertainment component. The components listed below were used to estimate the amount of traffic generated under Alternative 3. The trip generation rate for the central portion of the project was based on the hotel, the entertainment components (bowling alley and recreational space), the external restaurant space, and the specialty retail area. Components within the central building such as the lounge and conference space were considered incidental and ancillary uses to the primary hotel and entertainment components, as discussed in more detail in Section 5, Trip Generation and Distribution.

- Multi Purpose Recreational Facility
 - 55,850-square-foot children's arcade fun zone
 - 8,593-square-foot lounge
 - 10-venue food court; coffee shop; 100-seat specialty restaurant; retail restaurant
- 300-room hotel
 - Indoor swimming pool
 - 20,000-square-foot spa/wellness center
 - 93,500-square-foot Convention/Banquet Center
- 45,020-square-foot bowling alley
- 96,634 square feet of specialty retail
- 19,900 square feet of restaurants
 - 150-seat specialty restaurant
 - 120-seat steakhouse
- 155,145 square feet of site retail
- 41,633-square-foot commercial development
- 10,480-square-foot Tribal Cultural Center
- 14,036-square-foot Police and Fire Station

See **Figure 1** for a vicinity map and **Figures 2a-2c** for site plans for Alternatives 1 through 3.

2.2 Land Use and Zoning

The proposed site is located within Spokane County, Washington. The site is held in trust by the United States government on behalf of the Spokane Tribe; as tribal trust land it is not subject to local land use regulations. Surrounding zoning and land uses include Rural Traditional zoning west and north of the site and existing or planned commercial and residential land uses east of the site within the City of Airway Heights.

2.3 Phasing Plan of the Project

Three major phases are anticipated for the Alternative 1 development. Alternatives 2 and 3 were analyzed under a "build-out" phase only. For Alternative 1, the initial phase would be completed in 2012; the latest phase of development is expected to occur in 2019.

2.4 Purpose of Report and the Scope of Study

The purpose of this analysis is to review, assess and identify potential traffic related impacts which the proposed project may have on the surrounding transportation system.

This TIA has been completed in accordance with the standard practice for completing studies of this type in Spokane County and generally follows guidelines developed by the Institute of Transportation Engineers (A Recommended Practice - Traffic Access and Impact Studies for Site Development, 1991).

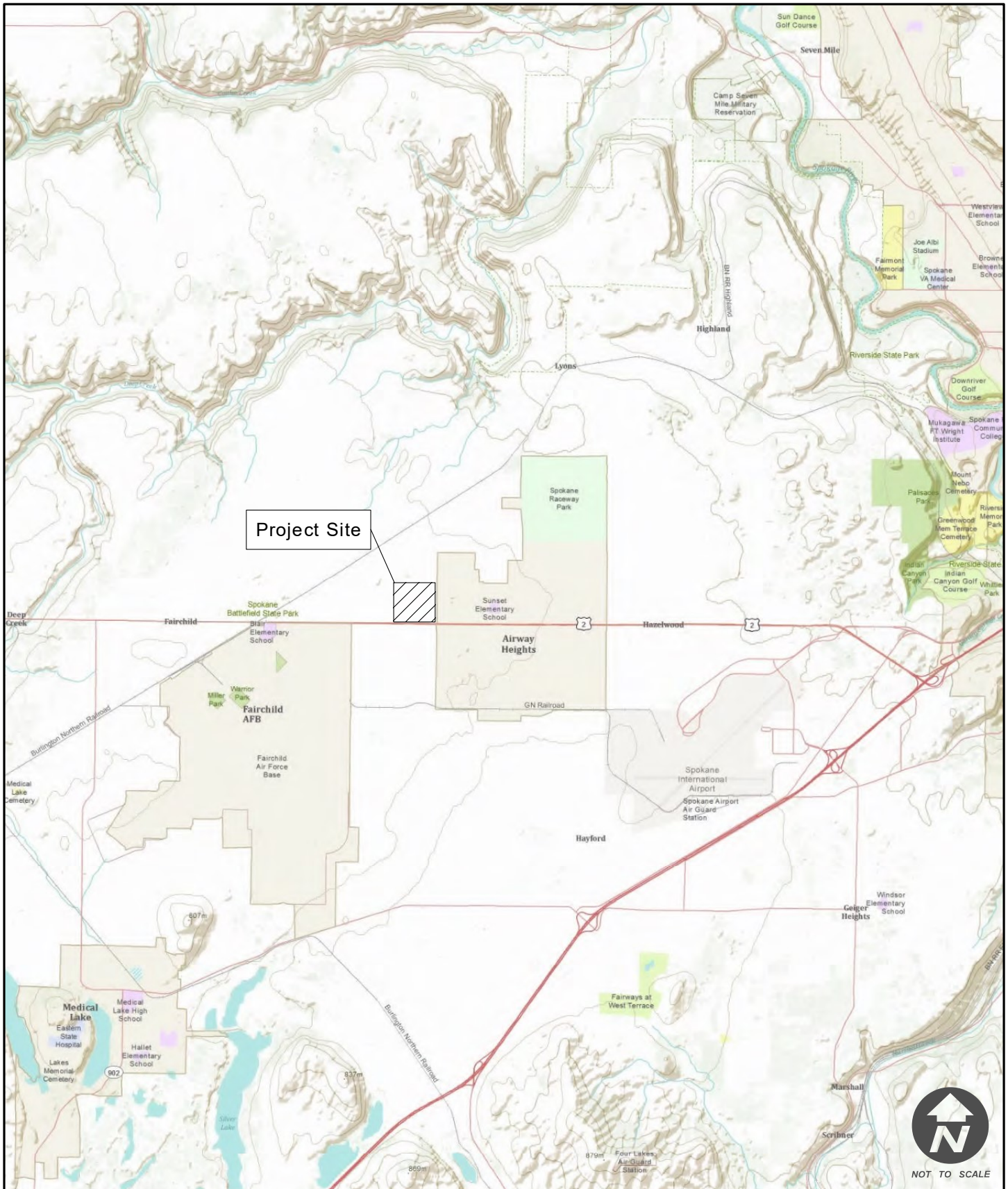


The project study area for this Traffic Impact Analysis was determined through discussions with City of Airway Heights, Spokane County and WSDOT to include the intersections of:

- Highway 2/Craig Road
- Highway 2/Lundstrom Street
- Highway 2/Lawson Street
- Highway 2/Garfield Street
- Highway 2/Hayford Road
- Craig Road/Deno Road
- Craig Road/6th Avenue
- Craig Road/McFarlane Street
- Craig Road/Thorpe Road
- Craig Road/State Route 902
- Highway 2/ Fairchild AFB
- Site access driveways

The review agencies noted above also specified that the scope of the analysis shall include PM peak hour analysis only as this is typically the ‘worst case’ weekday traffic condition.

Additionally, as directed by the review agencies, the technical analysis focused on intersections only and did not included roadway segment analysis. This approach is common since intersections are typically the weak link within the transportation network.



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WEST PLAINS DEVELOPMENT CITY OF AIRWAY HEIGHTS, WA

TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001

FIGURE 1

VICINITY MAP



NOT TO SCALE MAP FROM FRIEDMUTTER GROUP, DECEMBER 2010.



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908 N. Howard St. Ste 300
Spokane, WA 99201

WEST PLAINS DEVELOPMENT CITY OF AIRWAY HEIGHTS, WA

TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTRO00000001

FIGURE 2A

ALTERNATIVE 1 MASTER SITE PLAN



NOT TO SCALE MAP FROM FRIEDMUTTER GROUP, DECEMBER 2010.



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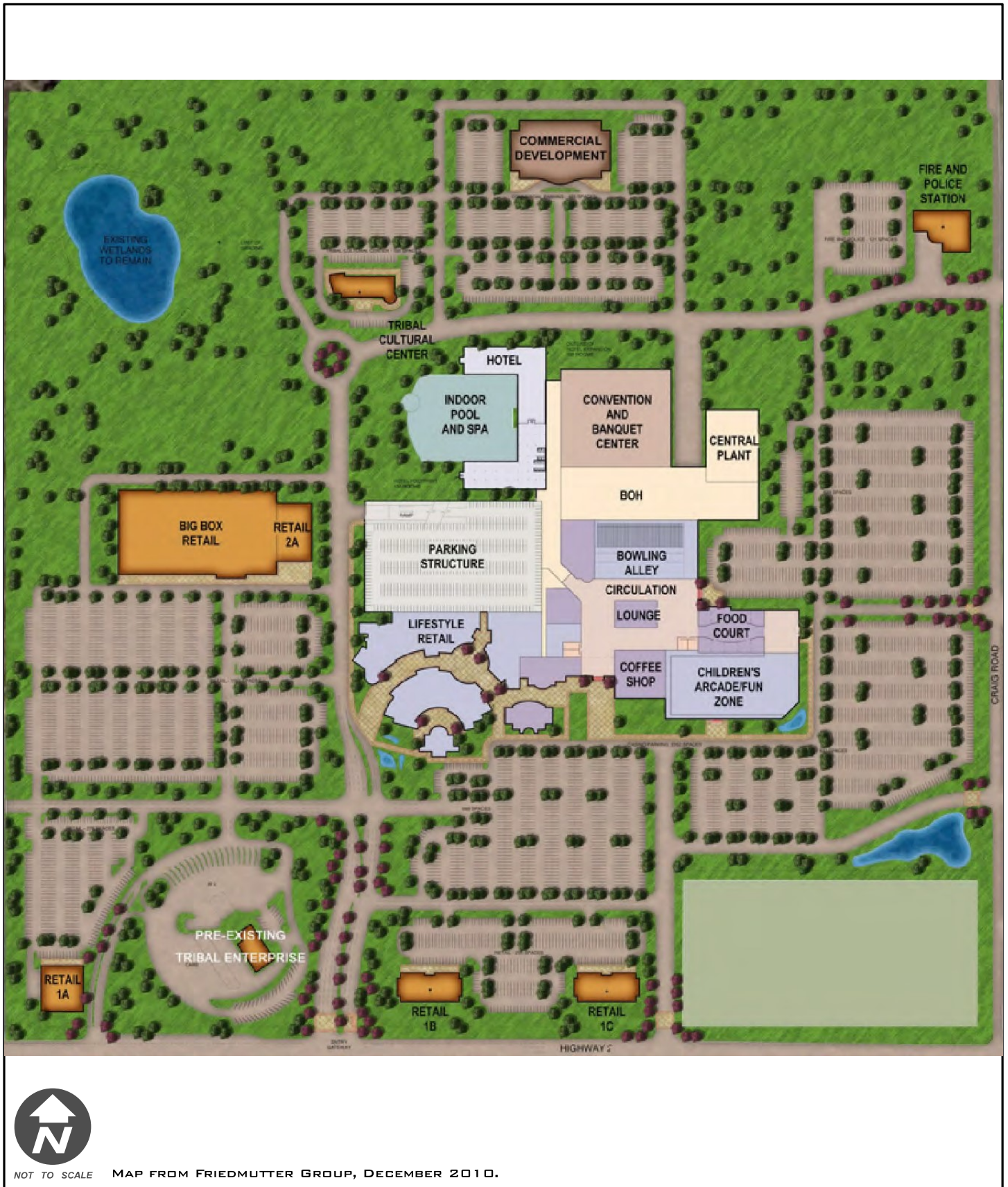
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FIGURE 2B

ALTERNATIVE 2 MASTER SITE PLAN



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FIGURE 2C

ALTERNATIVE 3 MASTER SITE PLAN



2.5 Methodology

The weekday PM peak hour has been identified as the time period when the greatest traffic demands are placed on the transportation system. This will be the time period utilized by this study for analyzing the traffic impacts of the proposed project. Mitigation needs, if any will generally arise during the peak hours. By inspection, if the system operates acceptably under PM peak hour traffic conditions, it will operate better as lower traffic volumes are observed during other times of the day.

The impact due to the proposed project was measured by comparing the level of service of the existing, future without project and future with project scenarios. The Without Project scenarios include the existing traffic conditions and Year 2012, 2015 and 2019 conditions. Background traffic volumes were derived from inclusion of approved, unbuilt pipeline projects. Refer to the future conditions sections of this document for additional discussion of the pipeline projects. Trip generation for most elements of the proposed project were calculated using the data provided by the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 8th Edition manual. Trip generation for the Casino/Hotel component is based on information provided in *Recalibration of Trip Generation Model for Las Vegas Hotel/Casinos. May, 2002 ITE Journal pp. 26-33. Rowe, Kaseko, Ackeret*. Trip generation for the proposed police/fire facility was based on data from *Police Station PM Peak Hour Trip Generation in the Portland Metro Area, December 2, 2009, Portland State University, Armans, Edmonds, et al.*

The LOS evaluation for this study was conducted using Synchro 7.0 developed by Trafficware. The software is primarily based on the procedures outlined in the Transportation Research Board's Highway Capacity Manual (HCM) 2000. This software uses detailed information on geometry, lane use, signal timing, peak hour volumes, and vehicle arrival types. The information is then used to calculate delays and to determine the LOS for each movement/approach. LOS was calculated for each study intersection under the three analysis scenarios. SIDRA software was used for roundabout analysis as is the standard practice in the state of Washington. Detailed Synchro analysis output worksheets are included in Appendix C of this report, while SIDRA analysis output is included in Appendix F.

2.6 Level of Service

Level of service (LOS) is a qualifiable premise developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles afforded to drivers who utilize the transportation network. It has been defined by the Transportation Research Board in the 2000 Highway Capacity Manual. This document has quantified level of service into a range from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion which may lead to system breakdown due to traffic volumes which may exceed capacity.

2.6.1 Signalized Intersections

For signalized intersections, recent research has determined that average control delay per vehicle is the best available measure of level of service. Control delay can be defined as the difference between the actual travel time and the free-speed travel time. Control delay includes the initial deceleration of vehicle from free-speed (posted speed limit) to join the queue, time spent in the queue and the acceleration from stop bar to the free-speed. HCM methodology estimates the average control delay for each lane group and aggregated for each approach and intersection as a whole.

2.6.2 Unsignalized Intersections

For unsignalized intersections, level of service is based on the delay experienced by each movement within the intersection. In the case of a two-way stop controlled intersection, the delay experienced by the minor street approach movements and the major street left turn movements are considered as the performance measure. Vehicles passing straight through the intersection on the major (uncontrolled) street experience no delay at the two-way stop controlled intersection. On the other hand, vehicles which are turning left from the minor street must stop for all left turning vehicle from the major street and all



through and right turn vehicles on both the minor and major streets. Therefore, in most cases, the minor street left turn delay is the critical movement at a two-way stop controlled intersection.

The Transportation Research Board has determined what levels of service for unsignalized intersections should be, by designating level of service A through F, where level of service A represents a facility where no vehicle in any movement is delayed very long and level of service F which represents a facility where there is excessive delay for the average vehicle in at least one movement in the intersection.

Corresponding LOS and ranges of delay are shown in Table 1 for signalized intersections and Table 2 for unsignalized intersections.

Table 1. Level of Service Criteria for Signalized Intersections

Level-of-Service	Control Delay per Vehicle (s/veh)
A	≤ 10.0
B	>10.0 and ≤ 20.0
C	>20.0 and ≤ 35.0
D	>35.0 and ≤ 55.0
E	>55.0 and ≤ 80.0
F	>80.0

Source: Highway Capacity Manual 2000, Transportation Research Board.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (s/veh)
A	≤ 10
B	>10 and ≤ 15
C	>15 and ≤ 25
D	>25 and ≤ 35
E	>35 and ≤ 50
F	>50

Source: Highway Capacity Manual 2000, Transportation Research Board.

Additionally, for unsignalized intersections, volume to capacity (V/C) ratio and queue length are sometimes considered when evaluating congested intersections and when determining if mitigations or improvements are warranted.



2.7 Applicable Standards, Policies and Assumptions

The following key assumptions were applied to the technical analysis and preparation of the traffic study for this project.

1. The traffic study was prepared to NEPA and BIA Implementing Guidelines
2. The traffic study complies with standard practices for traffic studies within this region and meets Spokane County, City of Airway Heights and WSDOT requirements for traffic studies of this type.
3. The study has been prepared in compliance with the local agreements between the Spokane Tribe and the City of Airway Heights and Spokane County; it is therefore in conformance with standards set forth in the Spokane County Standards for Road and Sewer Construction, Technical Reference 'A' and City of Airway Heights requirements.
4. WSDOT, Spokane County and City of Airway Heights standard practice typically calls for analysis of the 'build-out' condition of the proposed project. The anticipated buildout year utilized for Alternative 1 is 2019. The assumed buildout year for Alternatives 2 & 3 is 2012.
5. The study evaluates the study intersections listed in Section 2.4 of this report for three alternative build conditions plus 'Without Project' analysis scenarios for the buildout year and each phase of development.
6. Traffic conditions were assessed for PM peak hour conditions only based on the traffic study scope of work defined by WSDOT, Spokane County and City of Airway Heights. PM peak was selected since it is generally the worst case condition both in terms of existing traffic volumes on the network and the highest trip generation from the proposed project. Traffic counts were collected at the study intersection from 3:00-6:00 PM. The peak hour of volume (four consecutive 15-minute increments) from this time range was identified and used for the analysis. Note that the peak hour at each intersection may vary slightly, however, this approach results in a conservative analysis compared to selection of an arbitrarily predefined peak hour or the peak hour that may occur at most but not all intersections.
7. The trip generation calculations are based on the highest PM peak hour data. The analysis applies the PM peak hour trip generation to the PM peak hour traffic on the roadway network. Note that these two peaks may not occur at the same time in actual conditions. This approach again results on a conservative analysis.
8. The trip generation and distribution methodology and assumptions including supporting documentation regarding the casino trip generation rate was previously provided to the review agencies and accepted by the agencies.
9. Federal Highway Administration procedures under the National Environmental Policy Act require studying potential cumulative impacts for a 20 year horizon. This study includes a year 2032 analysis based on traffic growth rate data received from the regional Metropolitan Planning Organization, Spokane Regional Transportation Council (SRTC).
10. The technical analysis generally adheres to methodologies outlined in the *Highway Capacity Manual* as implemented in the analysis software utilized (Synchro 7.0 and SIDRA).
11. The proposed Spokane Tribe West Plains Development project is a Federal project on Federal land under the jurisdiction of the Federal Government, which is held in trust for the Spokane Tribe of Indians.

Additional information related to the analysis methods is included later sections of this report.



2.8 Significance Criteria

The following key assumptions were applied to the technical analysis and preparation of the traffic study for this project.

1. The minimum level of service applied to the intersections studied was LOS D for signalized arterial intersections and LOS E for unsignalized arterial intersections under WSDOT or Spokane County jurisdiction. LOS D is the minimum acceptable LOS for arterial intersections under the jurisdiction of the City of Airway Heights. This LOS criteria does not apply to site access driveways. Intersection jurisdiction is listed below.

<u>Intersection</u>	<u>Jurisdiction</u>
○ Highway 2/ Craig Road	WSDOT
○ Highway 2/Lundstrom Street	WSDOT
○ Highway 2/Lawson Street	WSDOT
○ Highway 2/Garfield Street	WSDOT
○ Highway 2/Hayford Road	WSDOT
○ Craig Road/Deno Road	Spokane County
○ Craig Road/6 th Avenue	City of Airway Heights
○ Craig Road/McFarlane Street	Spokane County
○ Craig Road/Thorpe Road (2)	Spokane County
○ Craig Road/State Route 902	WSDOT
○ Highway 2/ Fairchild AFB	WSDOT

2. Where intersections are estimated to operate at a failing level of service under future background conditions (Without Project), for 'With Project' conditions the analysis shall identify mitigation that returns the intersection to background traffic conditions (Without Project) in terms of vehicular delay. Under these circumstances the project is not required to mitigate to the LOS criteria noted above.



3. EXISTING CONDITIONS

3.1 Street Network

The arterial transportation network in close proximity to the project site consists of US 2 as the primary access carrier of traffic on the West Plains. Additional key arterials include Craig Rd., Hayford Rd., 6th Ave. and State Route 902. A description of the primary roadways within the study area is included below.

Highway 2 is an urban principal arterial under the jurisdiction of the Washington State Department of Transportation. SR-2 is the primary east-west route between Spokane and Fairchild Air Force Base, Airway Heights, as well as many rural communities to the west. The existing roadway is a five-lane facility with a two-way center left-turn lane and dedicated left turn lanes at key intersections and arterials. The posted speed limit is 55 miles per hour west of Craig and 35 miles per hour east of Craig.

Craig Road is a two lane County road north and south of State Route 2. The roadway is functionally classified as a rural local access road. Craig Road serves as the western boundary of the City of Airway Heights. Craig Rd. would fall under the jurisdiction of the City of Airway Heights if the subject site is annexed and Craig is designated as an Urban Minor Arterial in the Airway Heights Streets Plan.

Sixth Avenue is designated as an urban minor arterial. It exists in the central and eastern parts of the City but does not currently connect to Craig Rd. Extension and connection to Craig Rd. is planned by the City or through adjacent development projects. For the purposes of this study it was assumed that 6th Ave. is in place and extended to connect to Craig Rd. by 2012.

Hayford Road is a rural minor arterial serving as a connection between I-90 and northwest Spokane County. The north-south roadway is primarily a two-lane, shouldered facility, south of SR-2. Hayford Rd. is a five-lane facility with a two way center left-turn lane north of SR-2 to just north of Sprague Ave. It provides a connection to Trails Rd. which serves as an alternative to Hwy 2 in providing access to the West Plains to/from areas in northwest Spokane. The existing speed limit on this roadway varies from 35 mph to 50 mph.

State Route 902 (SR 902) is a rural minor arterial in the vicinity of the study intersection (SR 902/Craig). It serves as an east-west route and connection between Medical Lake and I-90. SR 902 is a two lane facility. The existing posted speed limit is 55 mph near the study area.

3.2 Intersection Geometry and Control

The existing intersection geometrics were compiled from field reviews. The study area was reviewed to determine the existing number and type of lanes and the traffic control along the roadway. Four of the eleven study intersections are signalized. Descriptions of the study intersections and their controls are discussed below. The existing lane geometrics and traffic control are illustrated in **Figure 3**.

Craig Road / Hwy 2 is a two-way unsignalized intersection with stop control on the Craig Road approaches. The eastbound approach includes a left turn lane, two through lanes and a right turn lane. The westbound approach has a left turn lane, a through lane, and a shared through/right lane. The northbound and southbound approaches have a shared left/through/right lane. The posted speed limit is 45 miles per hour along Craig Road. The posted speed limit is 55 miles per hour west of Craig and 35 miles per hour east of Craig along US 2.

Lundstrom Street / Hwy 2 is a two-way unsignalized intersection with stop control on the Lundstrom Street approaches. The eastbound and westbound approaches have a left turn lane, a through lane and a shared through/right lane. The northbound and southbound approaches have a shared left/through/right lane. The posted speed limit is 25 miles per hour along Lundstrom Street. The posted speed limit is 35 miles per hour along US 2.

Lawson Street / Hwy 2 is a signalized intersection. The eastbound and westbound approaches have a left turn lane, a through lane, and a shared through/right lane. The northbound and southbound approaches



have a shared left/through lane and a right turn lane. The posted speed limit is 25 miles per hour along Lawson Street. The posted speed limit is 35 miles per hour along US 2.

Garfield Road / Hwy 2 is a signalized intersection. The eastbound approach has a left turn lane, a through lane, and a shared through/right lane. The westbound approach has a left turn lane, two through lanes and a right turn lane. The northbound approach has a shared left/through/right lane. The southbound approach has a shared left/through lane and a right turn lane. The posted speed limit is 30 miles per hour along Garfield Street. The posted speed limit is 35 miles per hour along US 2.

Hayford Road / Hwy 2 is a signalized intersection. The eastbound approach has dual left turn lanes, a through lane, and a shared through/right lane. The westbound approach has a left turn lane, two through lanes and a right turn lane. The northbound and southbound approaches have a left turn lane, a through lane, and a shared through/right lane. The posted speed limit is 45 miles per hour along Hayford Road. The posted speed limit is 35 miles per hour along US 2.

Craig Road / Deno Road is a two-way unsignalized intersection with stop control on Deno Road. All approaches have a shared left/through/right lane. The posted speed limit is 45 miles per hour along Craig Road. The posted speed limit is 30 miles per hour along Deno Road.

Craig Road / McFarlane Road is a two-way unsignalized intersection with stop control on McFarlane Road. All approaches have a shared left/through/right lane. The posted speed limit is 45 miles per hour along Craig Road and McFarlane Road.

Craig Road (East) / Thorpe Road is an unsignalized “T” intersection with stop control on Craig Road. The eastbound approach has a shared left/through lane. The westbound approach has a shared through/right lane. The southbound approach has a shared left/right lane. The posted speed limit is 30 miles per hour along Thorpe Road. The posted speed limit is 45 miles per hour on Craig Road.

Craig Road (West) / Thorpe Road is an unsignalized “T” intersection with stop control on Craig Road. The eastbound approach has a shared through/right lane. The westbound approach has a shared left/through lane. The northbound approach has a shared left/right lane. The posted speed limit is 30 miles per hour along Thorpe Road. The posted speed limit is 30 miles per hour on Craig Road.

State Route 902 / Craig Road is a two-way unsignalized intersection with stop control on Craig Road. The eastbound and westbound approaches have a left turn and a shared through/right lane. The northbound and southbound approaches have a shared left/through/right lane. The posted speed limit is 45 miles per hour along Craig Road. The posted speed limit is 55 miles per hour along SR-902.

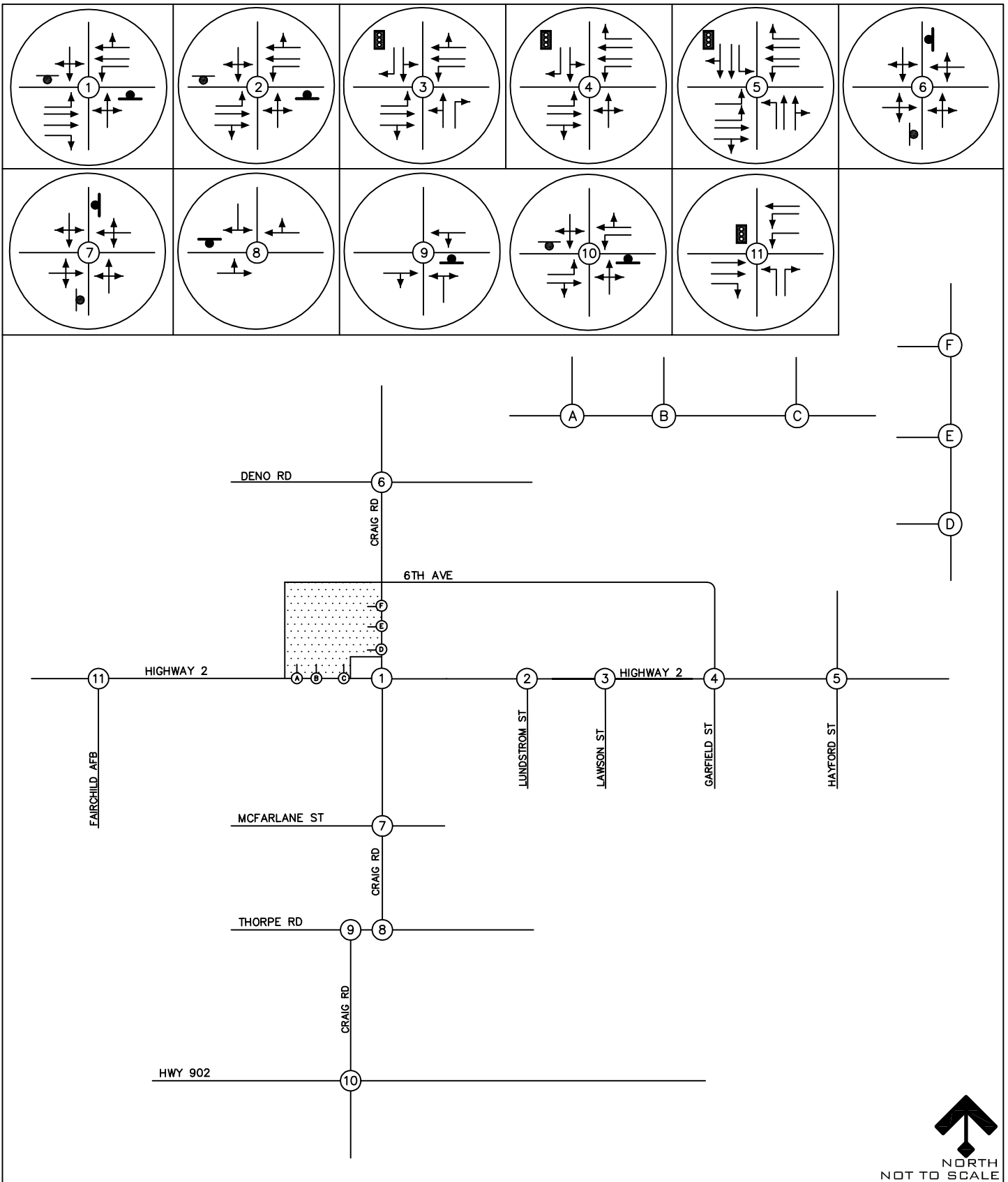
Fairchild AFB / US 2 is a “T” signalized intersection. The eastbound approach has two through lanes and a right run lane. The westbound approach has dual left turn lanes and a through lane. The northbound approach has a left turn lane and a right turn lane. The posted speed limit is 55 miles per hour along US 2. The posted speed limit is 20 miles per hour along Fairchild AFB approach.

3.3 Transit

Transit service is provided to Airway Heights by Spokane Transit Authority (STA) via Route 61. This route terminates within the City of Spokane at the downtown transit plaza and makes stops at the Airway Heights Park & Ride west of Hwy 2/Lawson and within Fairchild Air Force Base, seven days a week. During peak period busses operate with one-half hour headways and off peak periods have one-hour headways.

3.4 Bike and Pedestrian Facilities

Bike and Pedestrian facilities are limited immediately adjacent to the subject site with no sidewalks or paved trails along Hwy 2 or Craig Rd. near the site. Sidewalks exist along Hwy 2 east of Craig Rd. Bicycles are accommodated along Hwy 2 via the paved shoulder; there are no designated bike lanes in the vicinity of the project site or on the roadway network included in the traffic study.



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**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**

FIGURE 3

**EXISTING LANE
GEOMETRY**



3.5 Traffic Volumes

The bulk of intersection (PM) peak hour turning movements were counted in July 2009 specifically for this project. Additional counts were collected at the Hwy 2/Fairchild and Craig Rd/SR 902 intersections in September 2009 to address the review agencies' (WSDOT and Spokane County) desire to add these intersections to the study scope. Additionally, counts (turning movements only) were taken at the Spoko Fuel driveway in May 2010. Traffic count data sheets are provided in Appendix A. Traffic counts were collected from 3:00-6:00 PM. The time period of the peak hour varied by location. For this analysis the highest hour (four consecutive 15 minutes increments) was utilized for the analysis. **Figure 4** shows existing condition PM peak hour volumes.

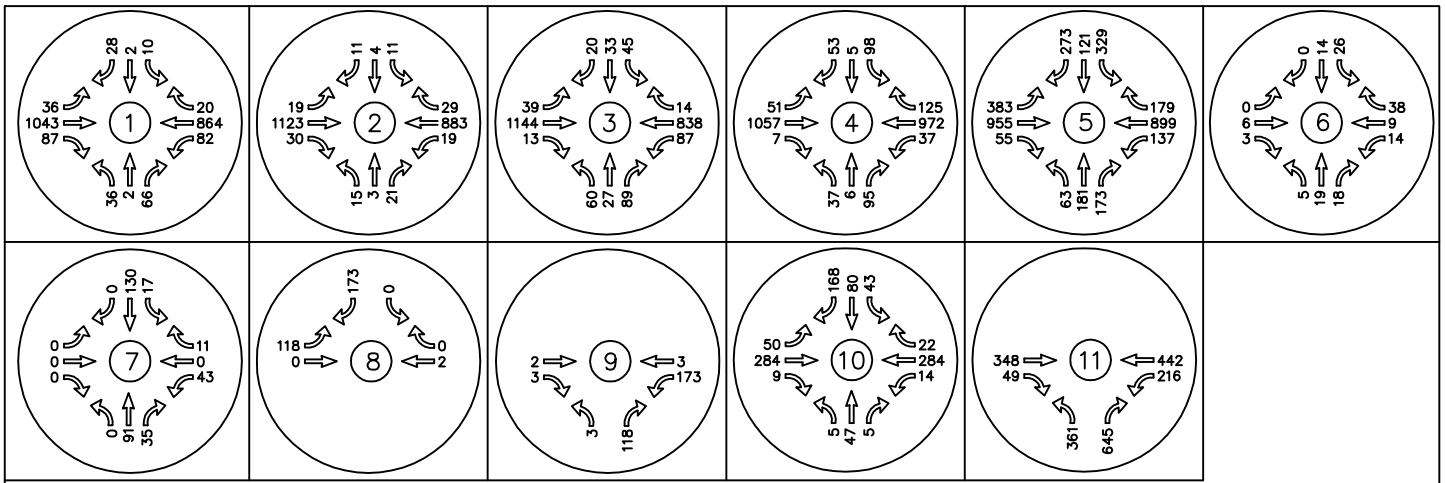
3.6 Operational Analysis and Level of Service - Existing Conditions

The existing levels of service for the study intersections are shown in Table 3.

Table 3. Level of Service for Existing PM Peak Hour Conditions

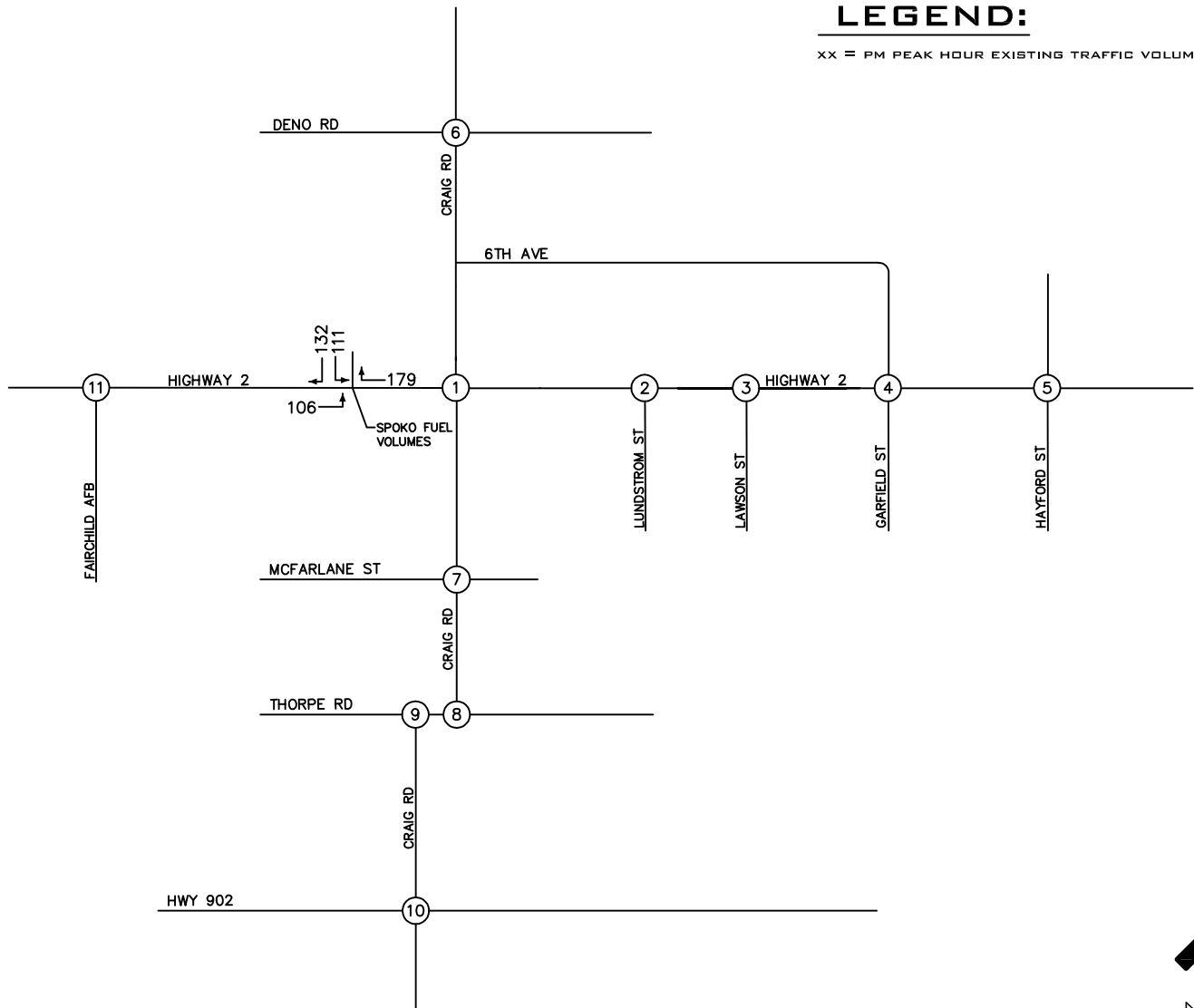
INTERSECTION		Existing Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 at Craig Rd.	U	NB LTR	27.3	D
Hwy. 2 at Lundstrom St.	U	NB LTR	21.0	C
Hwy. 2 at Lawson St.	S	--	15.1	B
Hwy. 2 at Garfield St.	S	--	15.5	B
Hwy. 2 at Hayford Rd.	S	--	38.9	D
Craig Rd. at Deno Rd.	U	EB LTR	9.3	A
Craig Rd. at McFarlane St.	U	WB LTR	10.8	B
Craig Rd. at Thorpe Rd. East	U	SB LR	9.0	A
Craig Rd. at Thorpe Rd. West	U	NB LR	9.0	A
Craig Rd. at SR 902	U	SB LTR	34.5	D
Hwy. 2 at Fairchild AFB	S	--	14.6	B

As shown in Table 3, all study intersections are operating at an acceptable Level of Service (LOS) during existing p.m. peak hour conditions.



LEGEND:

xx = PM PEAK HOUR EXISTING TRAFFIC VOLUMES



NORTH
NOT TO SCALE



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**TRAFFIC IMPACT ANALYSIS
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FIGURE 4

**EXISTING TRAFFIC
VOLUMES**



4. FUTURE BASELINE CONDITIONS

A traffic operations analysis was performed for three future baseline time periods: 2012, 2015 and 2019. These time periods correspond to the timing of buildout of various phases of the three project alternatives considered. For each baseline period, traffic volumes were estimated by adding projected traffic growth from pipeline projects to existing traffic volumes. Analysis of these scenarios allows for the comparison and identification of project related impacts.

4.1 General Assumptions

The following general assumptions were utilized for this analysis.

- The City of Airway Heights plans to extend 6th Ave. to the west to connect to Craig Rd. The extension may occur as a City initiated project or constructed as part of an adjacent or nearby development. For the purposes of the analysis contained in this report, it was assumed that the 6th Ave. connection to Craig Rd. was in place by 2012.
- Pipeline projects included were based on known available data. See additional discussion in the following section.
- Spoko Fuel: Access to the Spoko Fuel site will likely change as part of the larger development. This analysis assumes that the major, full-movement site access will be located just east of the existing Spoko Fuel site with an additional right-in/right-out access located just west of the fuel site. The analysis contained herein includes reassigned existing traffic volumes observed at the Spoko Fuel site. The existing volumes were reassigned as follows:
 - 100% of existing SB right volumes assigned to westerly driveway
 - 100% of existing SB left turn volumes assigned to middle (main) driveway
 - 100% of existing eastbound left turn volumes assigned to middle (main) driveway
 - Existing westbound right turn volumes were split equally between the middle (main) driveway and the westerly driveway

4.2 Pipeline Projects

Numerous pipeline projects were considered to develop traffic forecasts for the 2012, 2015 and 2019 time periods. Information was gathered from various involved agencies including City of Airway Heights, WSDOT, Spokane County and the Spokane Regional Transportation Council (SRTC). Note that the traffic studies for many of the projects were completed several years ago. In many cases the buildout timelines assumed in these studies have not been realized requiring David Evans and Associates, Inc. to make new assumptions regarding the buildout schedule of these projects. These assumptions were made based on the current economic climate, recent pace of development, and information provided by the review agencies. The assumptions used for each of the pipeline projects are further described later in this section. The resulting estimated traffic growth rates from inclusion of pipeline/background projects based on the assumptions utilized are as follows:

Forecast Year	Total Growth vs. Existing Volumes
2012	10.5%
2015	22.1%
2019	46.4%

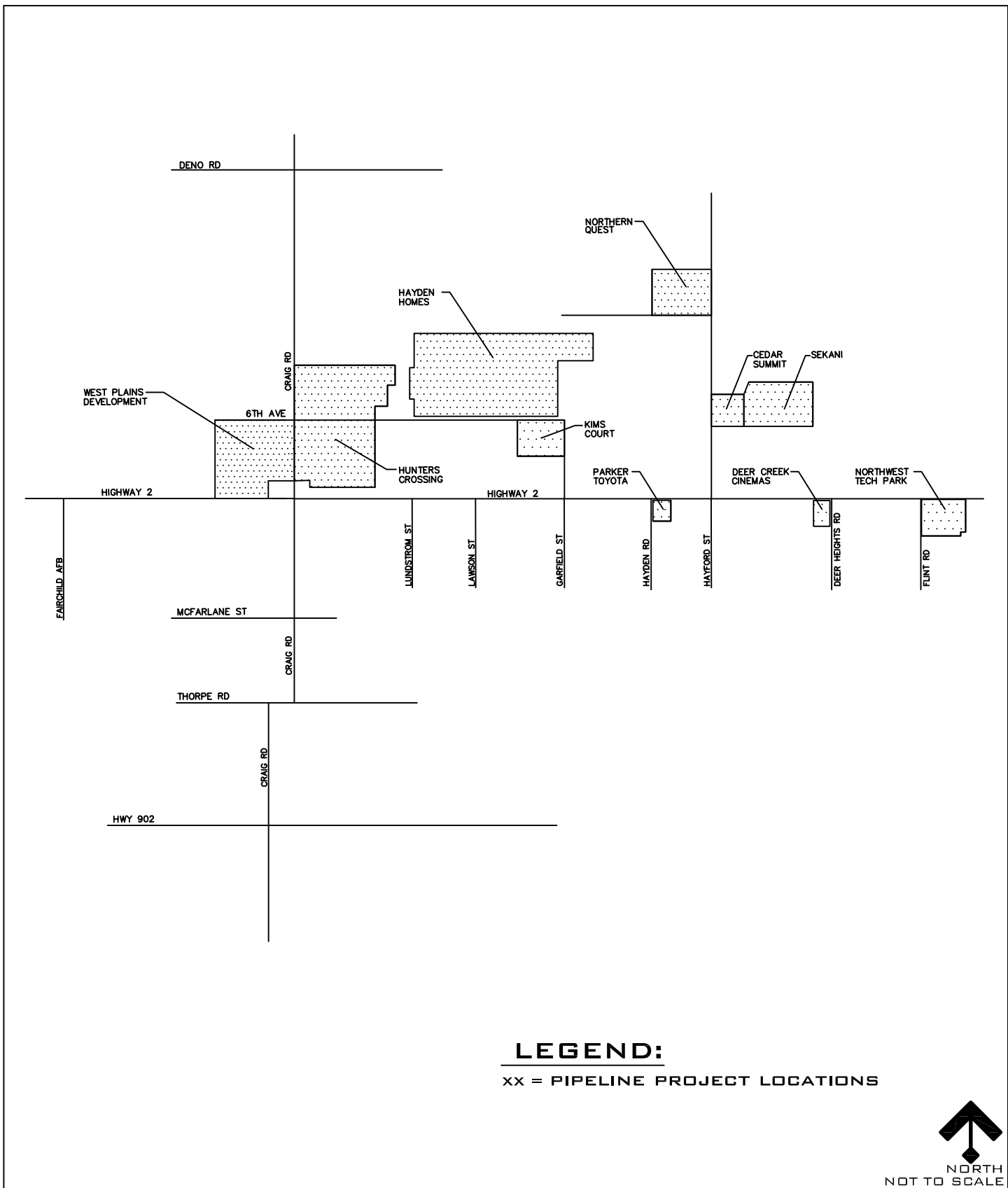


Pipeline Project Description and Assumptions

The following summarizes the pipeline projects included in this study and the assumptions used in the application and assignment of pipeline trips.

1. Deer Creek Cinemas
 - Project trips added to the network at study intersections
 - Project completion occurred after intersection traffic counts were conducted
2. Northwest Tech Park
 - Phase 1 complete
 - Phase 2 assumes that 20% in place by Year 2015 and 50% by Year 2019
3. Parker Toyota/Les Schwab Commercial Development on State Route 2
 - Phase 1 complete
 - Phase 2 assumed in place by Year 2015
4. Sekani at CrossPointe
 - Approximately 95 SFDU currently constructed (4/2010)
 - Additional 106 SFDU
 - Assume 20% by Year 2012, 40% by Year 2015 and 100% by Year 2019
5. Cedar Summit Estates
 - Approximately 350 MFDU (Apartments) Existing
 - Additional 66 MFDU
6. Kim's Court Apartments and Condominiums (250 Apartments, 18 townhomes)
 - Assumed in place by Year 2015
7. Northern Quest Hotel/Casino
 - PH1, 250 hotel rooms
 - PH1 completion occurred after intersection counts were conducted
 - Project trips added to the network at study intersections for PH1
 - PH2, 250 hotel rooms, assumed Year 2019 completion date
8. Hunter's Crossing
 - Assume 20% by Year 2012, 40% by Year 2015 and 100% by Year 2019
9. Hayden/Viking Homes
 - Approximately 35 SFDU currently constructed (4/2010)
 - Assume 20% by Year 2012, 40% by Year 2015 and 100% by Year 2019

Figure 5 shows the locations of pipeline projects within the study area. Appendix B provides tables indicating the intersection trip assignment for pipeline project traffic for the three phased build years (2012, 2015 and 2019) identified in this report.





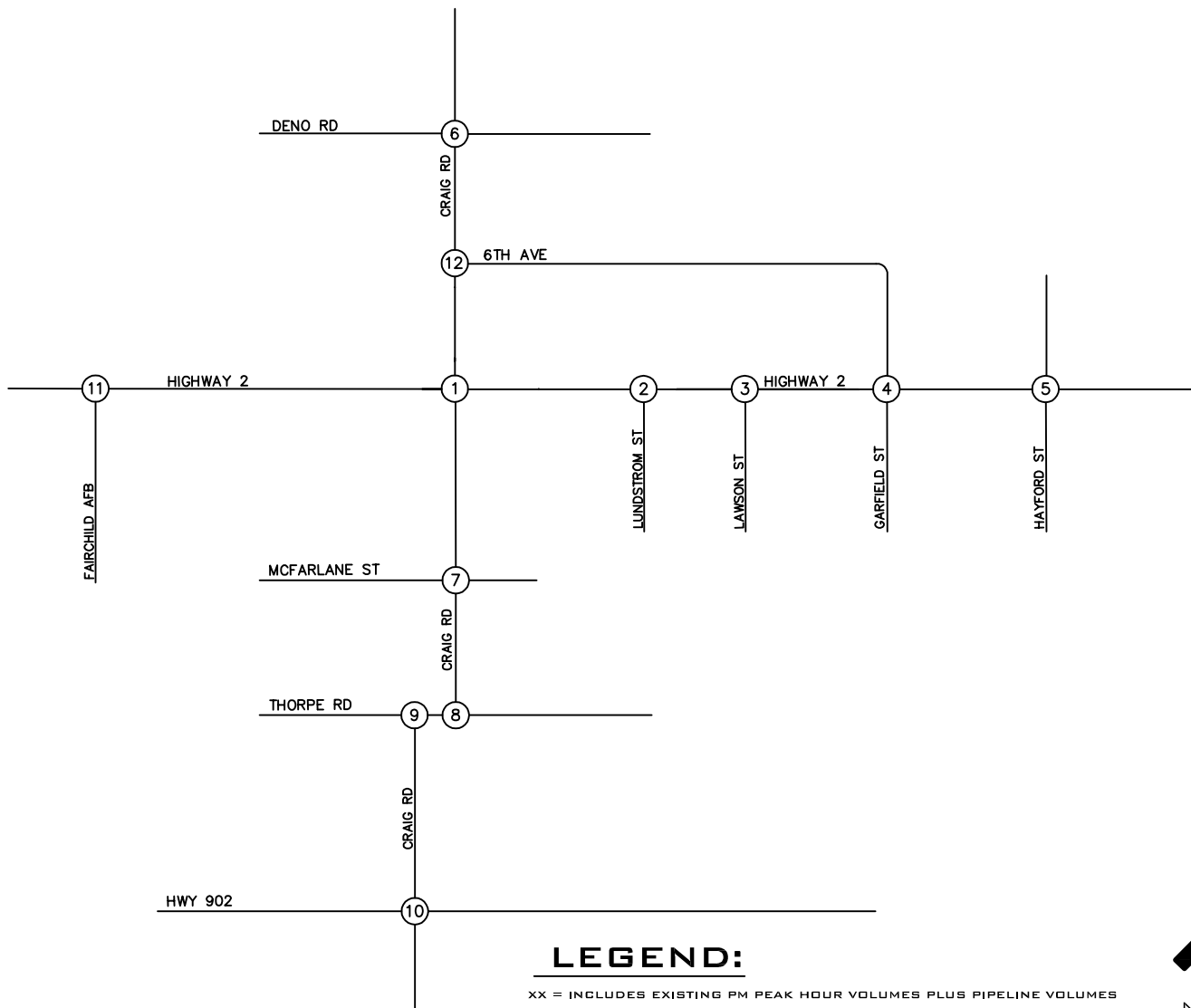
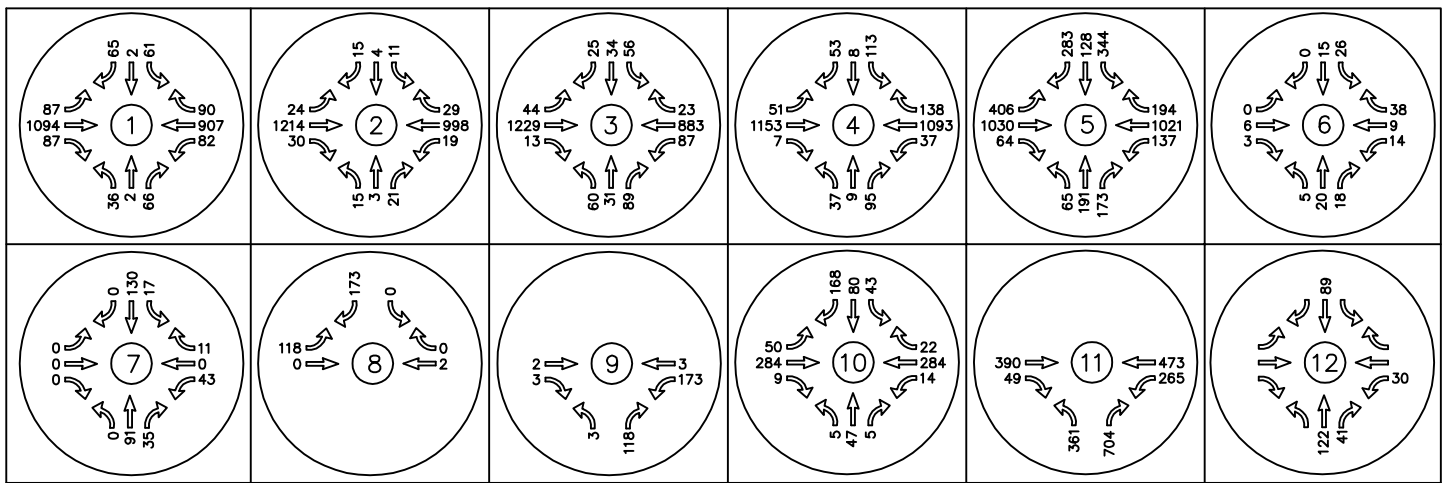
4.3 Operational Analysis and Level of Service - 2012 Pipeline Conditions

The Year 2012 pipeline traffic volumes used for this analysis scenario are shown in **Figure 6**. Operational analysis results are summarized in the table below.

Table 4. Level of Service for Year 2012 Pipeline PM Peak Hour Conditions

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 at Craig Rd.	U	SB LTR	75.0	F
Hwy. 2 at Lundstrom St.	U	NB LTR	23.7	C
Hwy. 2 at Lawson St.	S	--	18.9	B
Hwy. 2 at Garfield St.	S	--	16.9	B
Hwy. 2 at Hayford Rd.	S	--	41.4	D
Craig Rd. at Deno Rd.	U	EB LTR	9.4	A
Craig Rd. at McFarlane St.	U	WB LTR	10.8	B
Craig Rd. at Thorpe Rd. East	U	SB LR	9.0	A
Craig Rd. at Thorpe Rd. West	U	NB LR	9.0	A
Craig Rd. at SR 902	U	SB LTR	34.5	D
Hwy. 2 at Fairchild AFB	S	--	15.8	B
Craig Rd. / 6 th Ave.	U	WB Lt.	10.1	B

As shown in Table 4, the Hwy 2/Craig Rd. intersection is expected to have a failing LOS of F under 2012 Background conditions.





4.4 Operational Analysis and Level of Service - 2015 Pipeline Conditions

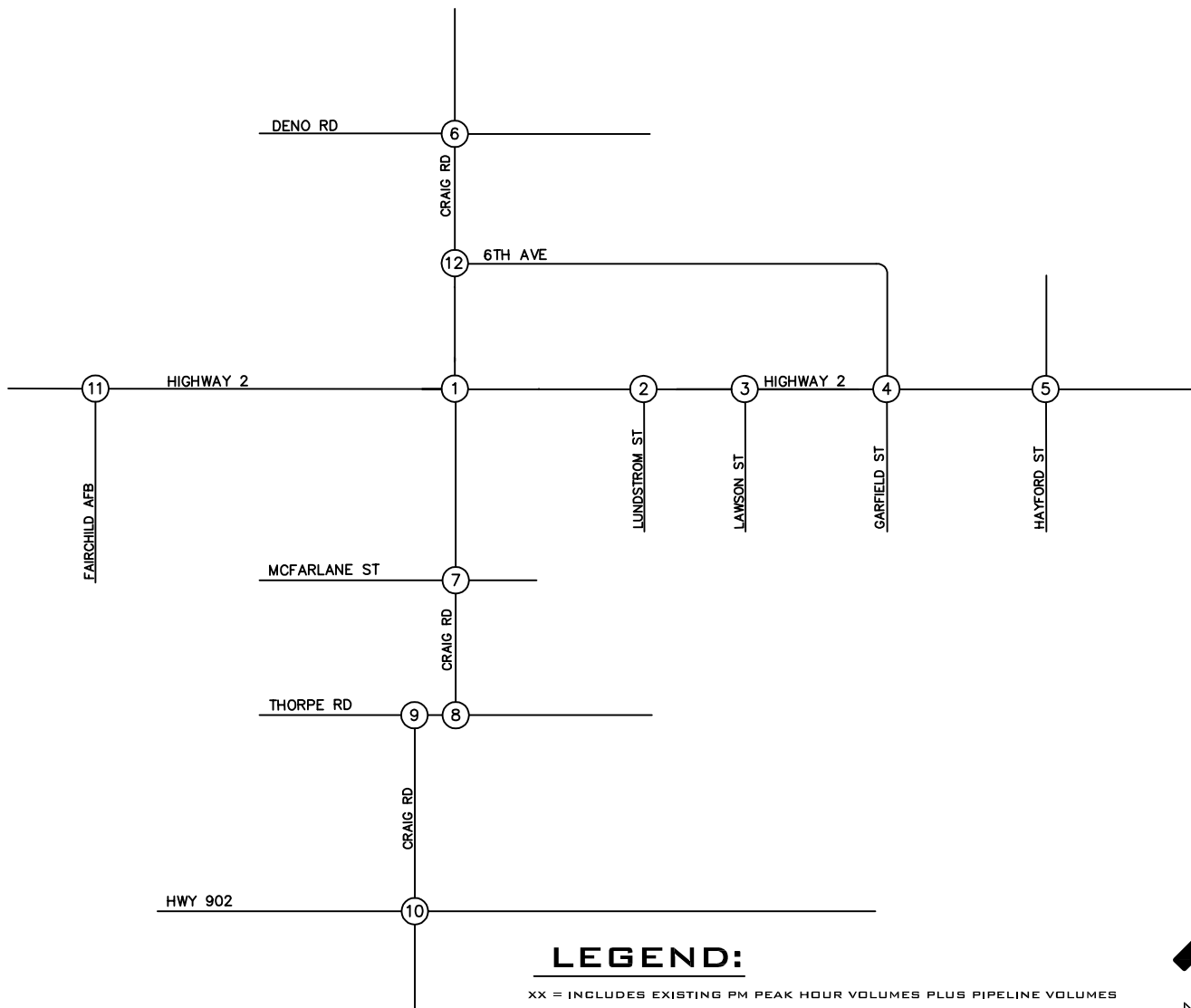
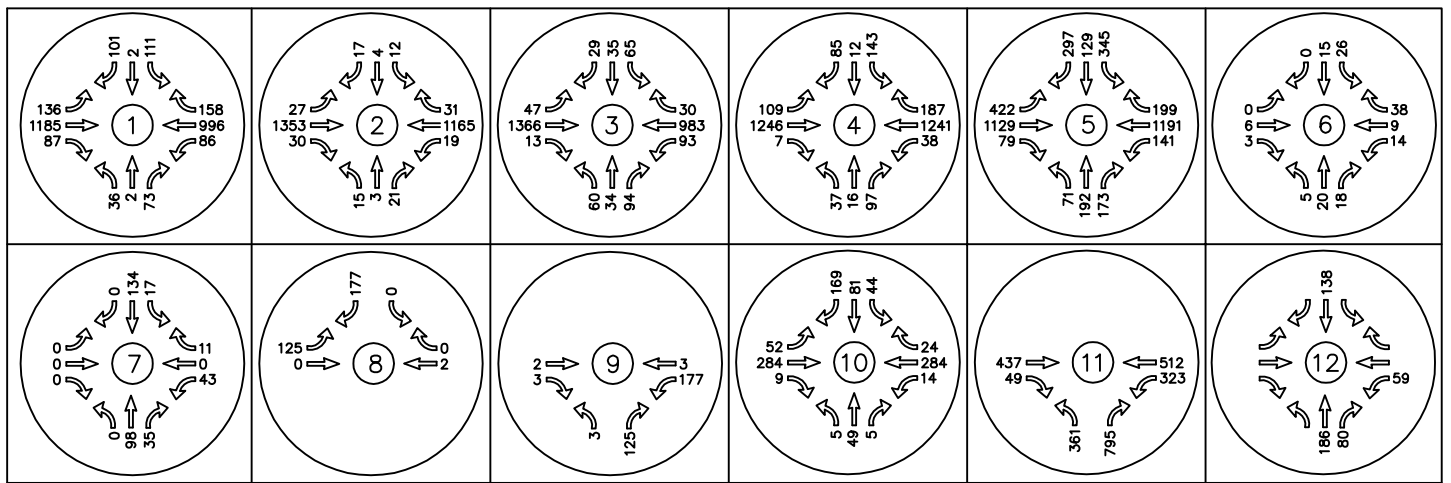
The Year 2015 pipeline traffic volumes used for this analysis scenario are shown in **Figure 7**. Operational analysis results are summarized in the table below.

Table 5. Level of Service for Year 2015 Pipeline PM Peak Hour Conditions

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 at Craig Rd.	U	SB LTR	806.7	F
Hwy. 2 at Lundstrom St.	U	NB LTR	28.7	D
Hwy. 2 at Lawson St.	S	--	20.1	B
Hwy. 2 at Garfield St.	S	--	21.9	C
Hwy. 2 at Hayford Rd.	S	--	44.5	D
Craig Rd. at Deno Rd.	U	EB LTR	9.4	A
Craig Rd. at McFarlane St.	U	WB LTR	10.9	B
Craig Rd. at Thorpe Rd. East	U	SB LR	9.0	A
Craig Rd. at Thorpe Rd. West	U	NB LR	9.0	A
Craig Rd. at SR 902	U	SB LTR	36.4	E
Hwy. 2 at Fairchild AFB	S	--	17.4	B
Craig Rd. / 6 th Ave.	U	WB Lt.	11.6	B

* *Excessive Delay*

As shown in Table 5, the Hwy 2/Craig Rd. intersection is expected to have a failing LOS of F under 2015 Background conditions with significant and excessive delay. Improvements/mitigations for this intersection are discussed in the mitigation sections in the 'With Project' sections.



LEGEND:

XX = INCLUDES EXISTING PM PEAK HOUR VOLUMES PLUS PIPELINE VOLUMES



NORTH
NOT TO SCALE



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FIGURE 7

**YEAR 2015 PIPELINE
TRAFFIC VOLUMES**



4.5 Operational Analysis and Level of Service - 2019 Pipeline Conditions

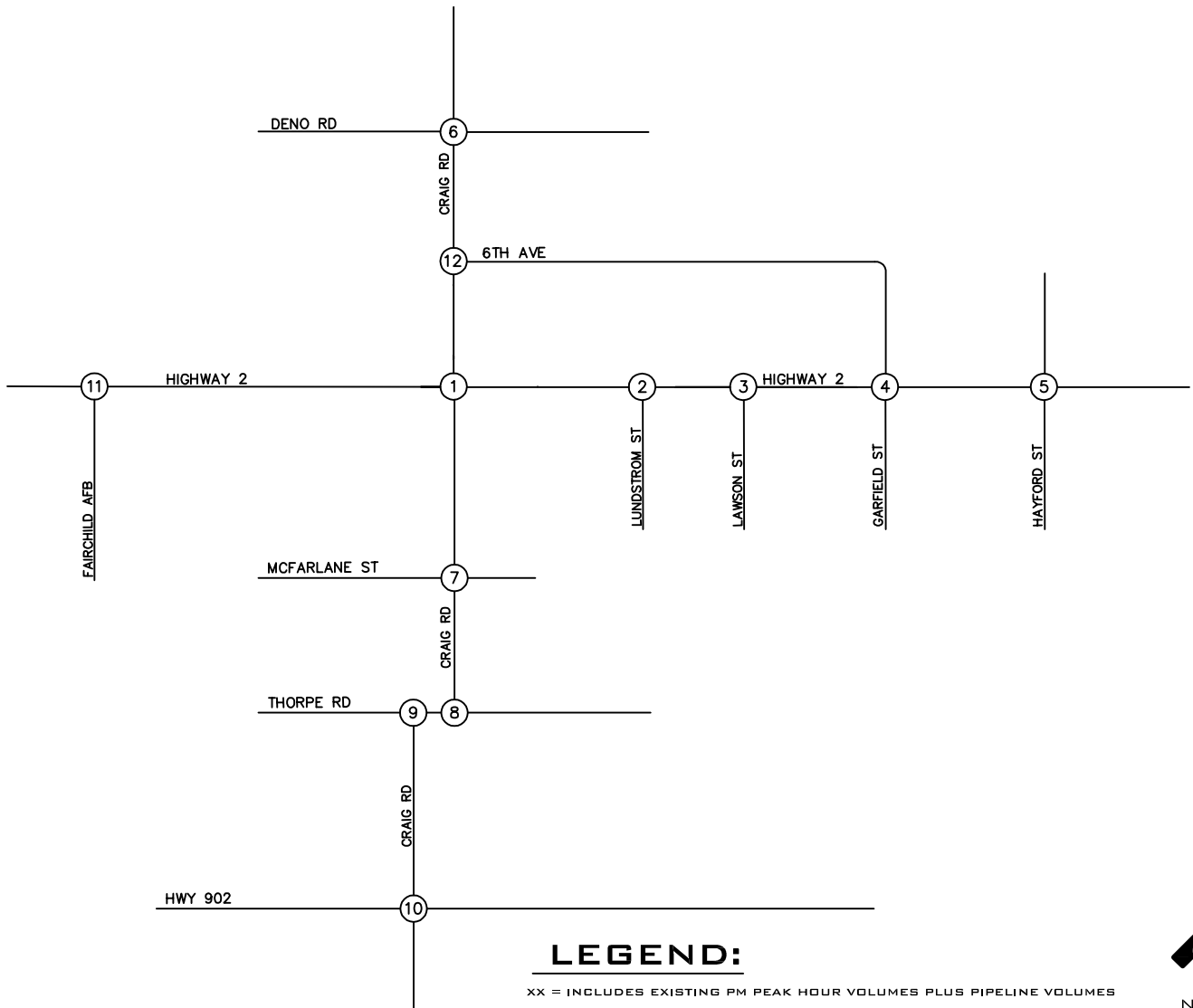
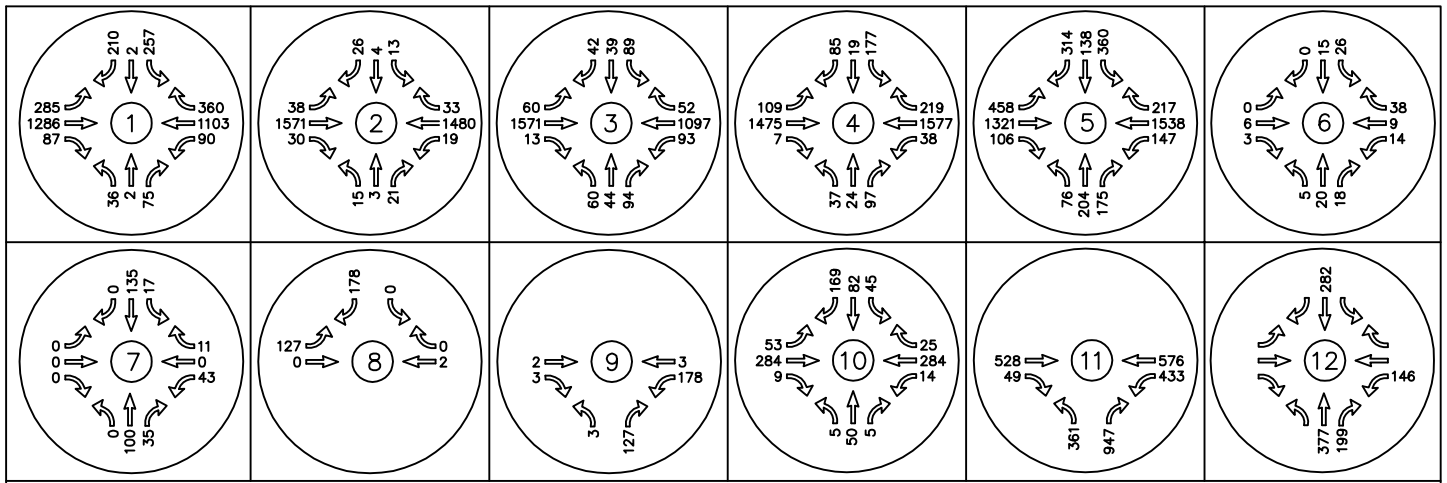
The Year 2019 pipeline traffic volumes used for this analysis scenario are shown in **Figure 8**. Operational analysis results are summarized in the table below.

Table 6. Level of Service for Year 2019 Pipeline PM Peak Hour Conditions

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 at Craig Rd.	U	SB LTR	*	F
Hwy. 2 at Lundstrom St.	U	NB LTR	42.8	E
Hwy. 2 at Lawson St.	S	--	23.1	C
Hwy. 2 at Garfield St.	S	--	29.6	C
Hwy. 2 at Hayford Rd.	S	--	66.6	E
Craig Rd. at Deno Rd.	U	EB LTR	9.4	A
Craig Rd. at McFarlane St.	U	WB LTR	10.9	B
Craig Rd. at Thorpe Rd. East	U	SB LR	9.1	A
Craig Rd. at Thorpe Rd. West	U	NB LR	9.0	A
Craig Rd. at SR 902	U	SB LTR	37.8	E
Hwy. 2 at Fairchild AFB	S	--	21.4	C
Craig Rd. / 6 th Ave.	U	WB Lt.	24.3	C

* *Excessive Delay*

As shown in Table 6, the Hwy 2/Craig Rd. and Hwy 2/Hayford Rd. intersections are expected to have failing LOS's of F and E respectively under 2019 Background conditions.



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**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**

FIGURE 8

**YEAR 2019 PIPELINE
TRAFFIC VOLUMES**



5. TRIP GENERATION and DISTRIBUTION

5.1 Trip Generation and Distribution

PM peak hour trip generation was calculated for each project alternative and phase of development. Trip generation rates for all land uses except the casino/hotel were based on information published in the Institute of Transportation Engineers (ITE) 8th Edition of *Trip Generation*. The Trip Generation Manual (TGM) provides empirical data, based upon actual field observations for trip generation characteristics of similar land uses throughout the United States.

Trip generation for the Casino/Hotel component is based on information provided in *Recalibration of Trip Generation Model for Las Vegas Hotel/Casinos*. May, 2002 ITE Journal pp. 26-33. Rowe, Kaseko, Ackeret. This research indicates that the best predictor of traffic volumes is the size of the gaming component of casino/hotels as measured by the gaming positions; which provides rates that are inclusive of the facility, accounting for employees, hotel patrons, and restaurant guests. Trip generation for the proposed police/fire facility was based on data from *Police Station PM Peak Hour Trip Generation in the Portland Metro Area*, December 2, 2009, Portland State University, Armans, Edmonds, et al. Note that as with site plan Alternative 1 of this project the sites sampled for the above study included a hotel component and traffic associated with the hotel is captured in the data and included in the trip rate that is based on the number of gaming positions in the casino component of the development.

For Alternative 3, the trip generation for the central portion of the project was calculated based on the external restaurant space, the specialty retail area, the hotel and entertainment components (bowling alley and recreational space). Components within the central building such as the lounge and conference space were considered incidental and ancillary uses to the primary hotel and entertainment components.

Specific tenants have not been identified for the retail portion of the site. The commercial retail component located on the west central portion of the site is expected to contain a mix of retailers from traditional big box stores, to mid-size specialty retailers to smaller retail tenants. Due to the unknown nature of this retail component, Land Use Category 820, Shopping Center was chosen from the *Trip Generation Manual*, 8th Edition. David Evans & Associates professional experience indicates that the ITE Shopping Center category provides a sound planning level estimate for larger retail developments where the specific end user or tenant is unknown. For the retail components contiguous with the casino/hotel, Land Use Category 814, Specialty Retail was chosen from the *Trip Generation Manual*, 8th Edition.

This report, site plan alternatives and related EIS refer to a 'Commercial' portion of the development, 41,633 sf in size and located on the north central part of the site. Specific tenants or uses of this portion of the development have not been identified. For the purposes of the traffic analysis a medical/dental usage was assumed and Land Use Category 720, Medical-Dental Office was chosen from the *Trip Generation Manual*, 8th Edition.

Trip generation by alternative and phase are summarized in the following sections.



5.2 Trip Generation – Alternative 1

Table 7. Alternative 1 - PM Peak Hour Trip Generation

Land Use	Units	Variable	ITE LU Code	Equivalent Unit Rate***	Inbound		Outbound		Total
					%	Value	%	Value	
Phase I									
Shopping Center	155.1	ksf	820	5.51	49%	418	51%	436	854
Quality Restaurant	9.2	ksf	931	7.50	67%	46	33%	23	69
*Casino / Hotel	1,878	Gaming Positions	-	0.76	52%	742	48%	685	1,427
****Commercial	41.6	ksf	720	3.15	27%	35	73%	96	131
General Office	10.5	ksf	710	8.67	17%	15	83%	76	91
**Police Station	14.0	ksf	-	1.36	57%	11	43%	8	19
Subtotal						1,267		1,324	2,591
Phase II									
Shopping Center	155.1	ksf	820	5.51	49%	418	51%	436	854
Quality Restaurant	18.0	ksf	931	7.50	67%	90	33%	45	135
*Casino / Hotel	2,468	Gaming Positions	-	0.72	52%	922	48%	850	1,772
****Commercial	41.6	ksf	720	3.15	27%	35	73%	96	131
General Office	10.5	ksf	710	8.67	17%	15	83%	76	91
**Police Station	14.0	ksf	-	1.36	57%	11	43%	8	19
Specialty Retail	96.6	ksf	814	2.62	44%	111	56%	142	253
Subtotal						1,602		1,653	3,255
Phase III (Buildout)									
Shopping Center	155.1	ksf	820	5.51	49%	418	51%	436	854
Quality Restaurant	18.0	ksf	931	7.50	67%	90	33%	45	135
*Casino / Hotel	3,040	Gaming Positions	-	0.69	52%	1,088	48%	1,003	2,091
****Commercial	41.6	ksf	720	3.15	27%	35	73%	96	131
General Office	10.5	ksf	710	8.67	17%	15	83%	76	91
**Police Station	14.0	ksf	-	1.36	57%	11	43%	8	19
Specialty Retail	205.0	ksf	814	2.50	44%	226	56%	287	513
Subtotal						1,883		1,951	3,834

KSF – thousand square feet

Notes: Land use sizes for each phase are cumulative and include values from previous phases.

*Source: ITE Journal/May 2002 – Recalibration of Trip Generation Model for Las Vegas Hotel/Casinos

**Source: Police Station PM Peak Hour Trip Generation in the Portland Metro Area, Portland State University, Fall 2009

*** Equivalent rate based on unit size. Rate will vary and is dependent on variable size. See trip generation calculations for equation used for each land use. Where available the trip rate equation was used not the average rate.

**** Medical-Dental Office – ITE LU 720 used for trip generation



5.3 Trip Generation – Alternative 2

Table 8. Alternative 2 - PM Peak Hour Trip Generation

Land Use	Units	Variable	ITE LU Code	Equivalent Unit Rate***	Inbound		Outbound		Total
					%	Value	%	Value	
Phase I									
Shopping Center	155.1	ksf	820	5.51	49%	418	51%	436	854
Quality Restaurant	9.2	ksf	931	7.50	67%	46	33%	23	69
*Casino	1,878	Gaming Positions	-	0.76	52%	742	48%	685	1,427
****Commercial	41.6	ksf	720	3.15	27%	35	73%	96	131
General Office	10.5	ksf	710	8.67	17%	15	83%	76	91
**Police Station	14.0	ksf	-	1.36	57%	11	43%	8	19
Subtotal						1,267		1,324	2,591

KSF – thousand square feet

Notes: Land use sizes for each phase are cumulative and include values from previous phases.

*Source: ITE Journal/May 2002 – Recalibration of Trip Generation Model for Las Vegas Hotel/Casinos

**Source: Police Station PM Peak Hour Trip Generation in the Portland Metro Area, Portland State University, Fall 2009

*** Equivalent rate based on unit size. Rate will vary and is dependent on variable size. See trip generation calculations for equation used for each land use. Where available the trip rate equation was used not the average rate.

**** Medical-Dental Office – ITE LU 720 used for trip generation

5.4 Trip Generation – Alternative 3

Table 9. Alternative 3 - PM Peak Hour Trip Generation

Land Use	Units	Variable	ITE LU Code	Equivalent Unit Rate***	Inbound		Outbound		Total	
					%	Value	%	Value		
Phase I										
Shopping Center	155.1	ksf	820	5.51	49%	418	51%	436	854	
Quality Restaurant	19.9	ksf	931	7.50	67%	100	33%	49	149	
Hotel	300	Rooms	310	0.66	49%	98	51%	101	199	
****Commercial	41.6	ksf	720	3.15	27%	35	73%	96	131	
General Office	10.5	ksf	710	8.67	17%	15	83%	76	91	
Bowling Alley	45.02	ksf	437	3.53	35%	56	65%	103	159	
Multipurpose Recreational Facility	55.85	ksf	435	3.58	55%	110	45%	90	200	
**Police Station	14.0	ksf	-	1.36	57%	11	43%	8	19	
Specialty Retail	96.6	ksf	814	2.62	44%	111	56%	142	253	
Subtotal						954		1,101	2,055	

KSF – thousand square feet

Notes: Land use sizes for each phase reflect totals through each phase including amounts from previous phases.

**Source: Police Station PM Peak Hour Trip Generation in the Portland Metro Area, Portland State University, Fall 2009

*** Equivalent rate based on unit size. Rate will vary and is dependent on variable size. See trip generation calculations for equation used for each land use. Where available the trip rate equation was used not the average rate.

**** Medical-Dental Office – ITE LU 720 used for trip generation



5.5 Trip Types

Retail and multi-use developments experience a number of different trips types, Shared (or Internal) Trips, Pass-by trips and New trips. These trip types are further described below.

Shared (Internal) Trips - These are trips which occur on or within the site where a vehicle will stop at more than one place on the site or a patron will visit multiple uses on a site. For example, someone destined for big-box store may also visit a restaurant on the site. For Alternatives 1 and 2, the Casino was treated as a retail use and the 20% retail to retail reduction rate was used. Standard ITE Retail to Office shared trip rates were utilized for trips between the office and both the Shopping Center and Casino components. For Alternative 1, potential trips associated with the hotel component are captured and included within the trip rate applied to the casino component as is the case with the source document and data used as the basis for the casino trip rate used for this study.

Pass-by Trips - These trips represent vehicles which currently use adjacent roadways providing primary access to the new land use / project. These trips, however, have an ultimate destination other than the project in question. They should be viewed as drop-in customers who stop in on their way to/from work or on their way to/from another site. Pass-by trips add turning movements to the site access points but do not represent additional trips to the greater transportation system.

For this particular project, pass-by traffic would come primarily from the existing traffic stream on Highway 2 with a lesser amount coming from Craig Rd.

Based on information in the ITE Trip Generation Handbook, the pass-by rate for a “Shopping Center” for PM peak hour is 34%; the pass-by rate for “Quality Sit-down Restaurant” is 44%. No published pass-by trip rates are available for the casino/hotel use. For the purposes of this analysis a conservative 5% pass-by rate was assumed for the casino use in Alternative 1.

New (External) Trips - These trips occur only to access a specific land use such as the discount superstore. These types of trips will travel to and from the new site and a single other destination such as home. This is the only trip type that will result in a net increase in the total amount of traffic within the study area.

For this project shared trips were calculated based on ITE procedures documented in the Trip Generation Handbook. Refer to the appendix for detailed calculations of shared trips for each alternative and phase of development. The resulting shared trip percentages reduction for each alternative at buildout is as follows: Alternative 1- 19.6%; Alternative 2- 19.0%; Alternative 3- 13.4%.

Pass-by trips were initially calculated passed on the rates discussed above. Per common industry practice all pass-by trips should not exceed 10% of the adjacent street(s) traffic volume; for this project the cap guideline applied for each alternative and phase and adjustments were made accordingly. The resulting effective pass-by rate for each alternative is as follows: Alternative 1- 11.7%; Alternative 2- 11.5%; Alternative 3- 16.3%.



5.6 Trip Reductions and Net New Trips

The following table shows a summary of the various trip types associated with this project.

Table 10. ALTERNATIVE 1- PM Peak Hour Trips by Land Use, Phase and Type

Land Use	Total Trips	Shared Trips	External Trips	Pass-by Trips	New Trips
Phase 1 – 2012					
Quality Restaurant	69	29	40	18	22
Retail - Shopping Center	854	208	646	174	472
Casino/Hotel	1,427	208	1,219	51	1,168
Med/Dent Office	131	48	83	0	83
General Office	91	0	91	0	91
Police Station	19	0	19	0	19
Subtotal	2,591	493	2,098	243	1,855
Phase 2 – 2015					
Quality Restaurant	135	57	78	34	44
Retail (Shopping Center & Specialty)	1,107	272	835	184	651
Casino/Hotel	1,772	272	1,500	63	1,437
Med/Dent Office	131	49	82	0	82
General Office	91	0	91	0	91
Police Station	19	0	19	0	19
Subtotal	3,255	650	2,605	281	2,324
Phase 3 - 2019 (Buildout)					
Quality Restaurant	135	57	78	34	44
Retail (Shopping Center & Specialty)	1,367	324	1,043	254	789
Casino/Hotel	2,091	324	1,767	75	1,692
Commercial	131	49	82	0	82
General Office	91	0	91	0	91
Police Station	19	0	19	0	19
Subtotal	3,834	754	3,080	363	2,717

Note: PH1 Pass-By Trips Capped at 243, PH2 Pass-By trips Capped at 281, PH3 Pass-By trips Capped at 363

**Table 11. ALTERNATIVE 2- PM Peak Hour Trips by Land Use, Phase and Type**

Land Use	Total Trips	Shared Trips	External Trips	Pass-by Trips	New Trips
<i>Phase 1 – 2012</i>					
Quality Restaurant	69	29	40	18	22
Retail (Shopping Center & Specialty)	854	208	646	174	472
Casino	1,427	208	1,219	51	1,168
Commercial	131	48	83	0	83
General Office	91	0	91	0	91
Police Station	19	0	19	0	19
Subtotal	2,591	493	2,098	243	1,855

Note: PH1 Pass-By Trips Capped at 243

Table 12. ALTERNATIVE 3- PM Peak Hour Trips by Land Use, Phase and Type

Land Use	Total Trips	Shared Trips	External Trips	Pass-by Trips	New Trips
<i>Phase 1 – 2012</i>					
Quality Restaurant	149	63	86	18	68
Retail (Shopping Center & Specialty)	1,107	93	1,014	225	789
Hotel	199	93	106	0	106
Commercial	131	50	81	0	81
General Office	91	0	91	0	91
Police Station	19	0	19	0	19
Bowling Alley	159	0	159	0	159
Multipurpose Recreational Facility	200	0	200	0	200
Subtotal	2,055	299	1,756	243	1,513

Note: PH1 Pass-By Trips Capped at 243



5.7 Trip Distribution (Proposed Project)

Trip distribution is the process used to identify the roadways used in traveling to and from the project site and the percentage of site-related traffic that will use each roadway. The proposed trip distribution assumptions for this project were based on many factors including the location, type and density of development surrounding the proposed project, existing transportation facilities, existing traffic volumes and patterns on adjacent and nearby arterial roadways, and engineering judgment. Traffic from the proposed project is expected to be distributed in the following manner:

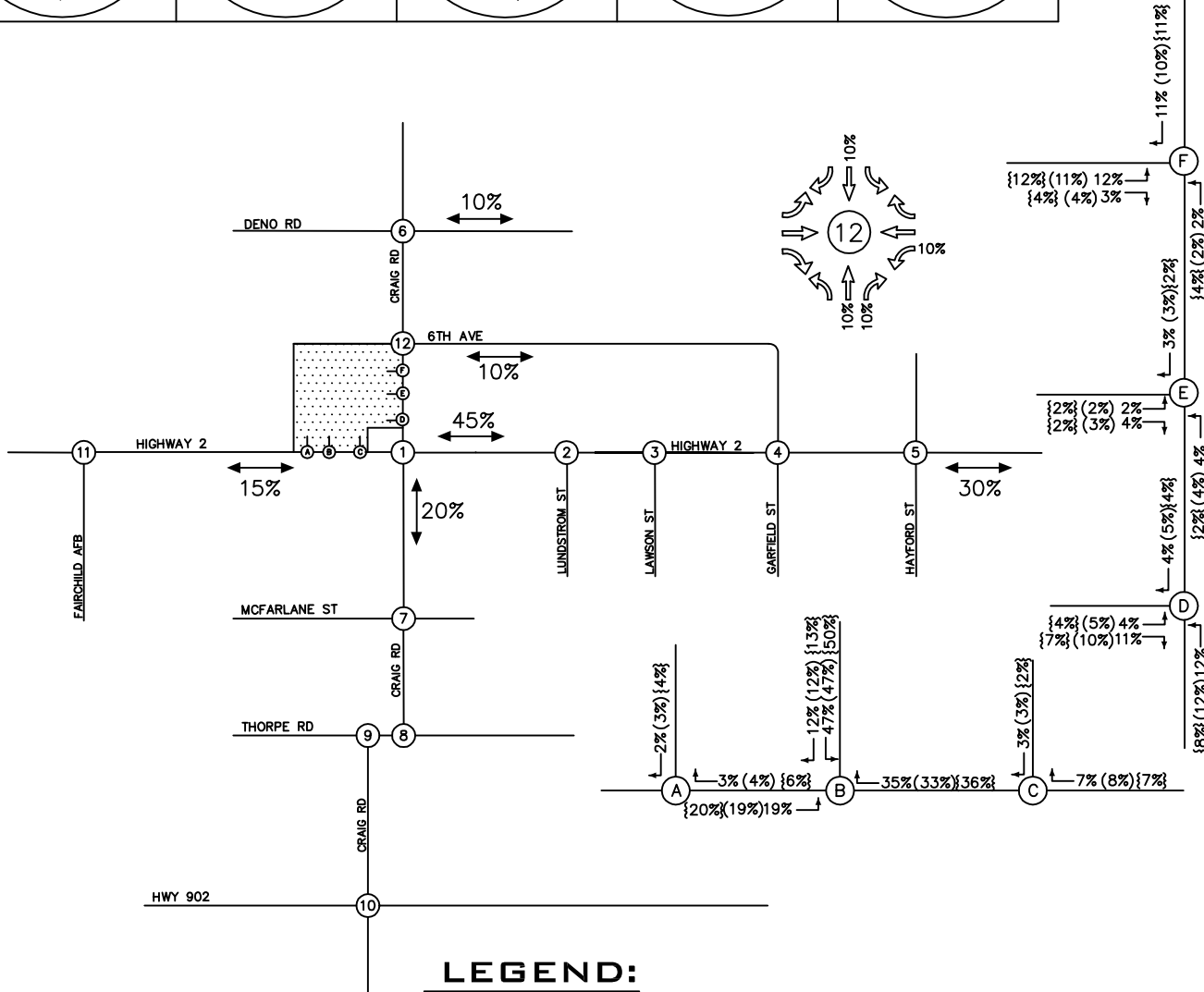
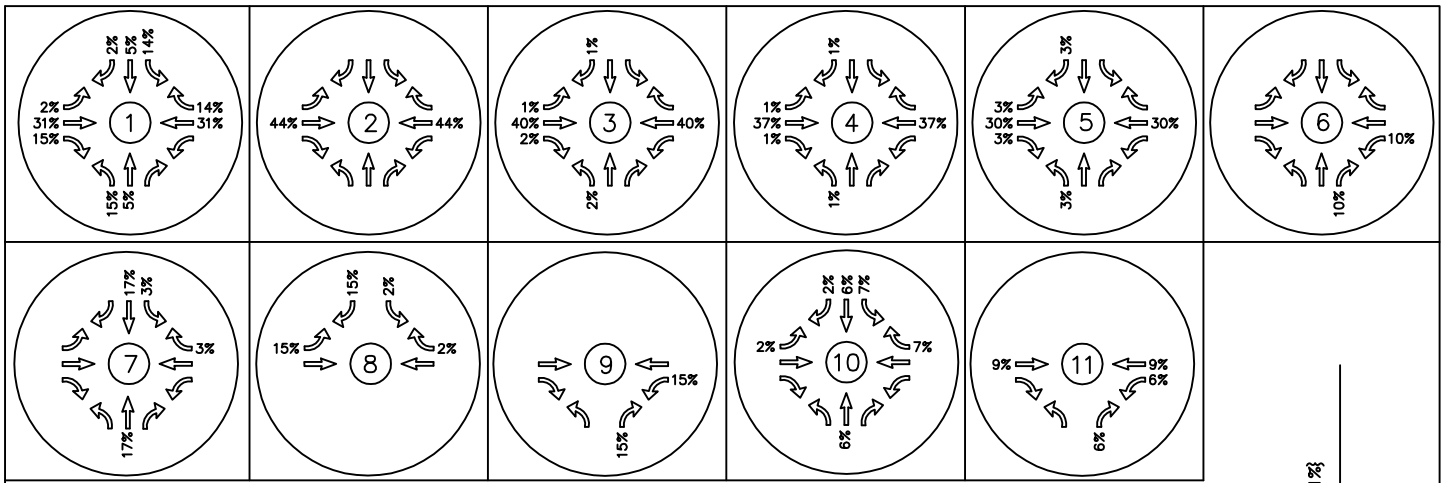
- 10% will go to/come from areas north and east of the site using northerly Craig Rd. and Deno Rd.
- 10% will go to/come from areas east of the site using 6th Ave.
- 45% will go to/come from areas east of the site using Hwy 2
- 15% will go to/come from areas west of the site using Hwy 2
- 20% will go to/come from areas south of the site using southerly Craig Rd.

The above trip distribution applies to all project alternatives.

See **Figure 9** for a graphical representation of the anticipated trip distribution.

5.8 Trip Assignment

The projected trips were assigned to the street network based on the trip distribution assumptions illustrated in **Figure 9**. Refer to the Appendix D for project trip assignment for each alternative and phase of development including net new and pass-by project trips. Total project trips for each alternative phase can be seen in **Figures 10-14**.



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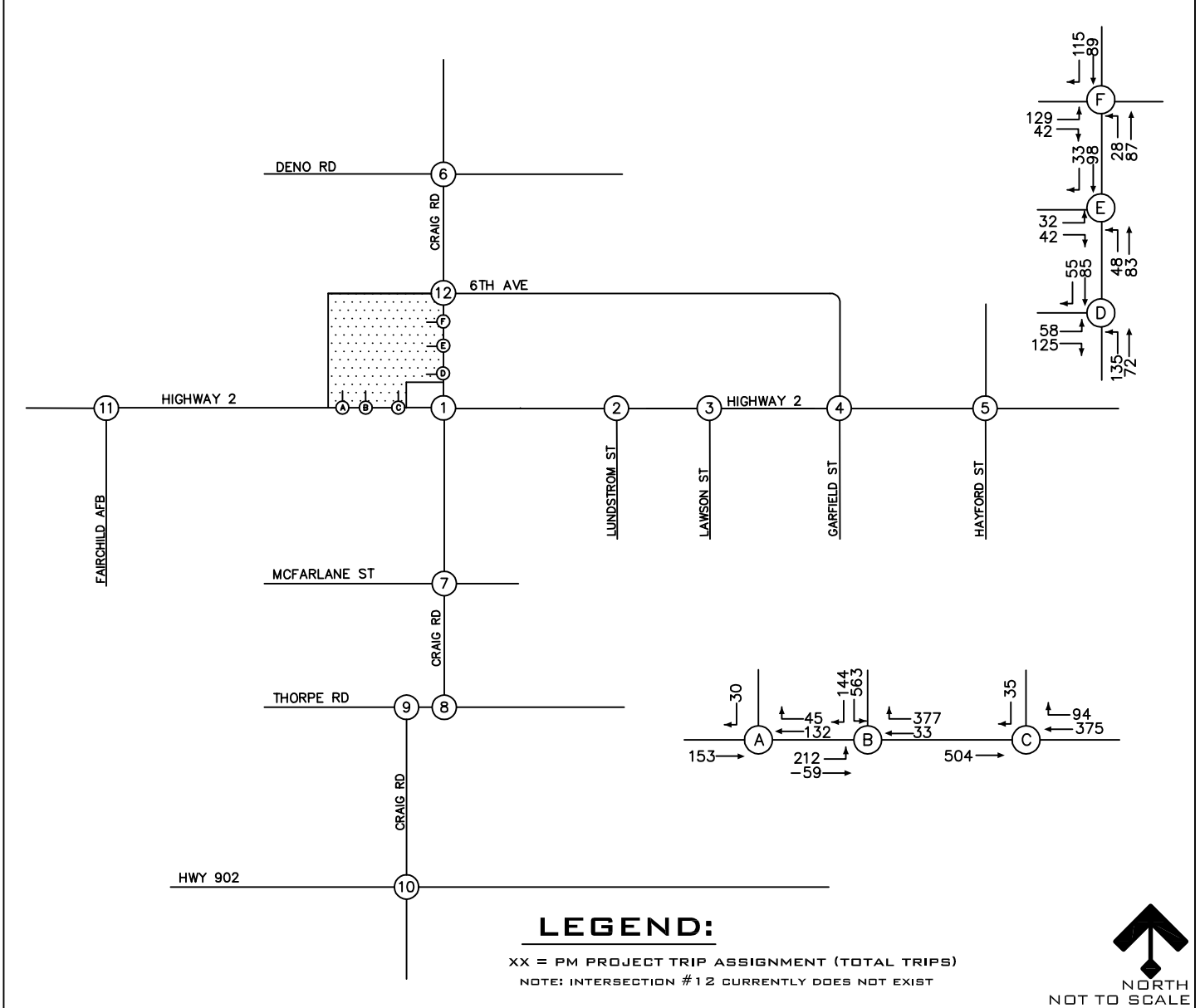
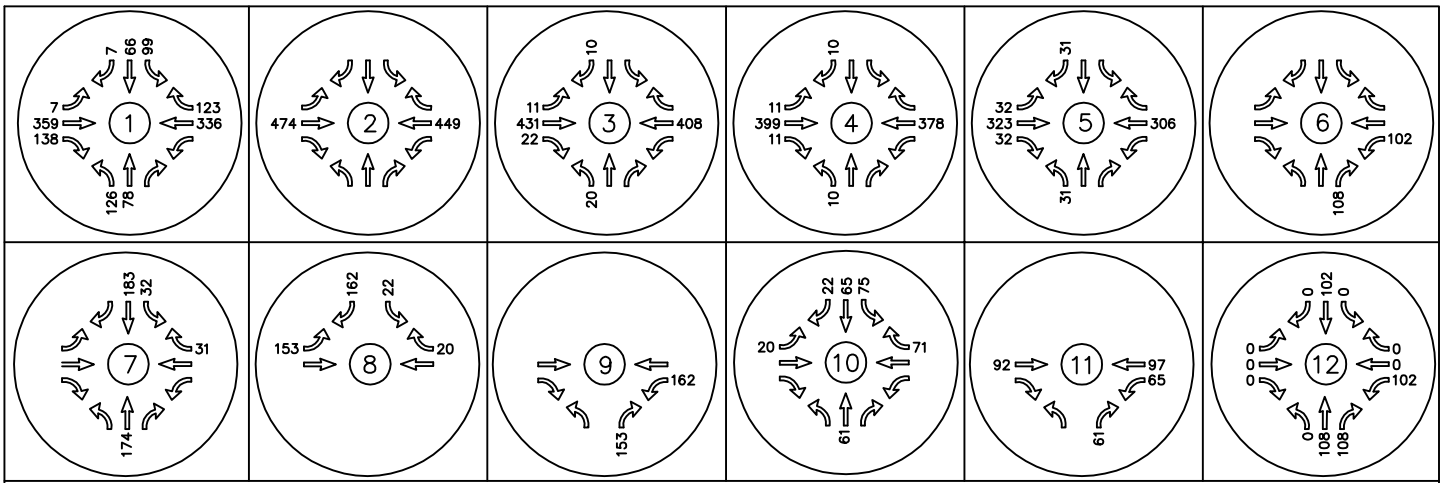
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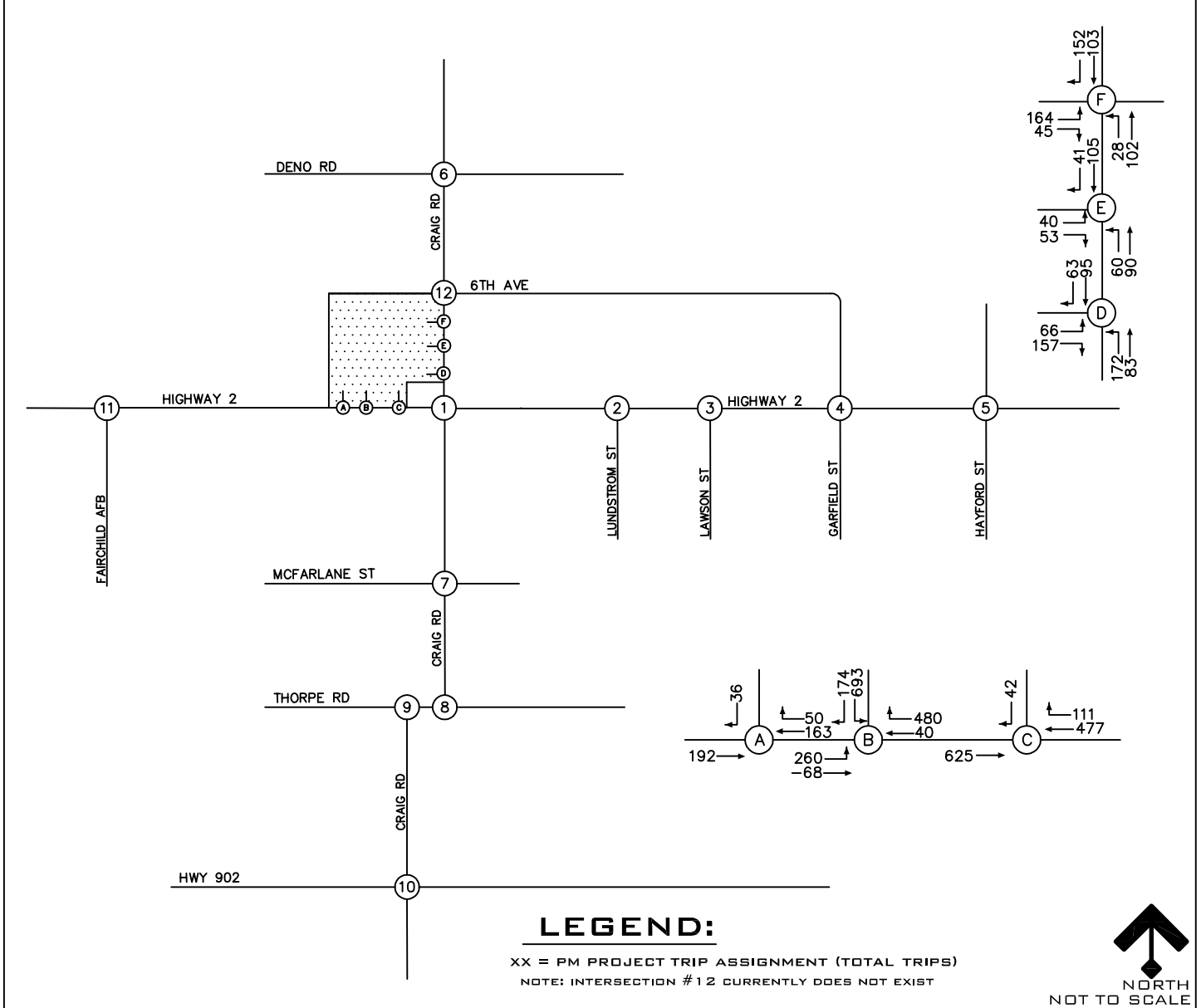
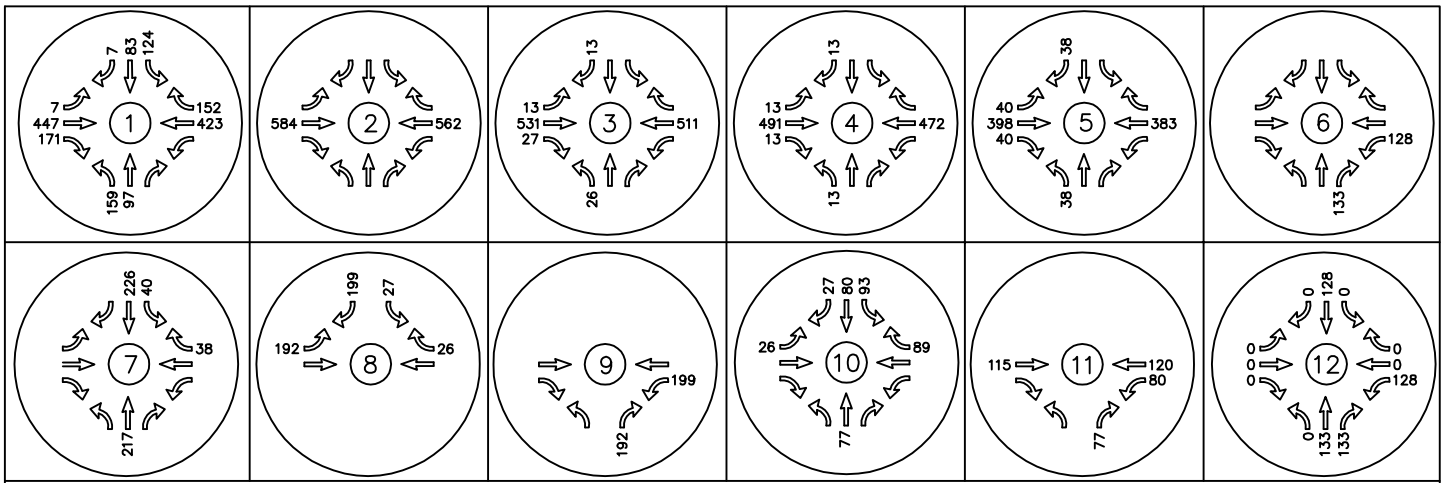
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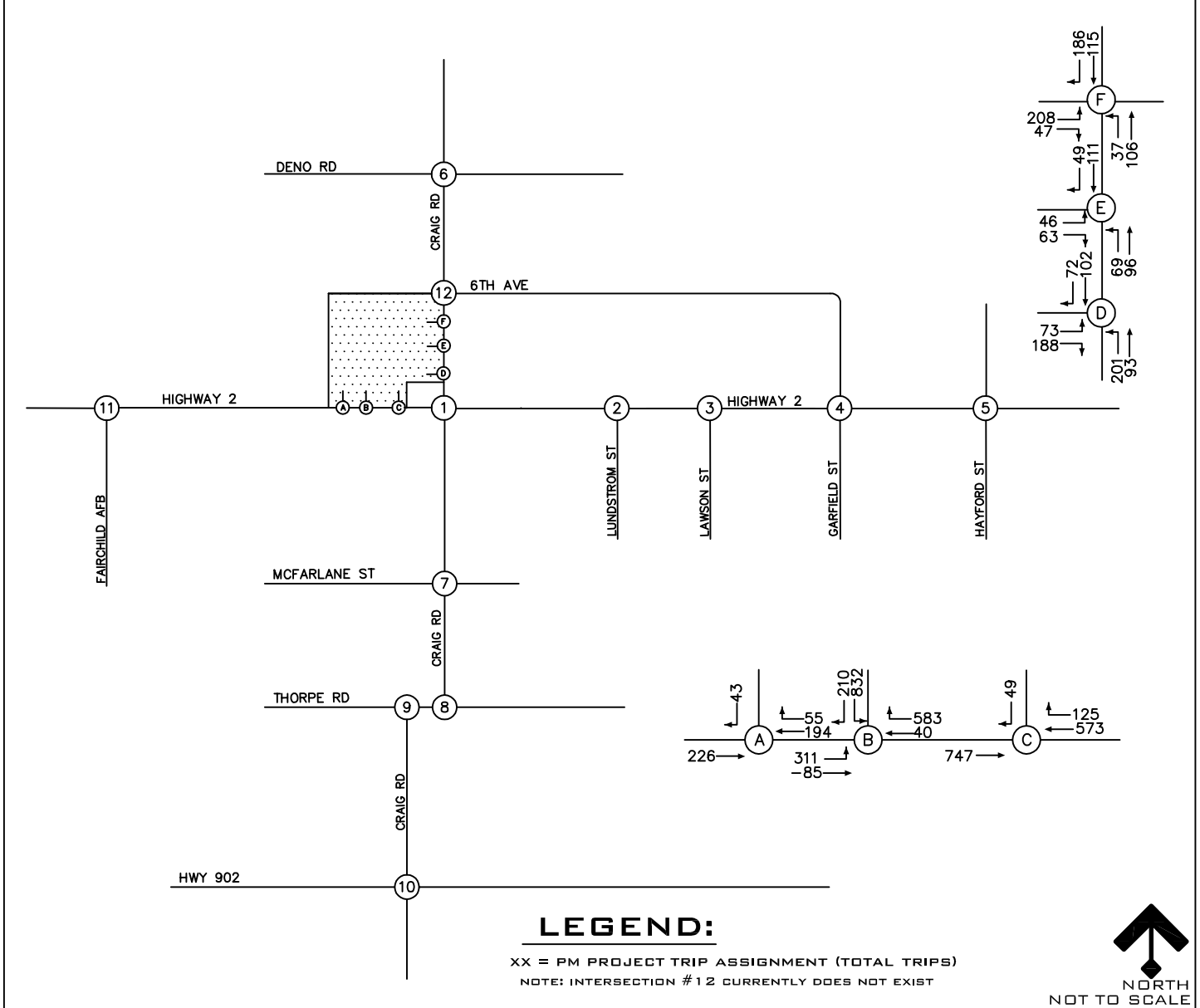
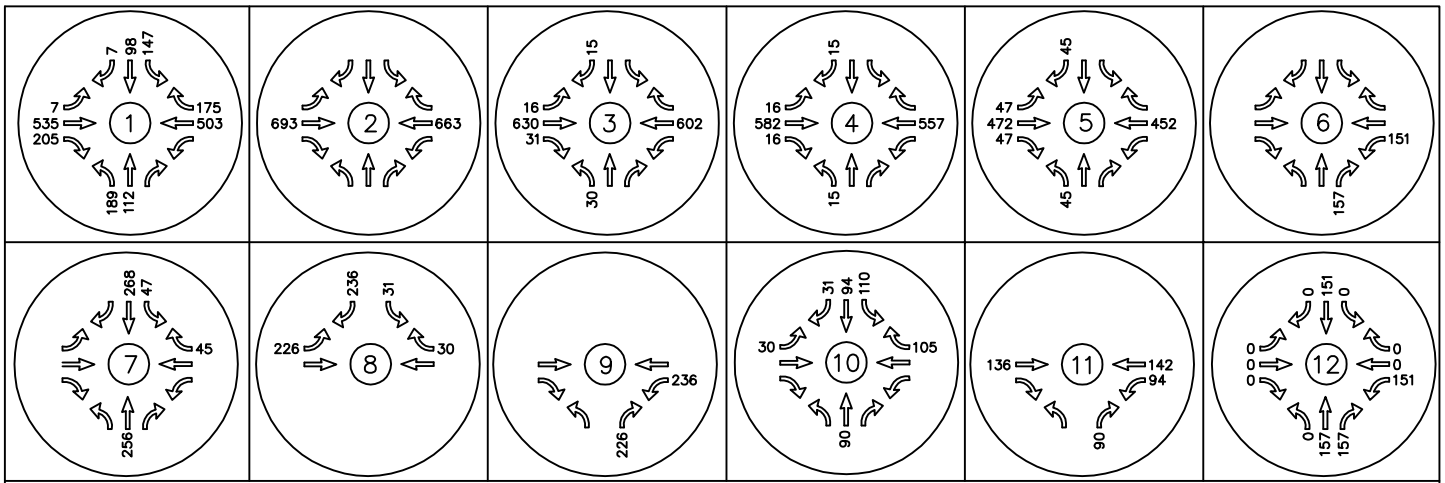
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FIGURE 9

**GENERAL SITE
DISTRIBUTION**







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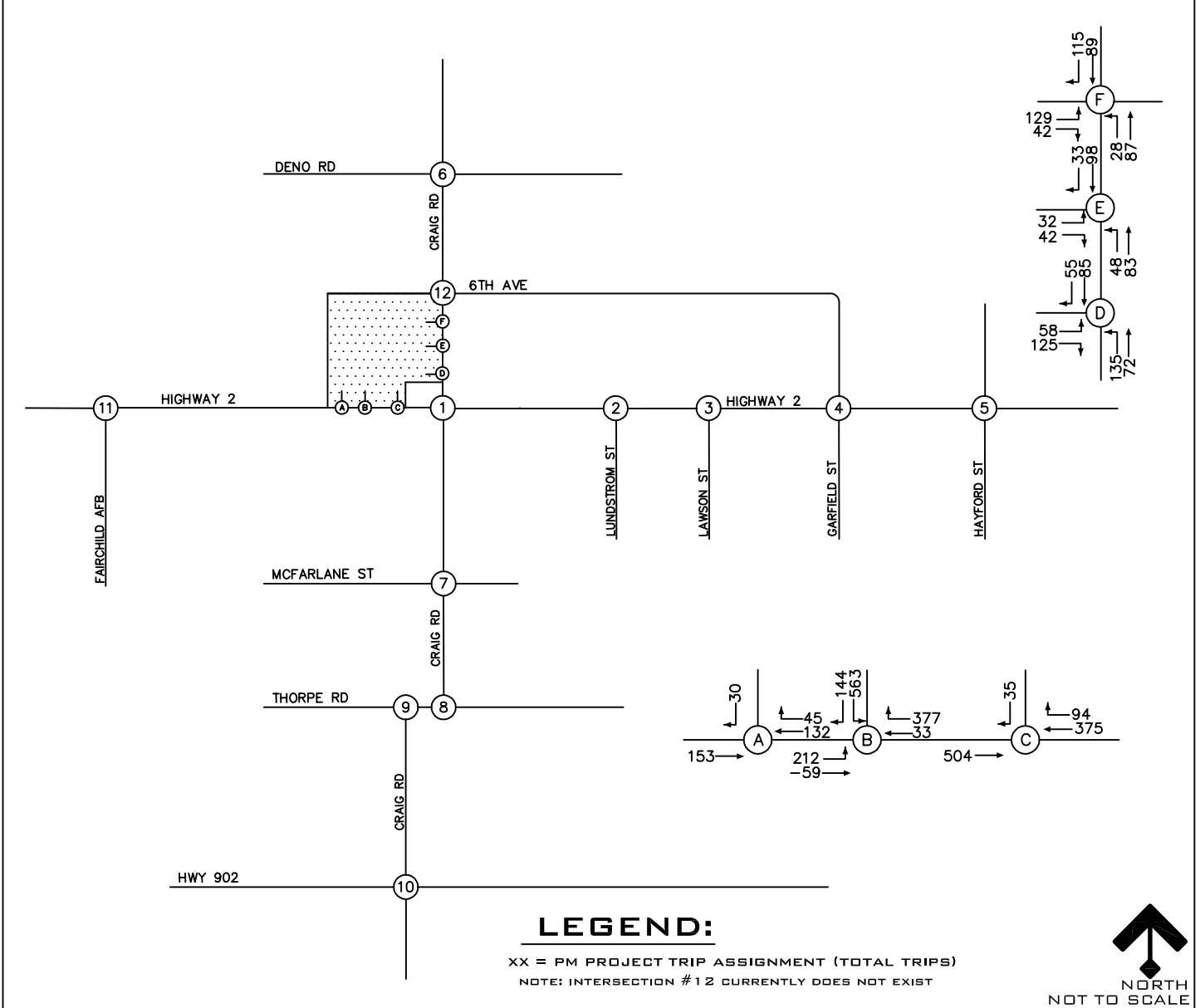
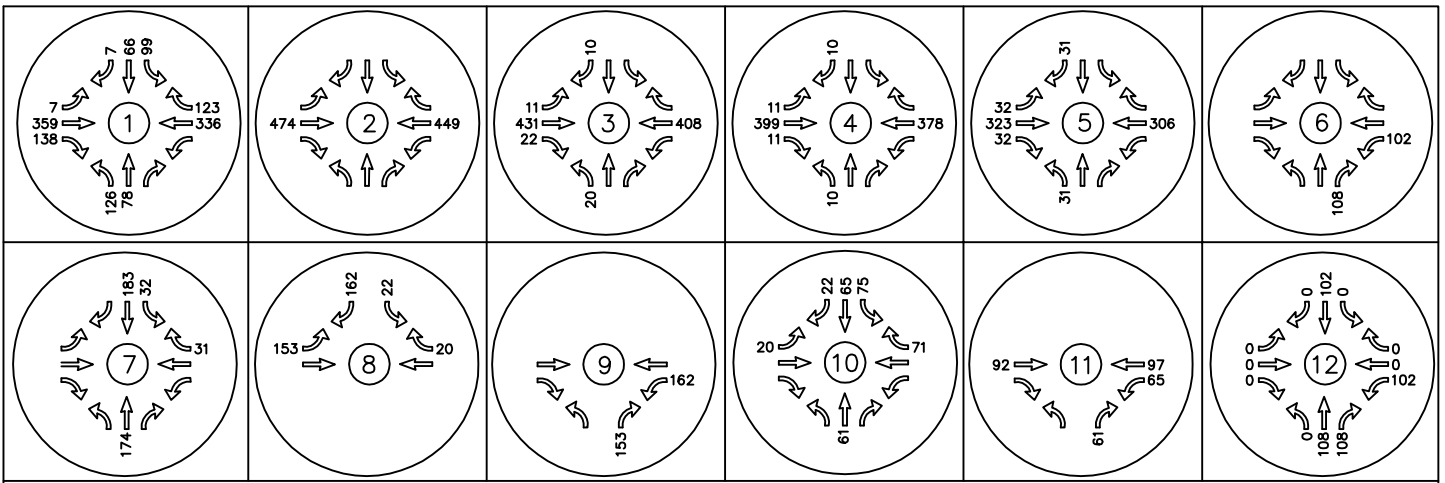
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**TRAFFIC IMPACT ANALYSIS
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FIGURE 12

**PROJECT TRIP
ASSIGNMENT
ALT. 1 - PH 3**

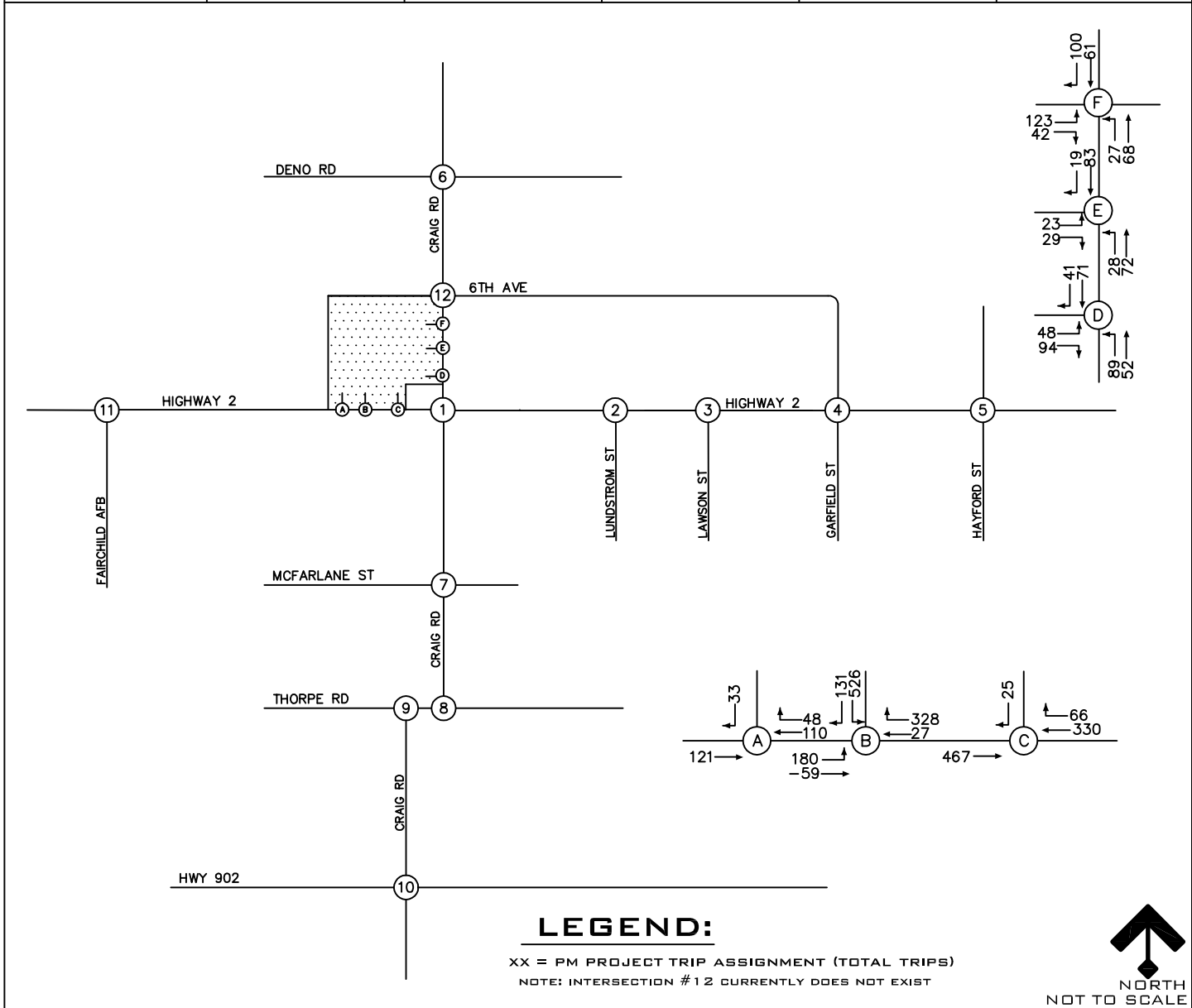
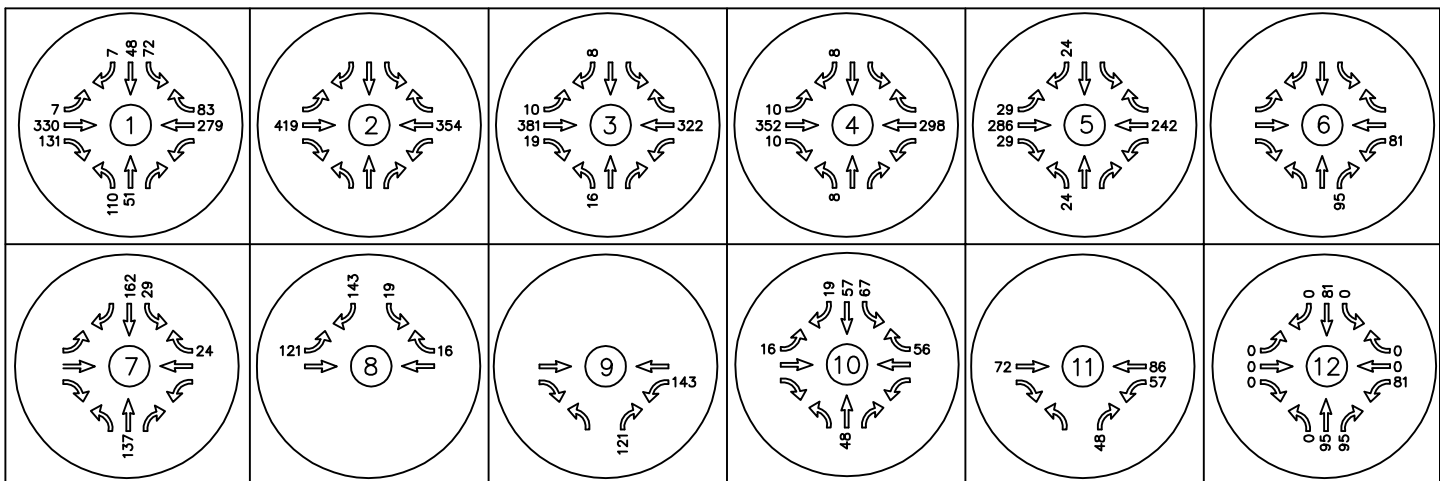


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**FIGURE 13
PROJECT TRIP
ASSIGNMENT
ALT. 2 - BUILDOUT**





6. FUTURE WITH PROJECT CONDITIONS

An operational analysis was performed for the three project alternatives including the three phases for Alternative 1. Descriptions and details of each project alternative and phase are included in previous sections of this report. A ‘mitigation’ scenario is included for each alternative analyzed.

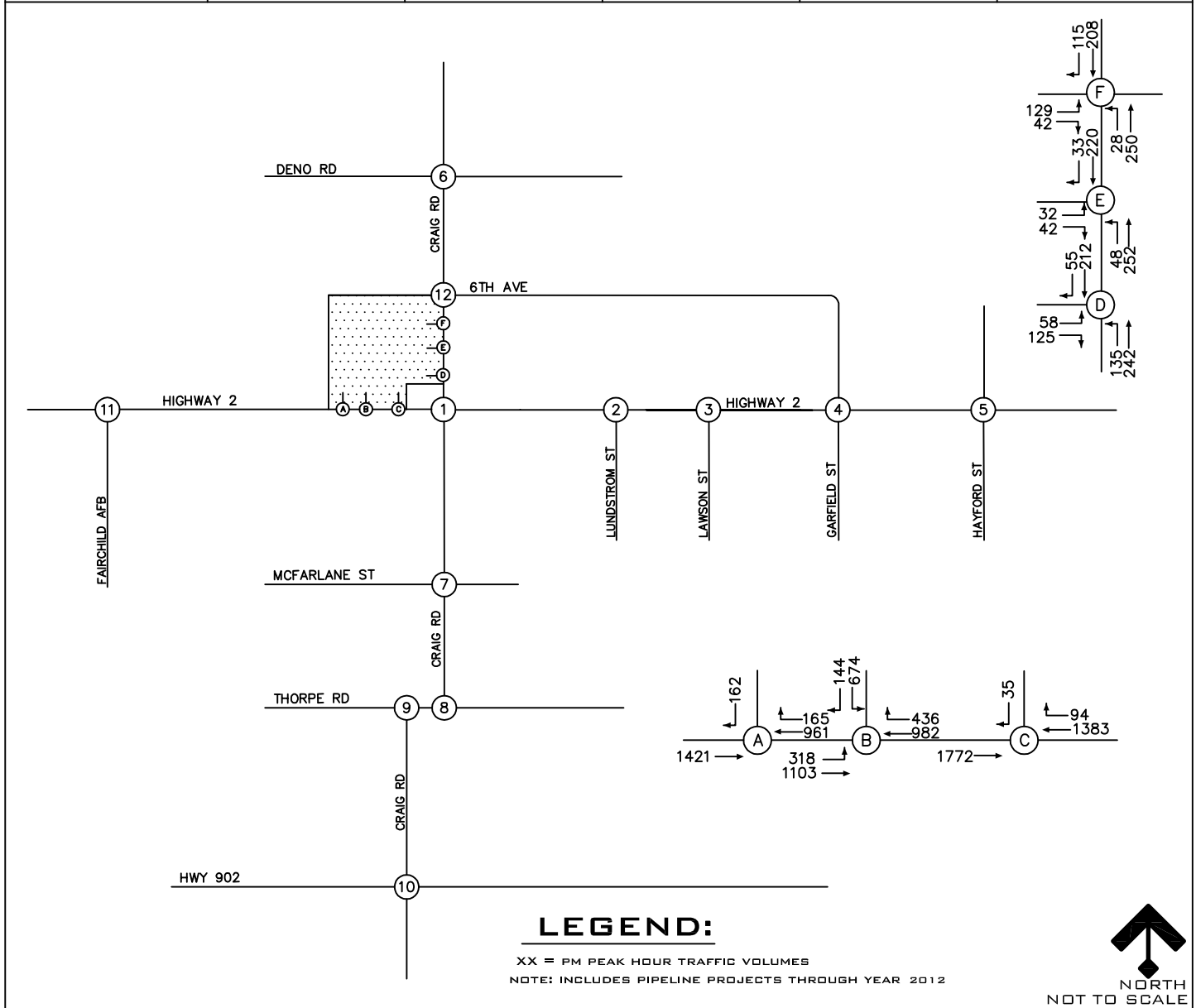
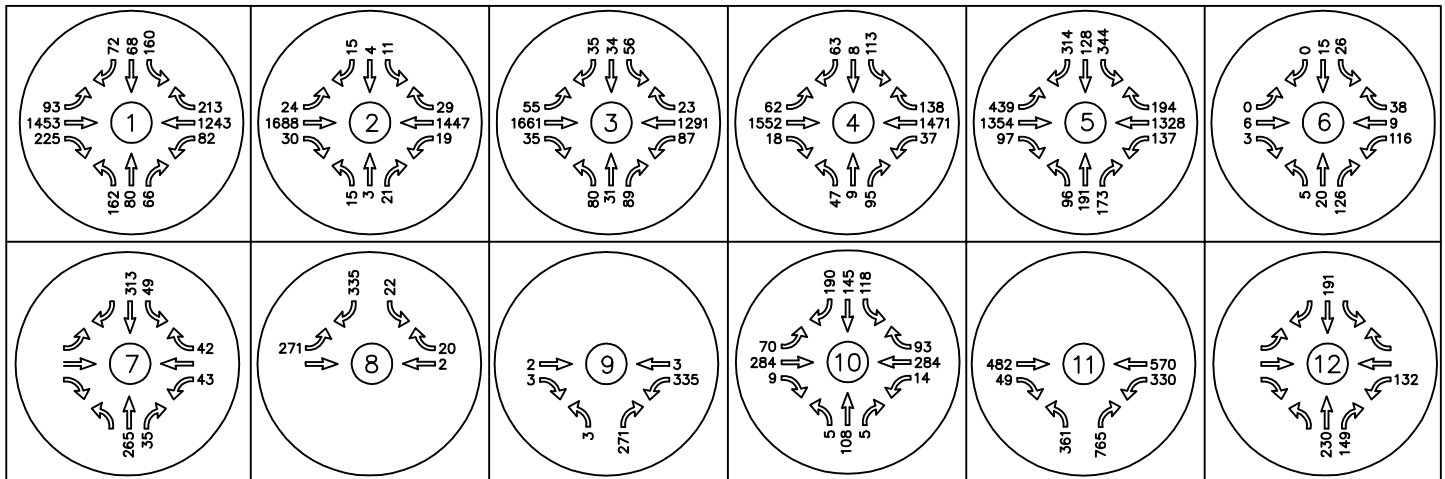
6.1.1 ALTERNATIVE 1 – 2012 Phase 1

The traffic volumes included for this analysis include 2012 background traffic volumes plus project Phase 1 related traffic. This scenario includes development of the commercial sites along Hwy 2; accesses to Craig Rd. are anticipated as part of this phase of development. The volumes used for this analysis scenario are shown on **Figure 15**. A summary of the LOS results are shown below in Table 13.

Table 13. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 1

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
	(S) Signalized (U) Unsignalized (R) Roundabout			
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	46.3	E
Hwy. 2 / Lawson St.	S	--	18.8	B
Hwy. 2 / Garfield St.	S	--	19.3	B
Hwy. 2 / Hayford Rd.	S	--	59.8	E
Craig Rd. / Deno Rd.	U	WB LTR	10.7	B
Craig Rd. / McFarlane St.	U	WB LTR	15.7	C
Craig Rd. / Thorpe Rd. East	U	SB LR	11.3	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.1	B
Craig Rd. / SR 902	U	SB LTR	421.4	F
Hwy. 2 / Fairchild AFB	S	--	19.0	B
Craig Rd. / 6 th Ave.	U	WB Lt	12.0	B
Hwy 2 / Driveway West	U	SB Rt	16.1	C
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	16.4	C
Craig Rd. / Driveway North	U	EB Lt	12.8	B
Craig Rd. / Driveway Middle	U	EB Lt	11.9	B
Craig Rd. / Driveway South	U	EB Lt	14.9	B

The Hwy 2 / Craig Rd., Hwy 2 / Hayford, Craig Rd. / SR 902 and Hwy 2 / Middle Dwy., intersections are anticipated to experience a substandard LOS. Mitigation for these locations is identified in the mitigation subsection at the end of the Alternative 1 section.





6.1.2 ALTERNATIVE 1 – 2015 Phase 2

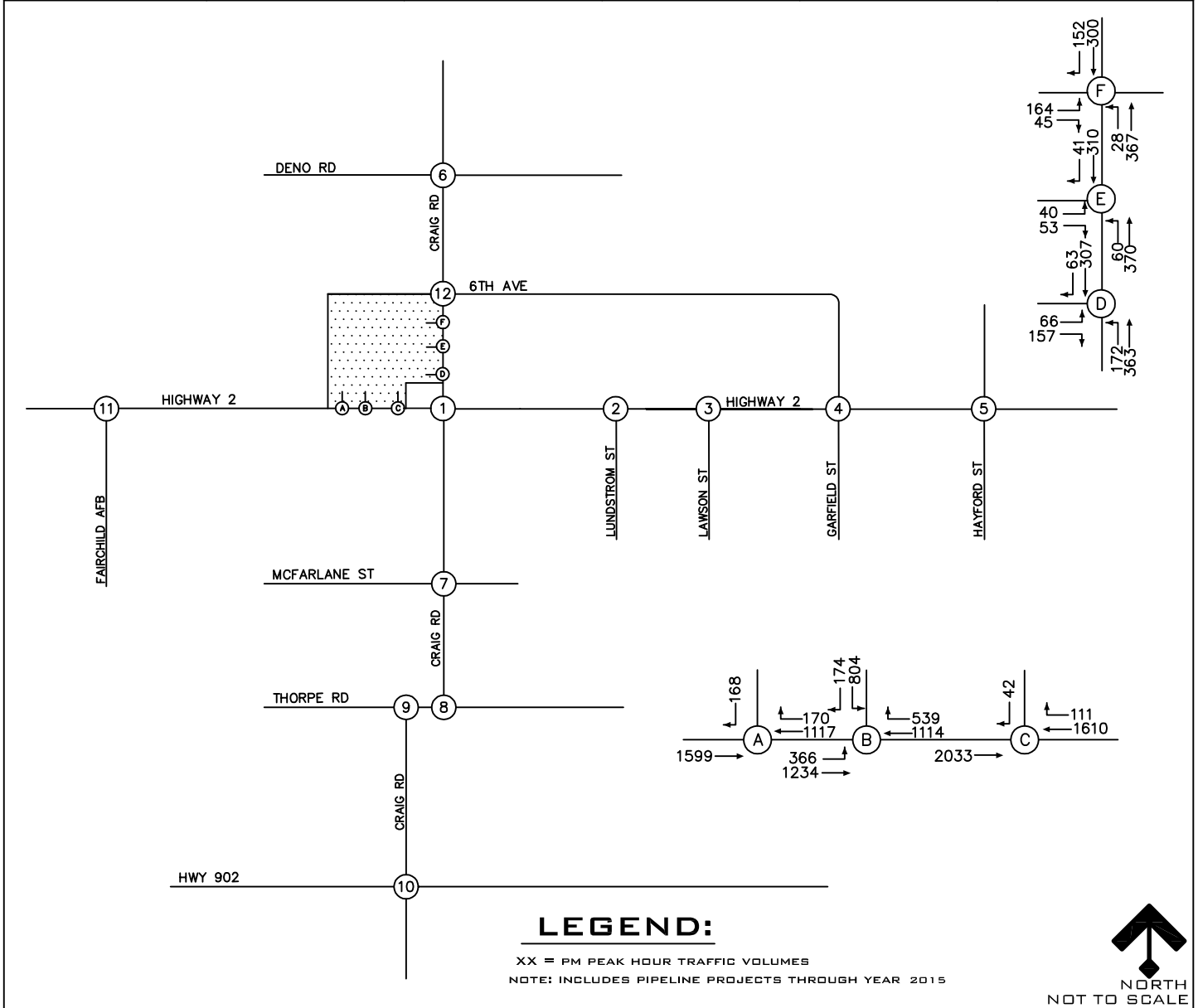
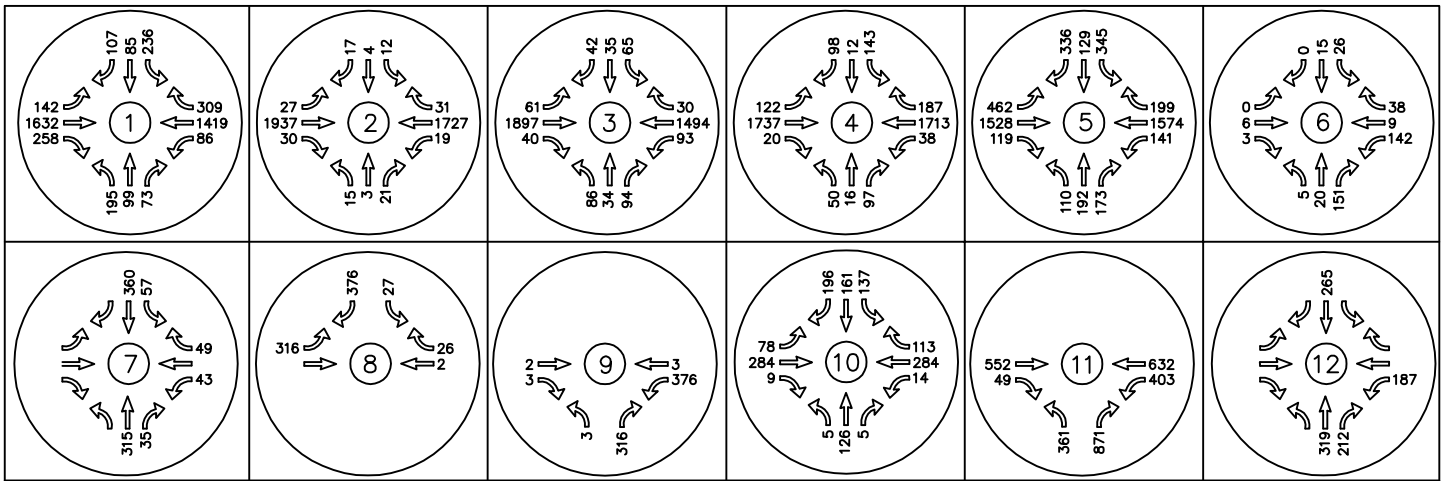
The traffic volumes included for this analysis include 2015 background traffic volumes plus project Phase 2 related traffic. The volumes used for this analysis scenario are shown on **Figure 16**. A summary of the LOS results are shown below in Table 14.

Table 14. Level of Service for 2015 with Project PM Peak Hour Conditions-Alternative 1

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	76.6	F
Hwy. 2 / Lawson St.	S	--	22.8	C
Hwy. 2 / Garfield St.	S	--	27.9	C
Hwy. 2 / Hayford Rd.	S	--	80.0	E
Craig Rd. / Deno Rd.	U	WB LTR	11.2	B
Craig Rd. / McFarlane St.	U	WB LTR	18.0	C
Craig Rd. / Thorpe Rd. East	U	SB LR	12.5	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.5	B
Craig Rd. / SR 902	U	SB LTR	671.9	F
Hwy. 2 / Fairchild AFB	S	--	22.1	C
Craig Rd. / 6 th Ave.	U	WB Lt	15.0	B
Hwy 2 / Driveway West	U	SB Rt	18.9	C
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	19.6	C
Craig Rd. / Driveway North	U	EB Lt	16.3	C
Craig Rd. / Driveway Middle	U	EB Lt	14.0	B
Craig Rd. / Driveway South	U	EB Lt	20.2	C

* *Excessive Delay*

The Hwy 2 / Craig Rd., Hwy 2 / Hayford, Craig Rd. / SR 902 and Hwy 2 / Middle Dwy., intersections are anticipated to experience a failing LOS. The minor street approach at the unsignalized intersection of Hwy. 2 / Lundstrom is anticipated to operate at LOS F. Mitigation for these locations is identified in the mitigation subsection at the end of the Alternative 1 section.





6.1.3 ALTERNATIVE 1 – 2019 Phase 3

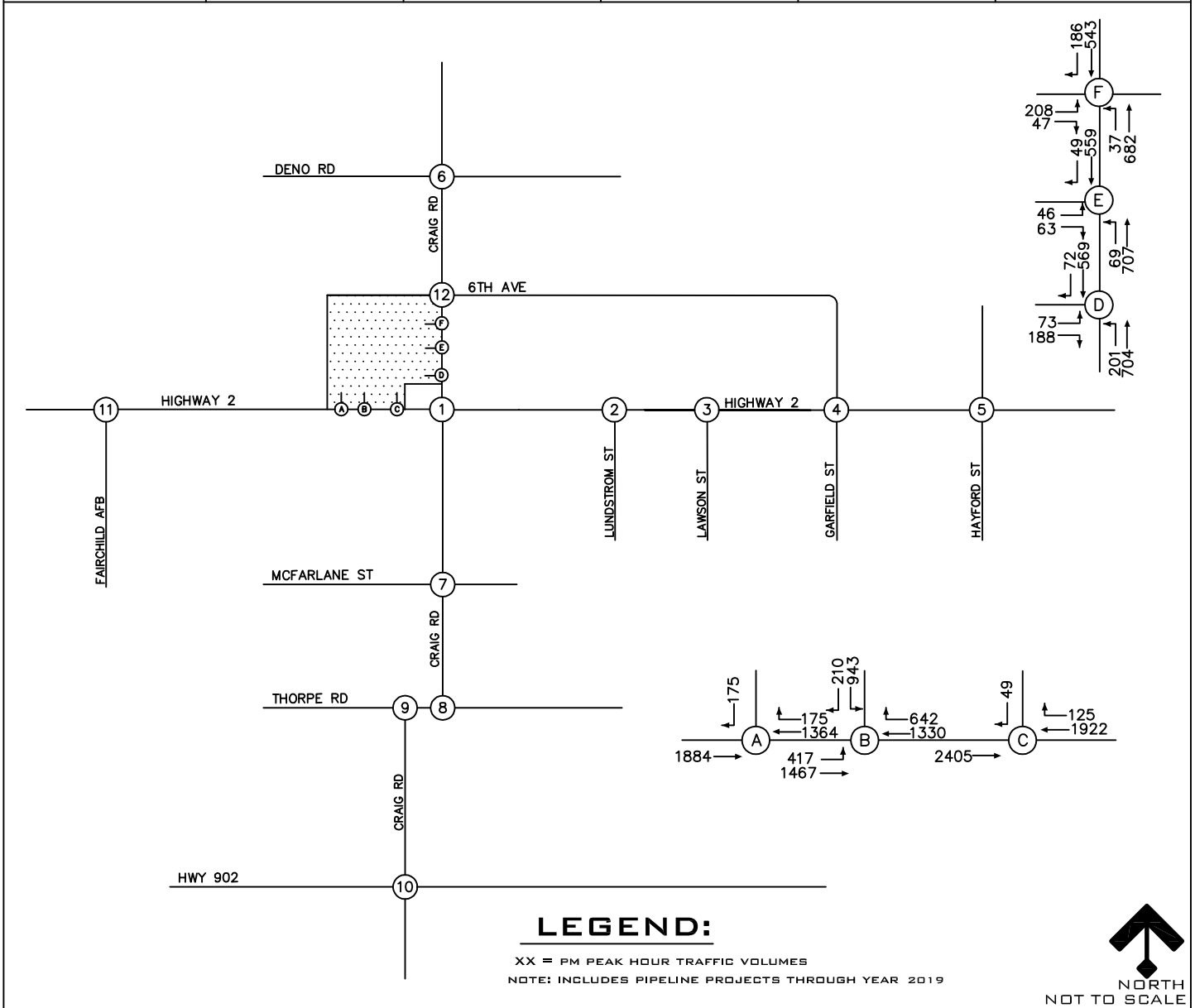
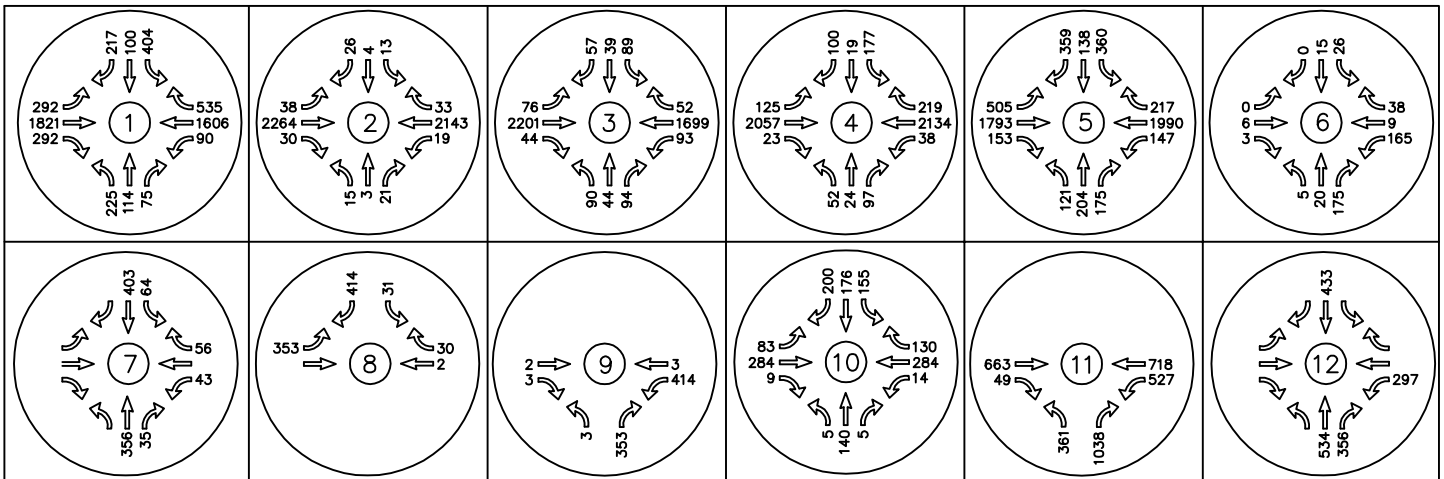
The traffic volumes included for this analysis include 2019 background traffic volumes plus project Phase 3 related traffic. The volumes used for this analysis scenario are shown on **Figure 17**. A summary of the LOS results are shown below in Table 15.

Table 15. Level of Service for 2019 with Project PM Peak Hour Conditions-Alternative 1

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	217.2	F
Hwy. 2 / Lawson St.	S	--	39.4	D
Hwy. 2 / Garfield St.	S	--	69.2	E
Hwy. 2 / Hayford Rd.	S	--	140.9	F
Craig Rd. / Deno Rd.	U	WB LTR	11.7	B
Craig Rd. / McFarlane St.	U	WB LTR	20.5	C
Craig Rd. / Thorpe Rd. East	U	SB LR	13.9	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.9	B
Craig Rd. / SR 902	U	SB LTR	*	F
Hwy. 2 / Fairchild AFB	S	--	31.9	C
Craig Rd. / 6 th Ave.	U	WB Lt	44.0	E
Hwy 2 / Driveway West	U	SB Rt	25.8	D
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	25.8	D
Craig Rd. / Driveway North	U	EB Lt	47.4	E
Craig Rd. / Driveway Middle	U	EB Lt	22.3	C
Craig Rd. / Driveway South	U	EB Lt	48.6	E

* *Excessive Delay*

The Hwy 2 / Craig Rd., Hwy 2 / Garfield, Hwy 2 / Hayford, Craig Rd. / SR 902 and Hwy 2 / Middle Dwy., intersections are anticipated to experience a failing LOS. The minor street approach at the unsignalized intersection of Hwy. 2 / Lundstrom is anticipated to operate at LOS F. Mitigation for these locations is identified in the mitigation subsection at the end of the Alternative 1 section.



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**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTRO00000001**

FIGURE 17

**YEAR 2019 PLUS PRJOECT
TRAFFIC VOLUMES
ALT. 1 - PH 3**



6.1.4 ALTERNATIVE 1 – MITIGATION

This section identifies mitigation improvements for Alternative 1 conditions. Proposed mitigations options are identified in the table below in bold with the corresponding operational analysis results by phase of development. Intersection locations with acceptable LOS are not included in the table.

Table 16. Mitigation Operational Analysis Results-Alternative 1

INTERSECTION	2012 PM Peak BG + Alt1-Ph1	2015 PM Peak BG + Alt1-Ph2	2019 PM Peak BG + Alt1-Ph3	2032 PM Peak BG + Alt1-Ph3
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 31.6	LOS = D Delay = 44.7	LOS = F Delay = 121.8	--
Add Dual EB, NB, SB Lt. turn lanes and NB through lane	--	--	LOS = D Delay = 52.7	LOS = F Delay = 101.5
Roundabout	LOS = A Delay = 7.8	LOS = B Delay = 12.4	LOS = D Delay = 47.4	LOS = F Delay = 94.9
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = F Delay = 76.6	CM = NBLTR LOS = F Delay = 217.2	CM = NBLTR LOS = F Delay = *
NB/SB Right turn lanes	--	CM = NBLT R LOS = F Delay = 63.3	CM = NBLT R LOS = F Delay = 179.6	CM = NBLTR LOS = F Delay = *
Add EB/WB Right turn bays, eliminate N/S left turns	--	--	--	CM = NBR LOS = E Delay = 42.3
Hwy. 2 / Lawson St.	--	--	--	LOS = F Delay = 89.1
Modify Signal Timing/Phasing, Add NB & SB Lt. turn bays	--	--	--	LOS = D Delay = 40.6
Hwy. 2 / Garfield St.	--	--	LOS = E Delay = 69.2	LOS = F Delay = 160.9
Optimized Signal Timing (NB/SB Left turn lanes)	--	--	LOS = D Delay = 52.5	LOS = F Delay = 131.5
Modify Signal Timing/Phasing, Add EB & WB Auxilliary Lanes	--	--	--	LOS = C Delay = 25.0
Hwy. 2 / Hayford Rd.	LOS = E Delay = 59.8	LOS = E Delay = 80.0	LOS = F Delay = 140.9	LOS = F Delay = 243.7
Optimized Signal Timing, Add SB Lt. Turn Lane	LOS = D Delay = 45.9	LOS = E Delay = 60.4	--	--
Add WB Lt. turn bay; Add NB & EB Rt. Turn Lanes	--	LOS = D Delay = 54.0	LOS = F Delay = 97.1	--
Add NB Lt. turn bay, WB auxilliary lane	--	--	LOS = D Delay = 51.3	LOS = F Delay = 95.4



MITIGATION - ALTERNATIVE 1, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt1-Ph1	2015 PM Peak BG + Alt1-Ph2	2019 PM Peak BG + Alt1-Ph3	2032 PM Peak BG + Alt1-Ph3
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = F Delay = 671.9	CM = SBLTR LOS = F Delay = *	CM = SBLTR LOS = F Delay = *
<i>Signalized</i>	LOS = B Delay = 15.6	LOS = B Delay = 16.4	LOS = B Delay = 17.6	LOS = C Delay = 20.5
<i>Roundabout</i>	LOS = A Delay = 8.6	LOS = A Delay = 9.4	LOS = B Delay = 10.4	LOS = B Delay = 16.1
Hwy. 2 / Fairchild AFB	--	--	--	LOS = F Delay = 90.6
<i>Modify Signal Timing, Add NB Lt. turn bay and WB through lane</i>	--	--	--	LOS = D Delay = 50.5
Craig Rd. / Sixth Ave.	--	--	CM = WB Lt LOS = E Delay = 44.0	CM = WB Lt LOS = F Delay = 89.9
<i>Add NB Right turn bay</i>	--	--	CM = WB Lt LOS = D Delay = 28.8	CM = WB Lt LOS = E Delay = 47.3
<i>Roundabout</i>	--	--	--	LOS = C Delay = 20.5
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *	CM = SB Lt LOS = F Delay = *
<i>Signalize, Add EB & SB Left turn lanes</i>	LOS = C Delay = 31.1	LOS = D Delay = 38.8	LOS = D Delay = 45.4	LOS = E Delay = 62.3
<i>Modify Signal Timing, Channelize WB Rt. Turn as 'Free' movement</i>	--	--	--	LOS = D Delay = 51.0
<i>Roundabout</i>	LOS = A Delay = 9.8	LOS = B Delay = 18.6	LOS = E Delay = 61.3	LOS = F Delay = 110.0
Craig Rd / Dwy. North	--	--	--	CM = EB Lt LOS = F Delay = 68.2
<i>Add NB Thru Lane</i>	--	--	--	CM = EB Lt LOS = E Delay = 37.3
<i>Roundabout</i>	--	--	--	LOS = B Delay = 11..4



Listed below are improvements recommended for consideration to reduce traffic impacts associated with the subject project. The project's recommended proportional share contribution to each mitigation is also listed. The proportional share for off-site intersections is calculated by divided the project generated traffic volume by the total intersection volume for each respective scenario.

2012 (Phase 1) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): A/9.8

2015 (Phase 2) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 36.0%
Resulting LOS & Delay (sec): D/44.7 / B/12.4
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.8%
Resulting LOS & Delay (sec): F/63.3
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru land to a 2nd SB left turn lane. Restripe the wide paved median for a 2nd WB left turn lane. Alternatively, widen the EB and NB approaches for exclusive right turn lanes along with adding the 2nd WB left turn lane.
Project Proportional Share: 17.7%
Resulting LOS & Delay (sec): E/60.4 / D/54.0 (alternative)
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 27.7%
Resulting LOS & Delay (sec): B/16.4 / A/9.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/38.8 / B/18.6 (roundabout)



2019 (Phase 3) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.3%
Resulting LOS & Delay (sec): D/52.7 / D/47.4 (roundabout)
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.4%
Resulting LOS & Delay (sec): F/179.6
- Hwy 2 / Garfield: Optimize signal timing.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): D/52.5
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Widen the EB and NB approaches for exclusive right turn lanes. Restripe the wide paved median for a 2nd WB left turn lane. Add 2nd NB left turn lane. Alternatively, add a 2nd NB left turn lane and a WB auxiliary lane.
Project Proportional Share: 18.0%
Resulting LOS & Delay (sec): F/97.1 / D/51.3 (alternative)
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 31.1%
Resulting LOS & Delay (sec): B/17.6 / B/10.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/45.4 / E/61.3 (roundabout)
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 38.0%
Resulting LOS & Delay (sec): D/28.8

Note, a failing LOS was identified at the unsignalized intersection of Hwy 2 / Lundstrom under Phase 2 and Phase 3 development conditions. Minor improvements (turn lanes are noted above and in Table 16; if delays persist at this intersection it is likely that traffic will shift and redistribute to other nearby arterial intersections at Hwy 2 / Craig Rd. and Hwy 2 / Lawson St., The minor volume shift is not expected to have an appreciable impact on LOS at the nearby arterial intersections.

Regarding congestion at Hwy 2/Hayford, it is worth noting that development of an alternative east/west route through Airway Heights along the alignment of 21st Ave. is under consideration by the City of Airway Heights, WSDOT Spokane County and the City of Spokane. The intent of this alternative route is to reduce through volumes on HWY 2 on the West Plains. Our analysis indicates that an acceptable LOS at Hayford (without a third WB lane) could be achieved with a reduction in east/west through volumes of approximately 19% with said reduced volume shifting to the new 21st Ave. route. Note, that at the time of publishing this report the 21st Ave. project has not been officially adopted by the agencies involved or added to the regional transportation improvement plan list of projects. If the 21st Ave. by-pass is accepted and adopted by the impacted agencies (WSDOT, City of Airway Heights, Spokane County and City of Spokane) the Spokane Tribe West Plains project could consider make a fair share contribution to the 21st Ave. project in lieu of improvements at Hwy 2/Hayford.



6.1.5 ALTERNATIVE 2 – 2012 Buildout

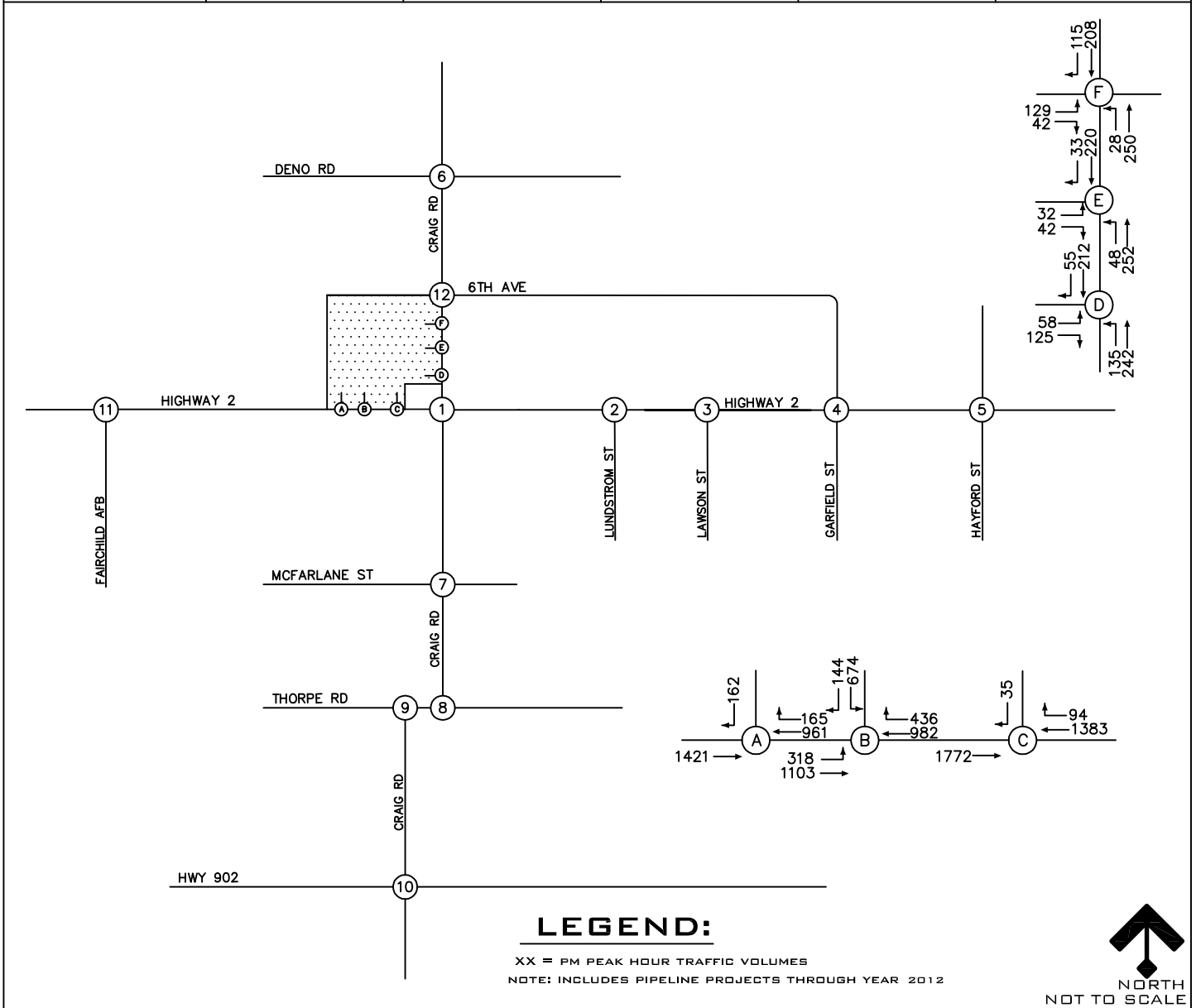
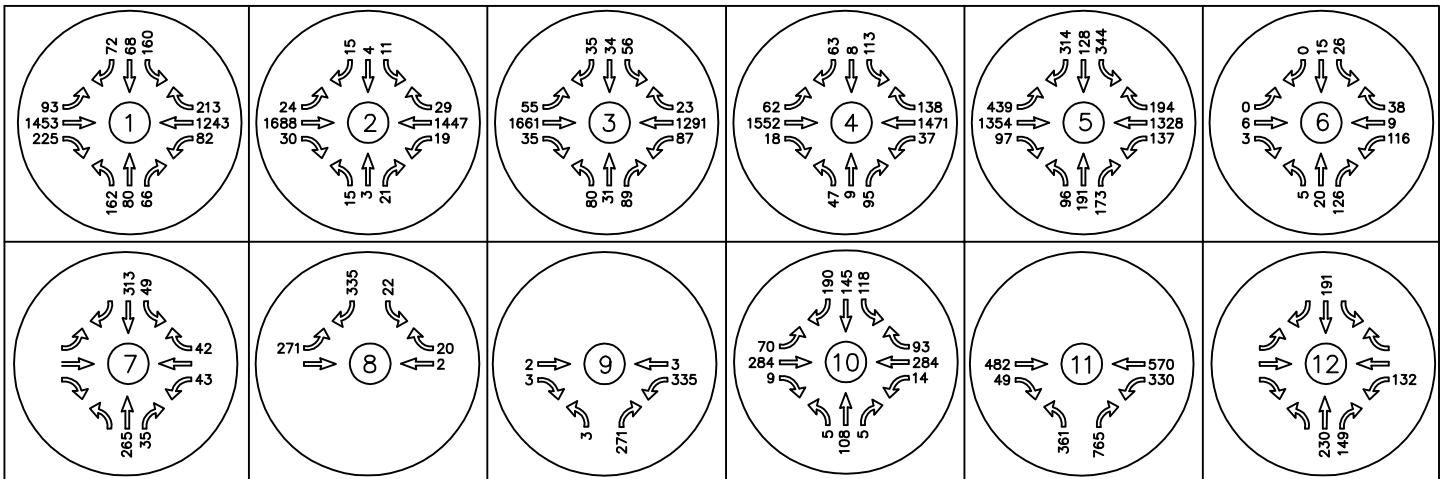
The traffic volumes included for this analysis include 2012 background traffic volumes plus project Buildout related traffic. The volumes used for this analysis scenario are shown on **Figure 18**. A summary of the LOS results are shown below in Table 17.

Table 17. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 2

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	NB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	46.3	E
Hwy. 2 / Lawson St.	S	--	18.8	B
Hwy. 2 / Garfield St.	S	--	19.3	B
Hwy. 2 / Hayford Rd.	S	--	59.8	E
Craig Rd. / Deno Rd.	U	WB LTR	10.7	B
Craig Rd. / McFarlane St.	U	WB LTR	15.7	C
Craig Rd. / Thorpe Rd. East	U	SB LR	11.3	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.1	B
Craig Rd. / SR 902	U	SB LTR	421.4	F
Hwy. 2 / Fairchild AFB	S	--	19.0	B
Craig Rd. / 6 th Ave.	U	WB Lt	12.0	B
Hwy 2 / Driveway West	U	SB Rt	16.1	C
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	16.4	C
Craig Rd. / Driveway North	U	EB Lt	12.8	B
Craig Rd. / Driveway Middle	U	EB Lt	11.9	B
Craig Rd. / Driveway South	U	EB Lt	14.9	B

* *Excessive Delay*

The Hwy 2 / Craig Rd., Hwy 2 / Hayford, Craig Rd. / SR 902 and Hwy 2 / Middle Dwy., intersections are anticipated to experience a failing LOS. Mitigation for these locations is identified in the mitigation subsection at the end of the Alternative 2 section.





6.1.6 ALTERNATIVE 2 – MITIGATION

This section identifies mitigation improvements for Alternative 2 conditions. Proposed mitigation options are identified in the table below in bold with the corresponding operational analysis results by phase of development. For brevity, intersection locations with acceptable LOS are not included in the table.

Table 18. Mitigation Operational Analysis Results-Alternative 2

INTERSECTION	2012 PM Peak BG + Alt2- Buildout	2032 PM Peak BG + Alt2- Buildout
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = NBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 31.6	LOS = F Delay = 109.7
Roundabout	LOS = A Delay = 7.8	LOS = D Delay = 54.3
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 46.3	CM = NBLTR LOS = F Delay = 574.9
NB/SB Right turn bays	CM = NBLTR LOS = E Delay = 40.7	CM = NBLTR LOS = F Delay = 500.9
Add EB/WB Right turn bays, eliminate N/S left turns	--	CM = NBLTR LOS = D Delay = 34.1
Hwy. 2 / Lawson St.	--	LOS = E Delay = 63.0
Modify Signal Timing/Phasing, Add EB/WB Rt turn bays, Reconfigure N/S app.	--	LOS = D Delay = 37.4
Hwy. 2 / Garfield St.	--	LOS = F Delay = 123.6
Modify Signal Timing/Phasing, Add EB Rt. And NB Lt turn bays, Reconfigure SB app.	--	LOS = E Delay = 57.2
Hwy. 2 / Hayford Rd.	LOS = E Delay = 59.8	LOS = F Delay = 217.2
Convert Thru Lane to 2nd SB Lt. Turn Lane	LOS = D Delay = 42.2	LOS = F Delay = 147.0
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 421.4	CM = SBLTR LOS = F Delay = *
Signalized	LOS = B Delay = 15.6	LOS = B Delay = 18.2
Roundabout	LOS = A Delay = 8.6	LOS = B Delay = 11.6



MITIGATION-ALT 2, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt2- Buildout	2032 PM Peak BG + Alt2- Buildout
Hwy. 2 / Fairchild AFB	--	LOS = E Delay = 75.8
Optimized Signal Timing, Add NB Lt turn bay and WB through lane	--	LOS = D Delay = 50.6
Craig Rd. / 6th Ave.	--	CM = WB Lt LOS = E Delay = 42.6
Add NB Right turn bay	--	CM = WB Lt LOS = D Delay = 28.5
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *
Signalized	LOS = C Delay = 31.1	LOS = D Delay = 46.8
Roundabout	LOS = A Delay = 9.8	LOS = E Delay = 65.8

Listed below are improvements recommended for consideration to reduce traffic impacts associated with the subject project. The project's recommended proportional share contribution to each mitigation is also listed. The proportional share for off-site intersections is calculated by divided the project generated traffic volume by the total intersection volume for each respective scenario.

2012 (Alt. 2 Buildout) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8
- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/31.1 / A/9.8 (roundabout)



6.1.7 ALTERNATIVE 3 – 2012 Buildout

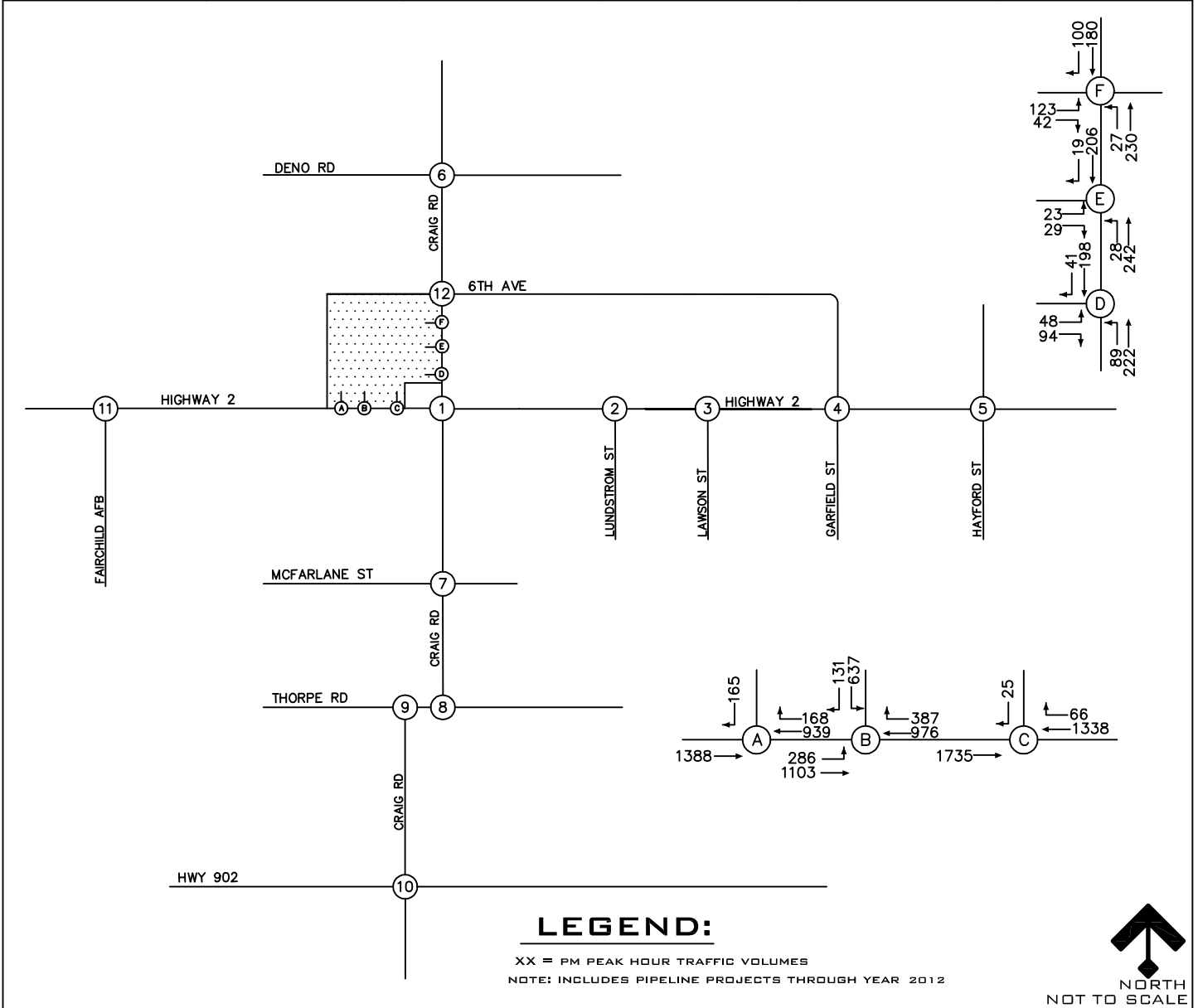
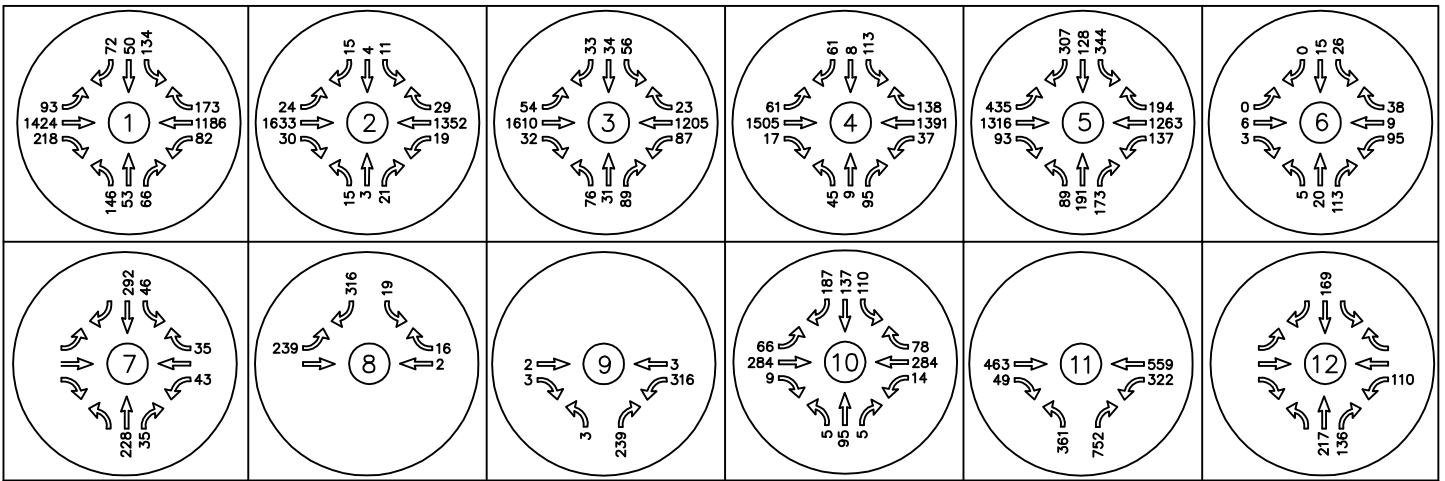
The traffic volumes included for this analysis include 2012 background traffic volumes plus project Buildout related traffic. The volumes used for this analysis scenario are shown on **Figure 19**. A summary of the LOS results are shown below in Table 19.

Table 19. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 3

INTERSECTION		Peak hour Level of Service (LOS)		
		PM Peak Hour		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	NB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	42.0	E
Hwy. 2 / Lawson St.	S	--	18.2	B
Hwy. 2 / Garfield St.	S	--	18.8	B
Hwy. 2 / Hayford Rd.	S	--	56.0	E
Craig Rd. / Deno Rd.	U	WB LTR	10.4	B
Craig Rd. / McFarlane St.	U	WB LTR	14.7	B
Craig Rd. / Thorpe Rd. East	U	SB LR	10.8	B
Craig Rd. / Thorpe Rd. West	U	NB LR	9.8	A
Craig Rd. / SR 902	U	SB LTR	319.6	F
Hwy. 2 / Fairchild AFB	S	--	18.5	B
Craig Rd. / 6 th Ave.	U	WB Lt	11.5	B
Hwy 2 / Driveway West	U	SB Rt	15.9	C
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	15.6	C
Craig Rd. / Driveway North	U	EB Lt	12.3	B
Craig Rd. / Driveway Middle	U	EB Lt	11.2	B
Craig Rd. / Driveway South	U	EB Lt	12.8	B

* Excessive Delay

The Hwy 2 / Craig Rd., Craig Rd. / SR 902 and Hwy 2 / Middle Driveway intersections are anticipated to experience a failing LOS. Mitigations for these locations are identified in the mitigation subsection at the end of the Alternative 3 section.





6.1.8 ALTERNATIVE 3 – MITIGATION

This section identifies mitigation improvements for Alternative 3 conditions. Proposed mitigations options are identified in the table below in bold with the corresponding operational analysis results by phase of development. For brevity, intersection locations with acceptable LOS are not included in the table.

Table 20. Level of Service for 2012 with Project PM Peak Hour Conditions-Alternative 3

INTERSECTION	2012 PM Peak BG + Alt3	2032 PM Peak BG + Alt3
Hwy. 2 / Craig Rd.	CM = NBLTR LOS = F Delay = *	CM = NBLTR LOS = F Delay = *
Signalized	LOS = C Delay = 28.2	LOS = F Delay = 90.3
Roundabout	LOS = A Delay = 7.1	LOS = D Delay = 42.8
Hwy. 2 / Lundstrom St.	CM = NBLTR LOS = E Delay = 42.0	CM = NBLTR LOS = F Delay = 406.5
Add NB/SB Right turn lanes	CM = NBLT R LOS = E Delay = 37.2	CM = NBLTR LOS = F Delay = 246.7
Add EB/WB Right Turn Lanes Eliminate N/S left turns	--	CM = NB Rt LOS = D Delay = 32.4
Hwy. 2 / Lawson St.	--	LOS = E Delay = 57.0
Modify Signal Timing/Phasing, Reconfigure N/S app.	--	LOS = D Delay = 37.0
Hwy. 2 / Garfield St.	--	Delay = 111.1 Delay = 111.1
Modify Signal Timing/Phasing, Add NB Lt. turn bay, Reconfigure SB app.	--	LOS = D Delay = 49.4
Hwy. 2 / Hayford Rd.	LOS = E Delay = 56.0	LOS = F Delay = 202.7
Convert Thru Lane to 2nd SB Lt. Turn Lane	LOS = D Delay = 40.6	LOS = F Delay = 141.4
Craig Rd. / SR 902	CM = SBLTR LOS = F Delay = 319.6	CM = SBLTR LOS = F Delay = 846.5
Signalized	LOS = B Delay = 15.1	LOS = B Delay = 17.2
Roundabout	LOS = A Delay = 8.2	LOS = B Delay = 10.7



MITIGATION-ALT 3, CONTINUED

INTERSECTION	2012 PM Peak BG + Alt3	2032 PM Peak BG + Alt3
Hwy. 2 / Fairchild AFB	--	LOS = E Delay = 71.4
<i>Optimized Signal Timing, Add NB Lt turn bay and WB through lane</i>	--	LOS = D Delay = 48.9
Hwy. 2 / Dwy. Middle	CM = SBL LOS = F Delay = *	CM = SBL LOS = F Delay = *
Signalized	LOS = C Delay = 29.3	LOS = D Delay = 40.3
Roundabout	LOS = A Delay = 9.2	LOS = D Delay = 60.0

Listed below are improvements recommended for consideration to reduce traffic impacts associated with the subject project. The project's recommended proportional share contribution for each mitigation is also listed. The proportional share for off-site intersections is calculated by divided the project generated traffic volume by the total intersection volume for each respective scenario.

2012 (Alt. 3 Buildout) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 30.2%
Resulting LOS & Delay (sec): C/28.2 / A/7.1 (roundabout)
- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 13.6%
Resulting LOS & Delay (sec): D/40.6
- Craig / SR 902: Install traffic signal; alternatively, consider installation of a roundabout
Project Proportional Share: 20.6%
Resulting LOS & Delay (sec): B/15.1 / A/8.2
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/29.3 / A/9.2 (roundabout)

6.2 Bike, Pedestrian and Transit Facilities

The traffic impacts of the project are not expected to have significant negative impact on non-motorized users. The addition of frontage improvements as discussed below will enhance bike and pedestrian facilities and accommodation adjacent to the project site.

It is recommended that the project install pedestrian (sidewalks or trails) and bike lanes along Hwy 2 and Craig Rd. project site frontages according applicable requirements of WSDOT, City of Airway Heights and Spokane County and to comply with local bike/pedestrian plans developed by the City of Airway Heights in the vicinity of the project.



The Spokane Tribe should work with the Spokane Transit Authority to identify opportunities (if any) to provide transit access near the project site. Furthermore, the Tribe should look to reduce vehicular trips to/from the site through employee trip reductions programs, employee shuttles and other similar means of achieving commute trip reduction.

6.3 Connectivity

Reasonable local connectivity and connectivity to adjacent arterial roadways can be achieved with the proposed site access locations and internal roadway network. Access and connectivity for the Shebourne site on the southerly side of HWY 2 across from the subject site can be achieved through a future 4th leg (southerly leg) of the Middle Dwy/Highway 2 intersection. Furthermore, this southerly leg of the Middle Driveway intersection could ultimately extend south to connect to the potential extension of 21st Ave. currently under consideration. An East-West road internal to the Spokane Tribe site, near the site's southwest corner, could provide a connection and access to the property west of the subject site. Additionally, a north-south roadway could feasibly be constructed from the East-West connection previously discussed north to intersect and connect to a future extension of 6th Ave.



7. CUMMULATIVE ANALYSIS

7.1.1 2032 Pipeline Conditions

The Year 2032 Base Volumes were calculated based on the 2019 volumes with pipeline projects and growth projected by the SRTC regional travel demand models. A comparison was made between the 2008 model and the 2032 “without Spokane Tribe Land Use” model. The projected background annual growth between 2008 and 2032 was determined to be 1.52%. Using this rate, the 2019 volumes (which accounted for all projects currently approved and in the “pipeline” for construction) were projected 13 years ahead as the 2032 base volumes, as shown in **Figure 20**. The operations in the 2032 forecast year across the existing network are provided in Table 21. This table illustrates that the current network will be deficient at several intersections based on projected growth rates and approved projects.

Table 21. Level of Service for 2032 Pipeline PM Peak Hour Conditions

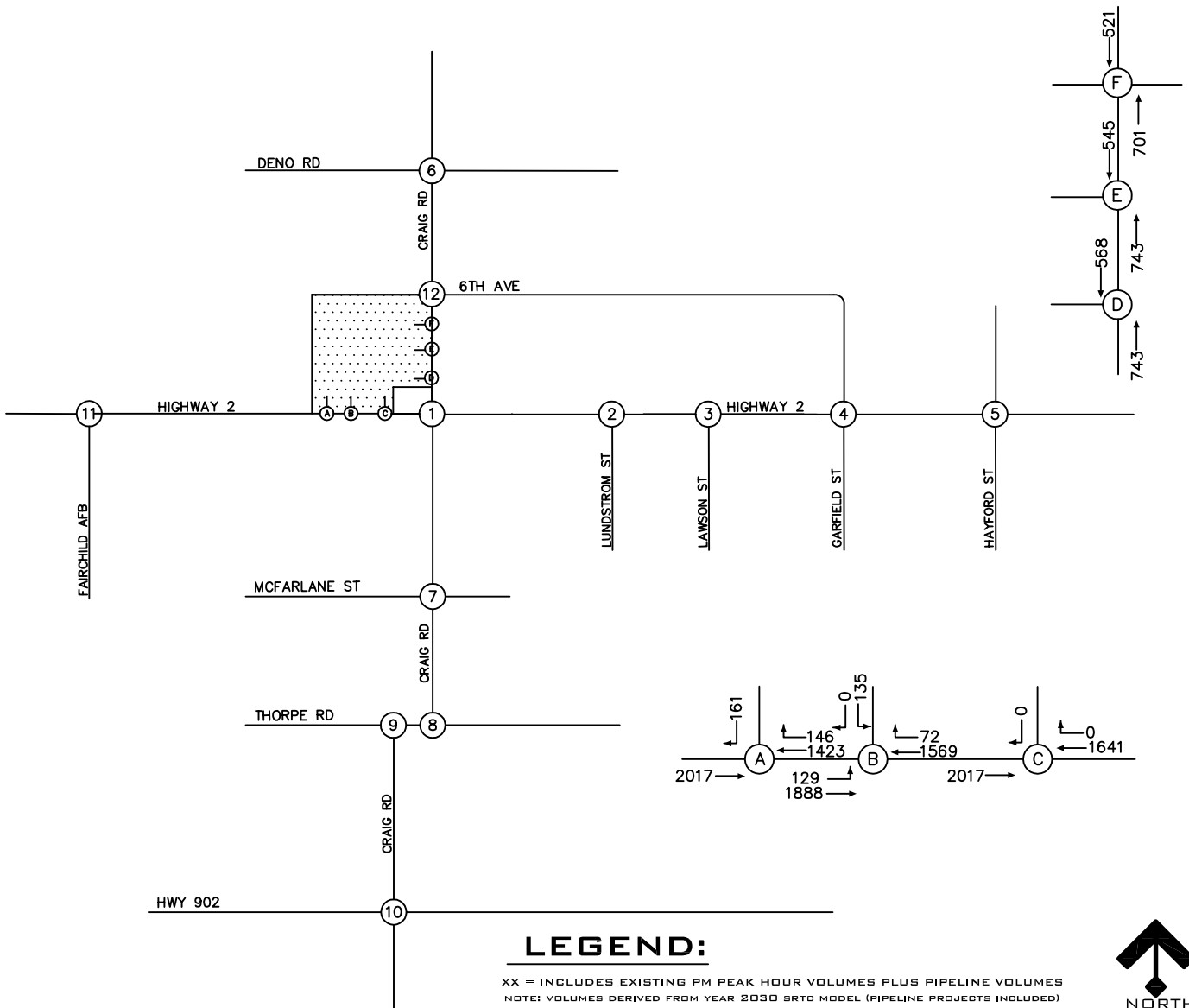
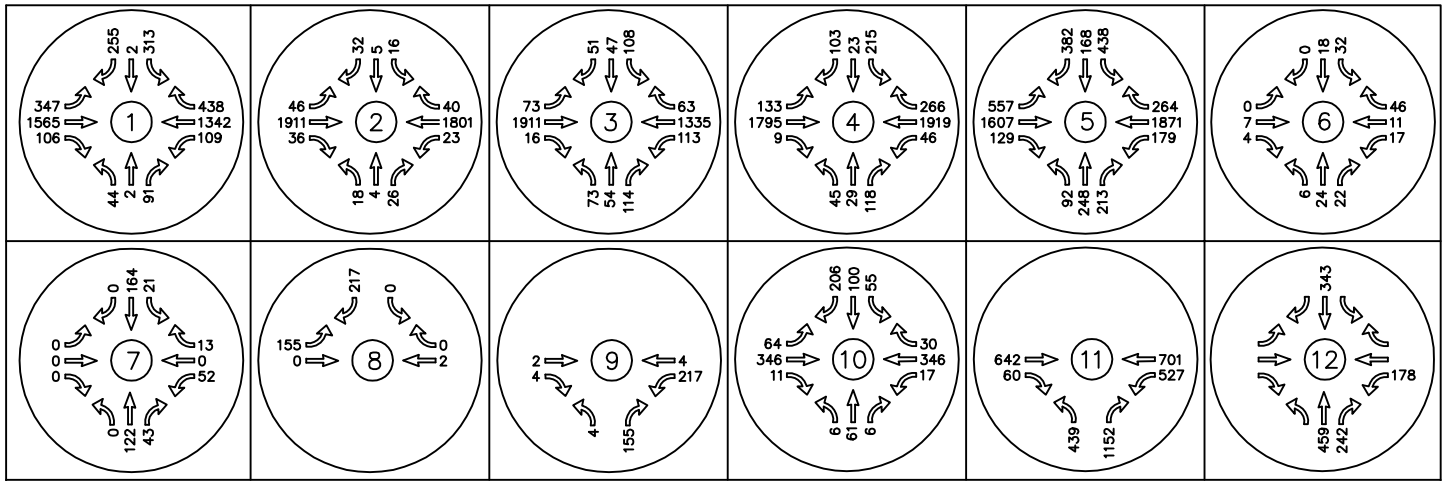
INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	109.6	F
Hwy. 2 / Lawson St.	S	--	29.9	C
Hwy. 2 / Garfield St.	S	--	58.7	E
Hwy. 2 / Hayford Rd.	S	--	150.3	F
Craig Rd. / Deno Rd.	U	EB LTR	9.5	A
Craig Rd. / McFarlane St.	U	WB LTR	11.8	B
Craig Rd. / Thorpe Rd. East	U	SB LR	9.3	A
Craig Rd. / Thorpe Rd. West	U	NB LR	9.3	A
Craig Rd. / SR 902	U	SB LTR	155.4	F
Hwy. 2 / Fairchild AFB	S	--	40.4	D
Craig Rd. / 6 th Ave.	U	WB Lt	18.1	C
Hwy 2 / Driveway West	U	SB Rt	26.1	D

* Excessive Delay

7.1.2 2032 With Project (Alternatives 1, 2 & 3)

From this platform of the calculated 2032 base volumes, each of the alternative buildout volumes were added and the network evaluated to determine the project’s impact on the LOS of the intersections. 2032 With Project volumes are shown in **Figures 21 - 23**. The intersections with levels of service dropping below ‘D’ were mitigated to bring them into compliance with the appropriate agency requirements. For WSDOT facilities (Hwy.2, SR 902), sufficient mitigation was required to bring the intersection back to the LOS projected under 2032 base conditions (see table 21).

As shown in Table 22, the addition of the proposed development under Alternative 1 brings all Hwy 2 study intersections to failing levels of service, based on the network and intersection layout. Further failures are projected on Craig Road north and south of Hwy.2. Based on the mitigation table as shown in Table 23, by adding or enhancing signals and/or roundabouts at affected intersections and modifying the lane usage at unsignalized intersections, the operations are improved within compliant ranges. Note that the LOS at Hwy.2/Craig and Hwy.2/Hayford, though still at LOS F, are improved over the 2032 base conditions shown in Table 21. Detailed descriptions of the suggested mitigations for all alternatives are included at the end of this section.



**DAVID EVANS
AND ASSOCIATES INC.**

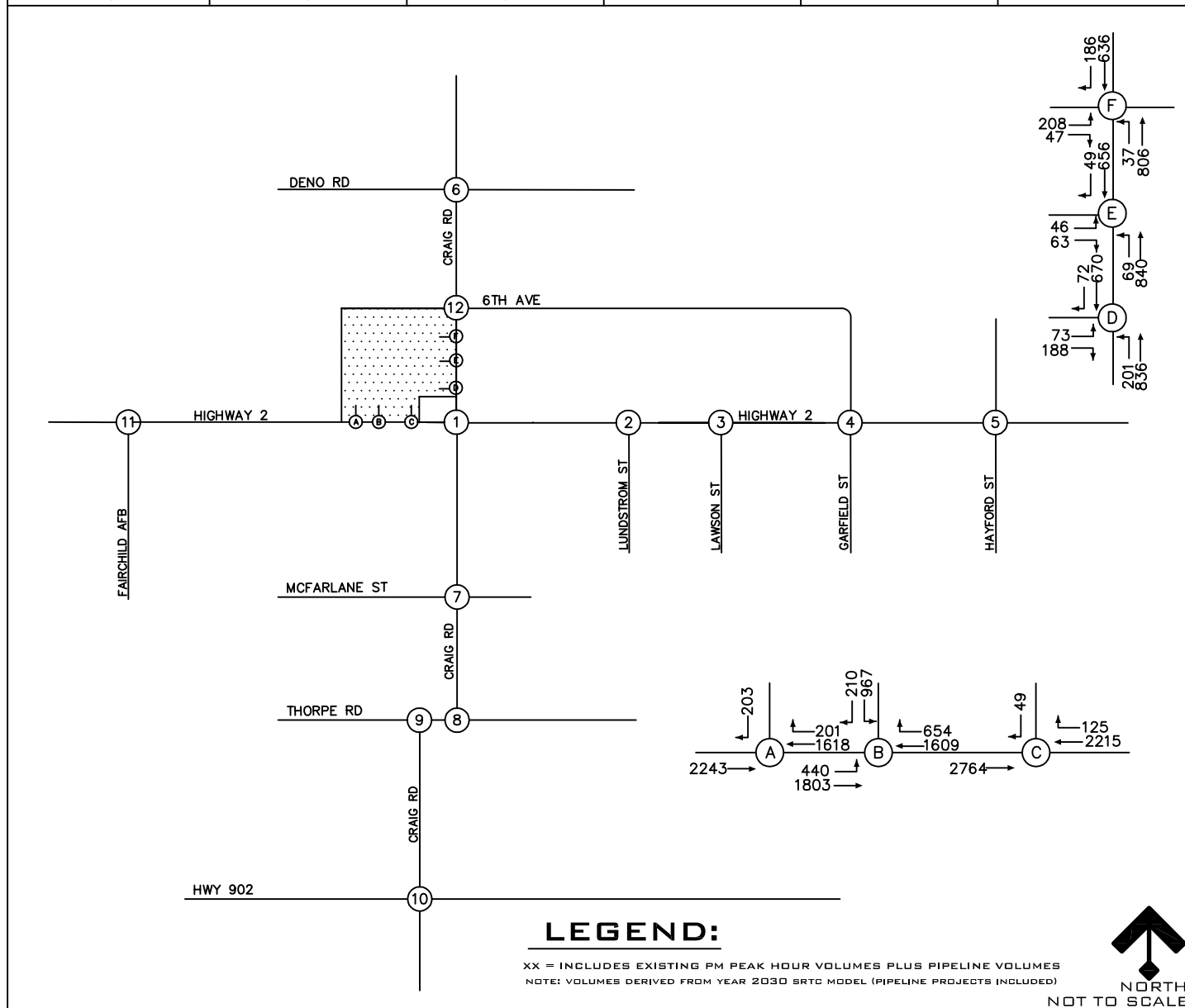
908 N. Howard St # 300
Spokane, Wa 99021
Phone: 509.327.8697

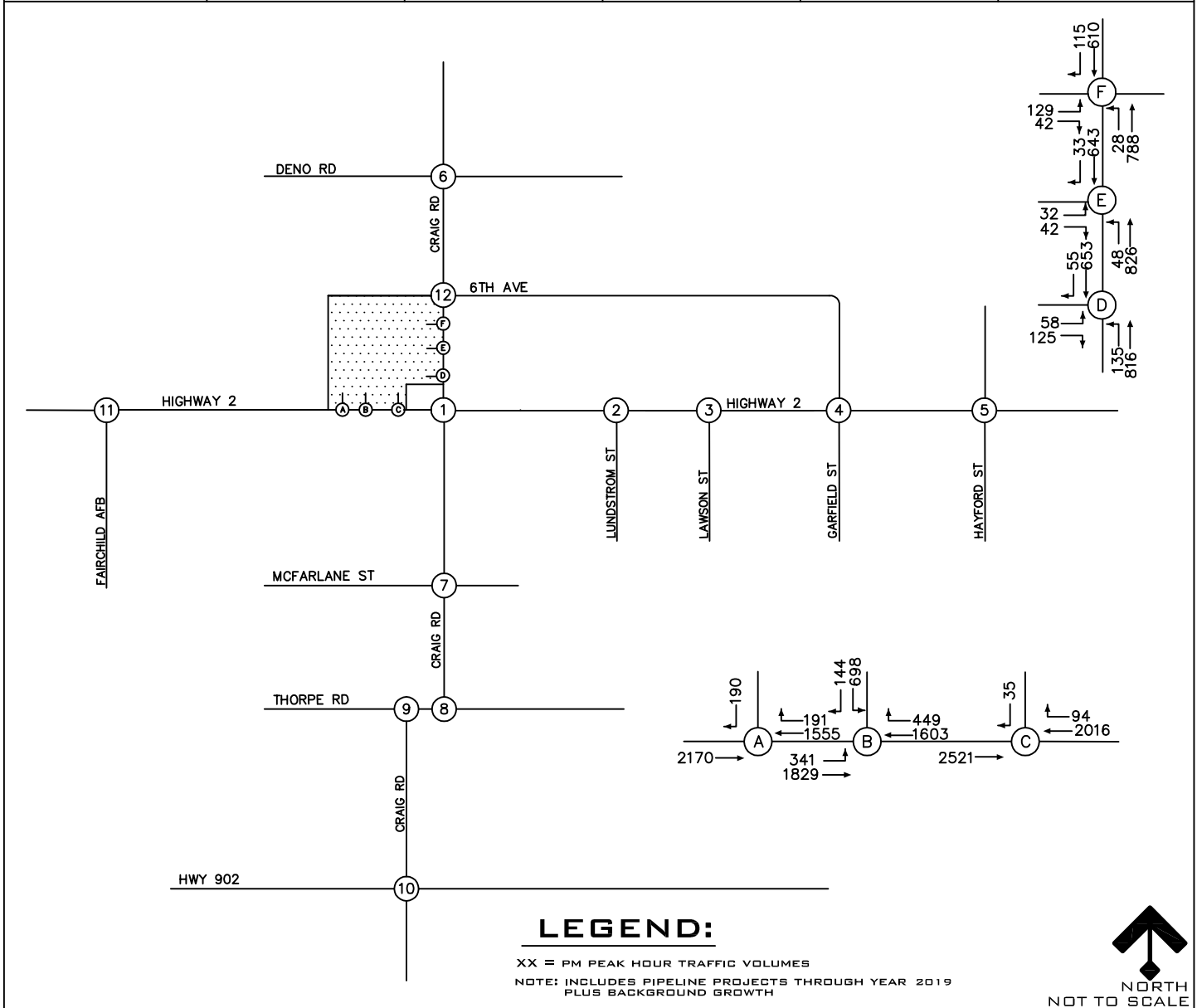
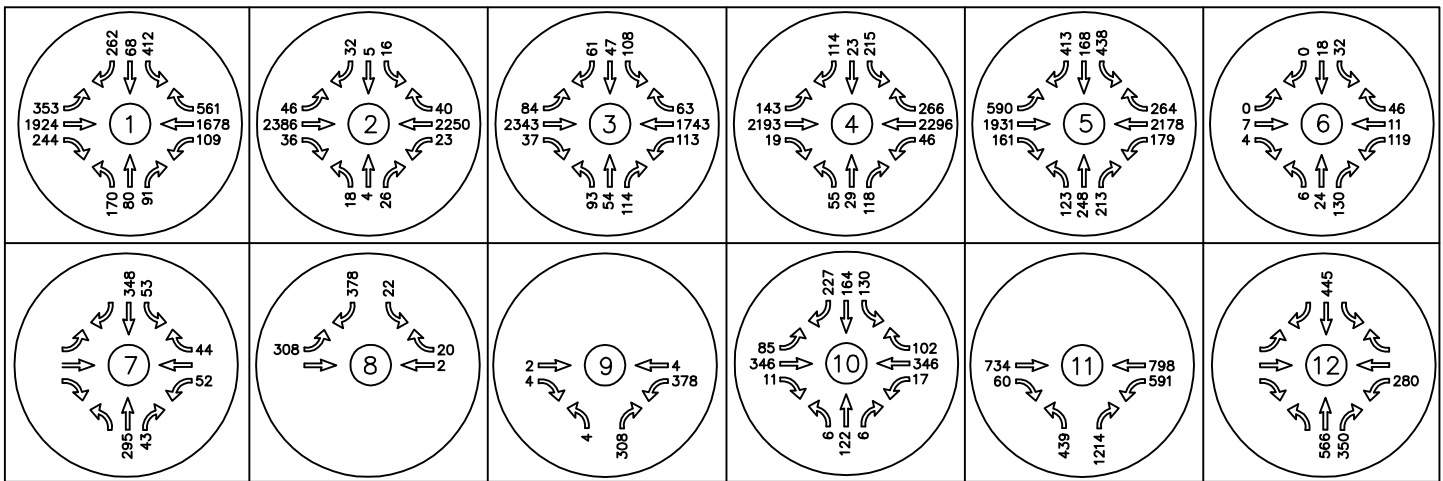
**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**

FIGURE 20

**YEAR 2032 BACKGROUND
TRAFFIC VOLUMES**





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**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**

FIGURE 22

**YEAR 2032 PLUS PROJECT
TRAFFIC VOLUMES
ALT. 2 - BUILDOUT**

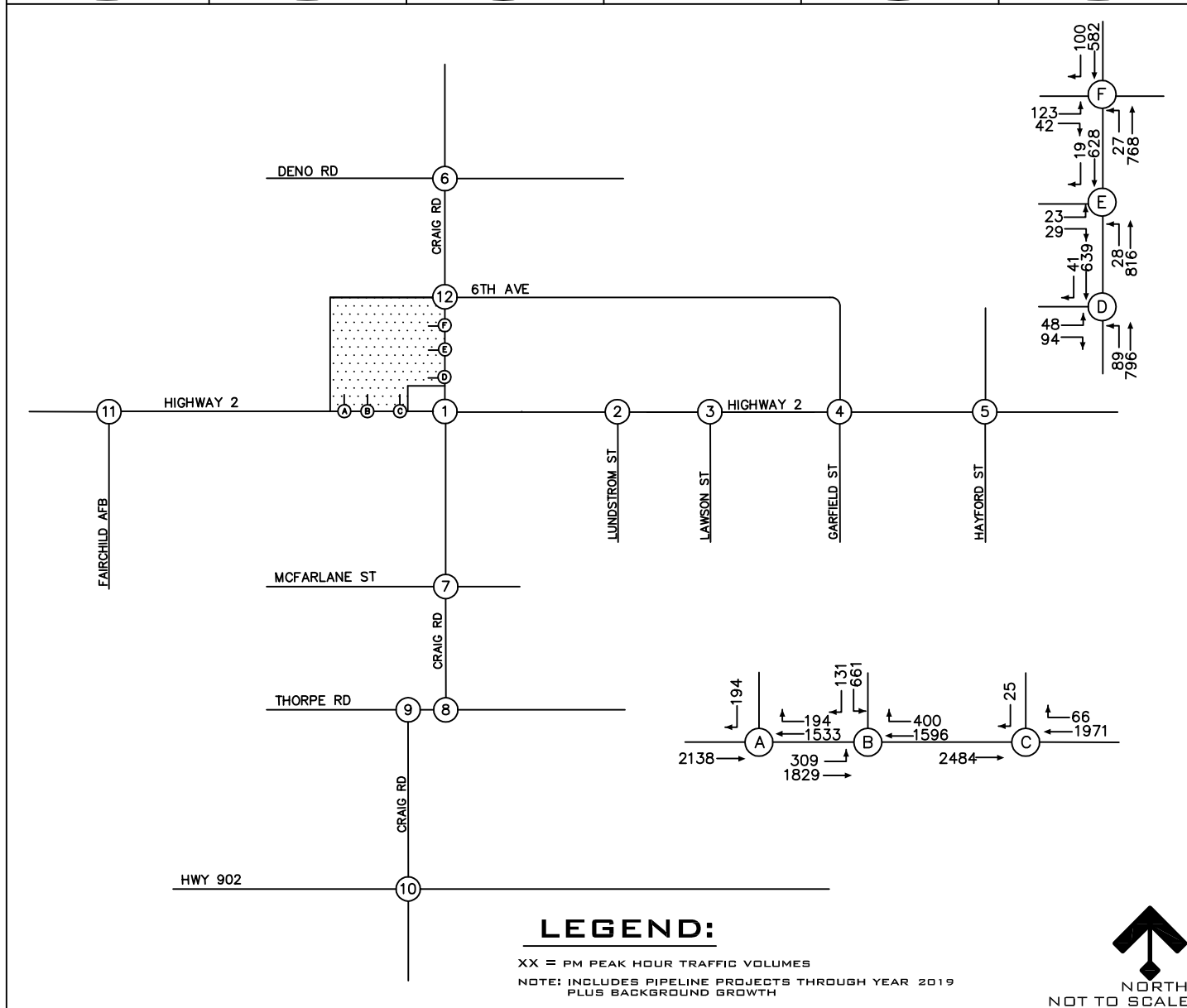
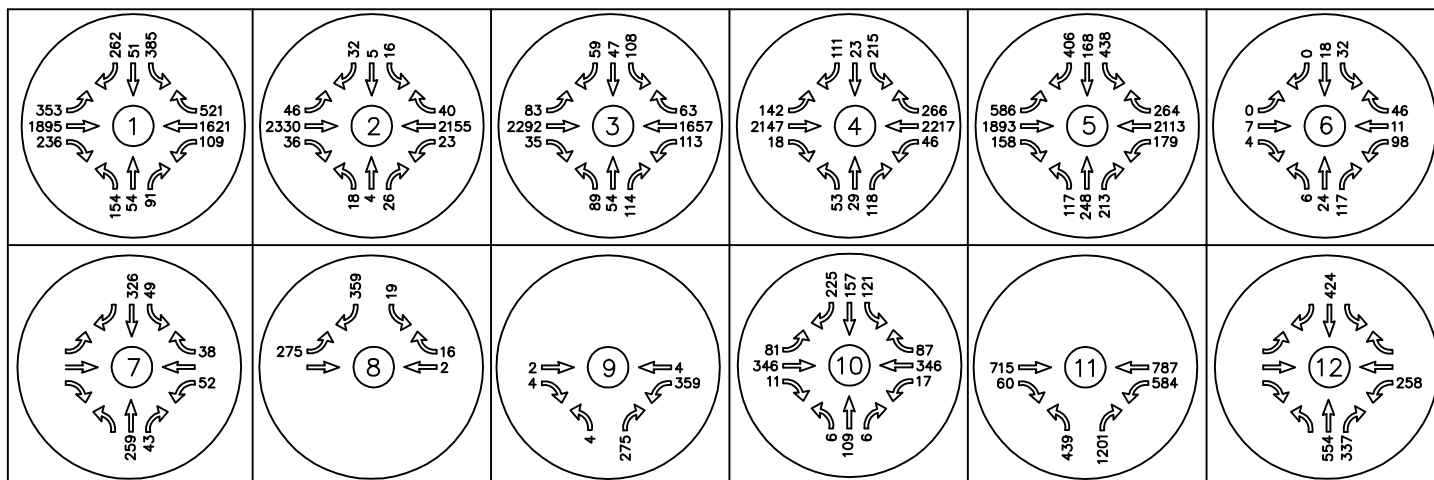




Table 22. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 1

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	*	F
Hwy. 2 / Lawson St.	S	--	89.1	F
Hwy. 2 / Garfield St.	S	--	160.9	F
Hwy. 2 / Hayford Rd.	S	--	247.2	F
Craig Rd. / Deno Rd.	U	WB LTR	12.3	B
Craig Rd. / McFarlane St.	U	WB LTR	25.1	D
Craig Rd. / Thorpe Rd. East	U	SB LR	15.1	C
Craig Rd. / Thorpe Rd. West	U	NB LR	11.5	B
Craig Rd. / SR 902	U	SB LTR	*	F
Hwy. 2 / Fairchild AFB	S	--	90.6	F
Craig Rd. / 6 th Ave.	U	WB Lt	89.9	F
Hwy 2 / Driveway West	U	SB Rt	47.9	E
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	34	D
Craig Rd. / Driveway North	U	EB Lt	68.2	F
Craig Rd. / Driveway Middle	U	EB Lt	20.4	C
Craig Rd. / Driveway South	U	EB Lt	36.5	E

* Excessive Delay

Table 23. Level of Service for 2032 Alternative 1 with Mitigation

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	S	--	101.5	F
Hwy. 2 / Lundstrom St.	U	NB Rt	42.3	E
Hwy. 2 / Lawson St.	S	--	40.6	D
Hwy. 2 / Garfield St.	S	--	25.0	C
Hwy. 2 / Hayford Rd.	S	--	95.4	F
Craig Rd. / SR 902	S	--	20.5	C
Hwy. 2 / Fairchild AFB	S	--	50.5	D
Craig Rd. / 6 th Ave.	R	--	20.5	C
Hwy 2 / Driveway West	U	SB Rt	14.8	B
Hwy 2 / Driveway Middle	S	--	51.0	D
Hwy 2 / Driveway East	U	SB Rt	12.5	B
Craig Rd. / Driveway North	R	--	37.3	E



Alternative 2 forecasts lower land-use trip generation than the first alternative, resulting in lesser impact compared to Alternative 1. As shown in Table 24, its impact on the system was felt mainly on Hwy. 2 from Hayford Road to the Middle Access. Mitigation results are summarized in Table 25; detailed mitigations descriptions are provided at the end of this section.

Table 24. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 2

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	574.9	F
Hwy. 2 / Lawson St.	S	--	63.0	E
Hwy. 2 / Garfield St.	S	--	123.6	F
Hwy. 2 / Hayford Rd.	S	--	214.7	F
Craig Rd. / Deno Rd.	U	WB LTR	11.1	B
Craig Rd. / McFarlane St.	U	WB LTR	18.4	C
Craig Rd. / Thorpe Rd. East	U	SB LR	12.0	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.5	B
Craig Rd. / SR 902	U	SB LTR	*	F
Hwy. 2 / Fairchild AFB	S	--	75.8	E
Craig Rd. / 6 th Ave.	U	WB Lt	42.6	E
Hwy 2 / Driveway West	U	SB Rt	38.0	E
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	26.1	D
Craig Rd. / Driveway North	U	EB Lt	28.4	D
Craig Rd. / Driveway Middle	U	EB Lt	18.2	C
Craig Rd. / Driveway South	U	EB Lt	24.0	C

* Excessive Delay

Table 25. Level of Service for 2032 Alternative 2 with Mitigation

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	S	--	109.7	F
Hwy. 2 / Lundstrom St.	U	NB Rt	34.1	D
Hwy. 2 / Lawson St.	S	--	37.4	D
Hwy. 2 / Garfield St.	S	--	57.2	E
Hwy. 2 / Hayford Rd.	S	--	147.0	F
Craig Rd. / SR 902	S	--	18.2	B
Hwy. 2 / Fairchild AFB	S	--	50.6	D
Craig Rd. / 6 th Ave.	U	WB Lt	28.5	D
Hwy 2 / Driveway Middle	S	--	46.8	D



Alternative 3 is projected to generate the fewest trips of the three alternatives (see Table 26 for resulting levels of service). As such, much of the mitigation was reduced only to what was necessary for compliance with LOS requirements. Most notably, whereas crossing movements onto Hwy. 2 from Lundstrom were eliminated for previous alternatives, they were retained for Alternative 3.

Table 26. Level of Service for 2032 with Project PM Peak Hour Conditions-Alternative 3

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	U	SB LTR	*	F
Hwy. 2 / Lundstrom St.	U	NB LTR	406.5	F
Hwy. 2 / Lawson St.	S	--	57.0	E
Hwy. 2 / Garfield St.	S	--	111.1	F
Hwy. 2 / Hayford Rd.	S	--	202.7	F
Craig Rd. / Deno Rd.	U	WB LTR	10.8	B
Craig Rd. / McFarlane St.	U	WB LTR	16.9	C
Craig Rd. / Thorpe Rd. East	U	SB LR	11.3	B
Craig Rd. / Thorpe Rd. West	U	NB LR	10.2	B
Craig Rd. / SR 902	U	SB LTR	846.5	F
Hwy. 2 / Fairchild AFB	S	--	71.4	E
Craig Rd. / 6 th Ave.	U	WB Lt	34.1	D
Hwy 2 / Driveway West	U	SB Rt	37.6	E
Hwy 2 / Driveway Middle	U	SB Lt	*	F
Hwy 2 / Driveway East	U	SB Rt	24.0	C
Craig Rd. / Driveway North	U	EB Lt	25.8	D
Craig Rd. / Driveway Middle	U	EB Lt	16.9	C
Craig Rd. / Driveway South	U	EB Lt	20.0	C

* Excessive Delay

Table 27. Level of Service for 2032 Alternative 3 with Mitigation

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	Peak hour Level of Service (LOS)		
		Critical Movement By Approach	Delay	LOS
Hwy. 2 / Craig Rd.	S	--	90.3	F
Hwy. 2 / Lundstrom St.	U	NB Rt	32.4	D
Hwy. 2 / Lawson St.	S	--	37.0	D
Hwy. 2 / Garfield St.	S	--	49.4	D
Hwy. 2 / Hayford Rd.	S	--	141.4	F
Craig Rd. / SR 902	S	--	17.2	B
Hwy. 2 / Fairchild AFB	S	--	48.9	D
Hwy 2 / Driveway Middle	S	--	40.3	D



7.1.3 2032 With Project (Alternatives 1, 2 & 3) Mitigations and Descriptions

Listed below are improvements recommended for consideration to reduce traffic impacts associated with the subject project. The project's recommended proportional share contribution for each mitigation is also listed. The proportional share for off-site intersections is calculated by divided the project generated traffic volume by the total intersection volume for each respective scenario.

2032 Alternative 1 Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 30.0%
Resulting LOS & Delay (sec): F/101.5 / F/94.9
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Alternatively, consider restriction of NB and SB left turn movements and installation of EB/WB right turn lanes.
Project Proportional Share: 25.5%
Resulting LOS & Delay (sec): F/ n/a / E/42.3 (alternative – turn restriction)
- Hwy 2 / Lawson: Modify the signal timing. Modify and widen NB and SB approaches as necessary to provide dedicated left turn lanes.
Project Proportional Share: 25.1%
Resulting LOS & Delay (sec): D/40.6
- Hwy 2 / Garfield: Optimize signal timing. Alternatively, modify signal timing and add 3rd EB and WB auxiliary through lanes.
Project Proportional Share: 20.4%
Resulting LOS & Delay (sec): F/131.5 / C/25.0 (alternative)
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Widen the EB and NB approaches for exclusive right turn lanes. Restripe the wide paved median for a 2nd WB left turn lane. Add 2nd NB left turn lane. Add a 3rd WB thru lane on the approach and downstream of the intersection as an auxiliary thru lane.
Project Proportional Share: 15.3%
Resulting LOS & Delay (sec): F/95.4
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 27.0%
Resulting LOS & Delay (sec): C/20.7 / B/16.1 (roundabout)
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 11.6%
Resulting LOS & Delay (sec): D/50.5
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane or consider installation of a roundabout.
Project Proportional Share: 33.5%
Resulting LOS & Delay (sec): E/47.3 / C/20.5 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/51.0 / F/110 (roundabout)
- Craig / North Driveway.: Consider adding a 2nd NB thru lane. If this improvement is chosen it is recommended that the 2nd NB thru lane be continuous from Highway 2 to 6th Ave. Alternatively, consider installation of a roundabout which would also achieve a satisfactory level of service.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): E/37.3 / B/11.4



2032 Alternative 2 Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dedicated NB and SB left turn lanes. Alternatively, consider installation of a roundabout.
Project Proportional Share: 22.5%
Resulting LOS & Delay (sec): F/109.7 / D/54.3 (roundabout)
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.
Project Proportional Share: 18.9%
Resulting LOS & Delay (sec): D/34.1
- Hwy 2 / Lawson: Modify the signal timing. Add EB/WB right turn lanes, reconfigure N/S approaches.
Project Proportional Share: 18.6%
Resulting LOS & Delay (sec): D/37.4
- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.
Project Proportional Share: 14.8%
Resulting LOS & Delay (sec): E/57.2
- Hwy 2 / Hayford: Convert the inside SB thru lane to a 2nd SB left turn lane and optimize signal timing.
Project Proportional Share: 10.9%
Resulting LOS & Delay (sec): F/147.0
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 20.2%
Resulting LOS & Delay (sec): B/18.2 / B/11.6
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 25.6%
Resulting LOS & Delay (sec): D/28.5
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 8.2%
Resulting LOS & Delay (sec): D/50.6
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/46.8 / E/65.8 (roundabout)

2032 Alternative 3 Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dedicated NB and SB left turn lanes. Alternatively, consider installation of a roundabout.
Project Proportional Share: 19.5%
Resulting LOS & Delay (sec): F/90.3 / D/42.8 (roundabout)
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.
Project Proportional Share: 16.3%
Resulting LOS & Delay (sec): D/32.4
- Hwy 2 / Lawson: Modify the signal timing. Reconfigure N/S approaches.
Project Proportional Share: 16.0%
Resulting LOS & Delay (sec): D/37.0
- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.
Project Proportional Share: 12.7%



- Resulting LOS & Delay (sec):* D/49.4
- Hwy 2 / Hayford: Convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 9.3%
Resulting LOS & Delay (sec): F/141.4
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 17.4%
Resulting LOS & Delay (sec): B/17.2 / B/10.7 (roundabout)
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 6.9%
Resulting LOS & Delay (sec): D /48.9
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/40.3 / E/60.0 (roundabout)

Regarding congestion at Hwy 2/Hayford, it is worth noting that development of an alternative east/west route through Airway Heights along the alignment of 21st Ave. is under consideration by the City of Airway Heights, WSDOT Spokane County and the City of Spokane. The intent of this alternative route is to reduce through volumes on HWY 2 on the West Plains. Note, that at the time of publishing this report the 21st Ave. project has not been officially adopted by the agencies involved or added to the regional transportation improvement plan list of projects. If the 21st Ave. by-pass is accepted and adopted by the impacted agencies (WSDOT, City of Airway Heights, Spokane County and City of Spokane) the Spokane Tribe West Plains project could consider make a fair share contribution to the 21st Ave. project in lieu of improvements at Hwy 2/Hayford.



8. CONCLUSIONS

Based upon the technical analysis and mitigation/recommendations presented herein, sufficient capacity will be available to accommodate Spokane Tribe's West Plains development provided that certain roadway and intersections improvements are made.

The operational analysis performed for the three project alternatives and various phases within Alternative 1 indicate that there are some study intersection locations that may experience an unacceptable delay and LOS if improvements aren't implemented.

The table below indicates intersections that are experiencing substandard LOS and vehicular delay; under each Alternative listed the 1st phase and year during the course of development of the site where the intersection LOS drops to substandard levels is indicated.

Table 28. Intersection Substandard Level of Service

INTERSECTION	(S) Signalized (U) Unsignalized (R) Roundabout	PROJECT ALTERNATIVE		
		Alternative 1	Alternative 2	Alternative 3
Hwy. 2 / Craig Rd.	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy. 2 / Lundstrom St.	U	2015 – Phase 2	+	+
Hwy. 2 / Lawson St.	S	+	+	+
Hwy. 2 / Garfield St.	S	2019 – Phase 3	+	+
Hwy. 2 / Hayford Rd.	S	2012 – Phase 1	2012 – Buildout	+
Craig Rd. / Deno Rd.	U	+	+	+
Craig Rd. / McFarlane St.	U	+	+	+
Craig Rd. / Thorpe Rd. East	U	+	+	+
Craig Rd. / Thorpe Rd. West	U	+	+	+
Craig Rd. / SR 902	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy. 2 / Fairchild AFB	S	+	+	+
Craig Rd. / 6 th Ave.	U	2019 – Phase 3	+	+
Hwy 2 / Driveway West	U	+	+	+
Hwy 2 / Driveway Middle	U	2012 – Phase 1	2012 – Buildout	2012 – Buildout
Hwy 2 / Driveway East	U	+	+	+
Craig Rd. / Driveway North	U	+	+	+
Craig Rd. / Driveway Middle	U	+	+	+
Craig Rd. / Driveway South	U	+	+	+

+ *Acceptable LOS for alternative noted*

Mitigation improvements for congested intersections are discussed in the following Recommendations section. Regarding bike and pedestrian facilities, there are limited facilities in the immediate vicinity of the project site. Pedestrian facilities are provided and are bikes accommodated via the paved shoulder along Hwy 2 east of Craig Rd. Pedestrian and bike facilities are provided along much of the roadway network within the developed portions of Airway Heights to the east of the project site. The traffic impacts of the project are not expected to have significant negative impact on non-motorized users. The addition of frontage improvements (sidewalks and trails) will enhance bike and pedestrian facilities and accommodation adjacent to the project site.



Transit service is provided to Airway Heights by Spokane Transit Authority (STA) via Route 61. This route terminates within the City of Spokane at the downtown transit plaza and makes stops at the Airway Heights Park & Ride west of Hwy 2/Lawson and within Fairchild Air Force Base, seven days a week. During peak period busses operate with one-half hour headways and off peak periods have one-hour headways.



9. RECOMMENDATIONS

Mitigation recommendations are summarized below for each project alternative. At locations where traffic signalization is recommended, a signal warrant analysis was completed to aid in determining if signalization was an appropriate improvement alternative to consider.

The off-site improvements not contiguous with the project site should be constructed in a phased manner so that they are installed at the appropriate time and roughly corresponding to the phase of project development being undertaken.

For off-site improvements that are not contiguous with the project site or related to site access, the Spokane Tribe should contribute its proportional share of the cost required to construct the identified improvements.

Recommend improvements are summarized below along with the project's estimated proportional fair share contribution.

Alternative 1

2012 (Phase 1) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): A/9.8

2015 (Phase 2) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 36.0%
Resulting LOS & Delay (sec): D/44.7 / B/12.4
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.8%
Resulting LOS & Delay (sec): F/63.3
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Restripe the wide paved median for a 2nd WB left turn lane. Alternatively, widen the EB and NB approaches for exclusive right turn lanes along with adding the 2nd WB left turn lane.
Project Proportional Share: 17.7%
Resulting LOS & Delay (sec): E/60.4 / D/54.0 (alternative)



- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 27.7%
Resulting LOS & Delay (sec): B/16.4 / A/9.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/38.8 / B/18.6 (roundabout)

2019 (Phase 3) Mitigations:

- Hwy 2 / Craig: Install traffic signal and widen/improve intersection approaches to include dual EB, NB and SB left turn lanes and a 2nd NB thru lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.3%
Resulting LOS & Delay (sec): D/52.7 / D/47.4 (roundabout)
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.4%
Resulting LOS & Delay (sec): F/179.6
- Hwy 2 / Garfield: Optimize signal timing.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): D/52.5
- Hwy 2 / Hayford: Optimize signal timing and consider converting the inside SB thru lane to a 2nd SB left turn lane. Widen the EB and NB approaches for exclusive right turn lanes. Restripe the wide paved median for a 2nd WB left turn lane. Add 2nd NB left turn lane. Alternatively, add a 2nd NB left turn lane and a WB auxiliary lane.
Project Proportional Share: 18.0%
Resulting LOS & Delay (sec): F/97.1 / D/51.3 (alternative)
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 31.1%
Resulting LOS & Delay (sec): B/17.6 / B/10.4 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): D/45.4 / E/61.3 (roundabout)
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 38.0%
Resulting LOS & Delay (sec): D/28.8

Suggested intersection lane geometry for Alt. 1, PH3 (buildout conditions) at Middle Dwy./Hwy.2 and Craig Rd./Hwy.2 can be seen on **Figure 24**. Note that at the design stage consideration of or accommodation for a future 4th leg (southerly leg) of the Middle Dwy./Hwy 2 should be examined.

Alternative 2

Recommend improvements are summarized below along with the estimated proportional fair share contribution.

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 34.2%
Resulting LOS & Delay (sec): C/31.6 / A/7.8



- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 15.8%
Resulting LOS & Delay (sec): D/45.9
- Craig / SR 902: Install traffic signal or consider installation of a roundabout.
Project Proportional Share: 23.7%
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/31.1 / A/9.8 (roundabout)

Alternative 3

Recommend improvements are summarized below along with the estimated proportional fair share contribution.

- Hwy 2 / Craig: Install traffic signal and widen the NB and SB approaches to provide and exclusive left turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 30.2%
Resulting LOS & Delay (sec): C/28.2 / A/7.1 (roundabout)
- Hwy 2 / Hayford: Optimize signal timing and convert the inside SB thru lane to a 2nd SB left turn lane.
Project Proportional Share: 13.6%
Resulting LOS & Delay (sec): D/40.6
- Craig / SR 902: Install traffic signal; alternatively, consider installation of a roundabout
Project Proportional Share: 20.6%
Resulting LOS & Delay (sec): B/15.1 / A/8.2
- Hwy 2 / Middle Driveway: Install traffic signal and approach improvements (SB Middle Driveway); install a WB right turn lane. Alternatively, consider installation of a roundabout.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): C/29.3 / A/9.2 (roundabout)

2032 Cumulative Mitigation Improvements

The improvements identified below in addition to the improvements identified above are required to mitigate 2032 Cumulative With Project conditions.

2032 Alternative 1 Mitigations (in addition to Alt. 1 Ph. 3 2019 mitigations above):

- Hwy 2 / Lundstrom: Consider restriction of NB and SB left turn movements and installation of EB/WB right turn lanes.
Project Proportional Share: 25.5%
Resulting LOS & Delay (sec): E/42.3
- Hwy 2 / Lawson: Modify the signal timing. Modify and widen NB and SB approaches as necessary to provide dedicated left turn lanes.
Project Proportional Share: 25.1%
Resulting LOS & Delay (sec): D/40.6
- Hwy 2 / Garfield: Add 3rd EB and WB auxiliary through lanes.
Project Proportional Share: 20.4%
Resulting LOS & Delay (sec): C/25.0
- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 11.6%



Resulting LOS & Delay (sec): D/50.5 Craig Rd./Sixth Ave.: Consider installation of a roundabout in lieu of mitigation identified for 2019 condition.

Project Proportional Share: 33.5%

Resulting LOS & Delay (sec): C/20.5

- Craig / North Driveway.: Consider adding a 2nd NB thru lane. If this improvement is chosen it is recommended that the 2nd NB thru lane be continuous from Highway 2 to 6th Ave. Alternatively, consider installation of a roundabout which would also achieve a satisfactory level of service.

Project Proportional Share: 100%

Resulting LOS & Delay (sec): E.37.3 / B/11.4 (roundabout)

2032 Alternative 2 Mitigations (in addition to Alt. 2 2012 mitigations above):

- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.

Project Proportional Share: 18.9%

Resulting LOS & Delay (sec): D/34.1

- Hwy 2 / Lawson: Modify the signal timing. Add EB/WB right turn lanes, reconfigure N/S approaches.

Project Proportional Share: 18.6%

Resulting LOS & Delay (sec): D/37.4

- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.

Project Proportional Share: 14.8%

Resulting LOS & Delay (sec): E/57.2

- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.

Project Proportional Share: 25.6%

Resulting LOS & Delay (sec): D/28.5

- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.

Project Proportional Share: 8.2%

Resulting LOS & Delay (sec): D/50.6

2032 Alternative 3 Mitigations (in addition to Alt. 3 mitigations above):

- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes. Consider restricting NB/SB left turns and adding EB/WB right turn lanes.

Project Proportional Share: 16.3%

Resulting LOS & Delay (sec): D/32.4

- Hwy 2 / Lawson: Modify the signal timing. Reconfigure N/S approaches.

Project Proportional Share: 16.0%

Resulting LOS & Delay (sec): D/37.0

- Hwy 2 / Garfield: Optimize signal timing. Add EB right turn lane, add separate NB left turn lane, reconfigure SB approach.

Project Proportional Share: 12.7%

Resulting LOS & Delay (sec): D/49.4

- Hwy 2 / Hayford: Convert the inside SB thru lane to a 2nd SB left turn lane.

Project Proportional Share: 9.3%

Resulting LOS & Delay (sec): F/141.4

- Craig / SR 902: Install traffic signal or consider installation of a roundabout.

Project Proportional Share: 17.4%

Resulting LOS & Delay (sec): B/17.2 / B/10.7 (roundabout)

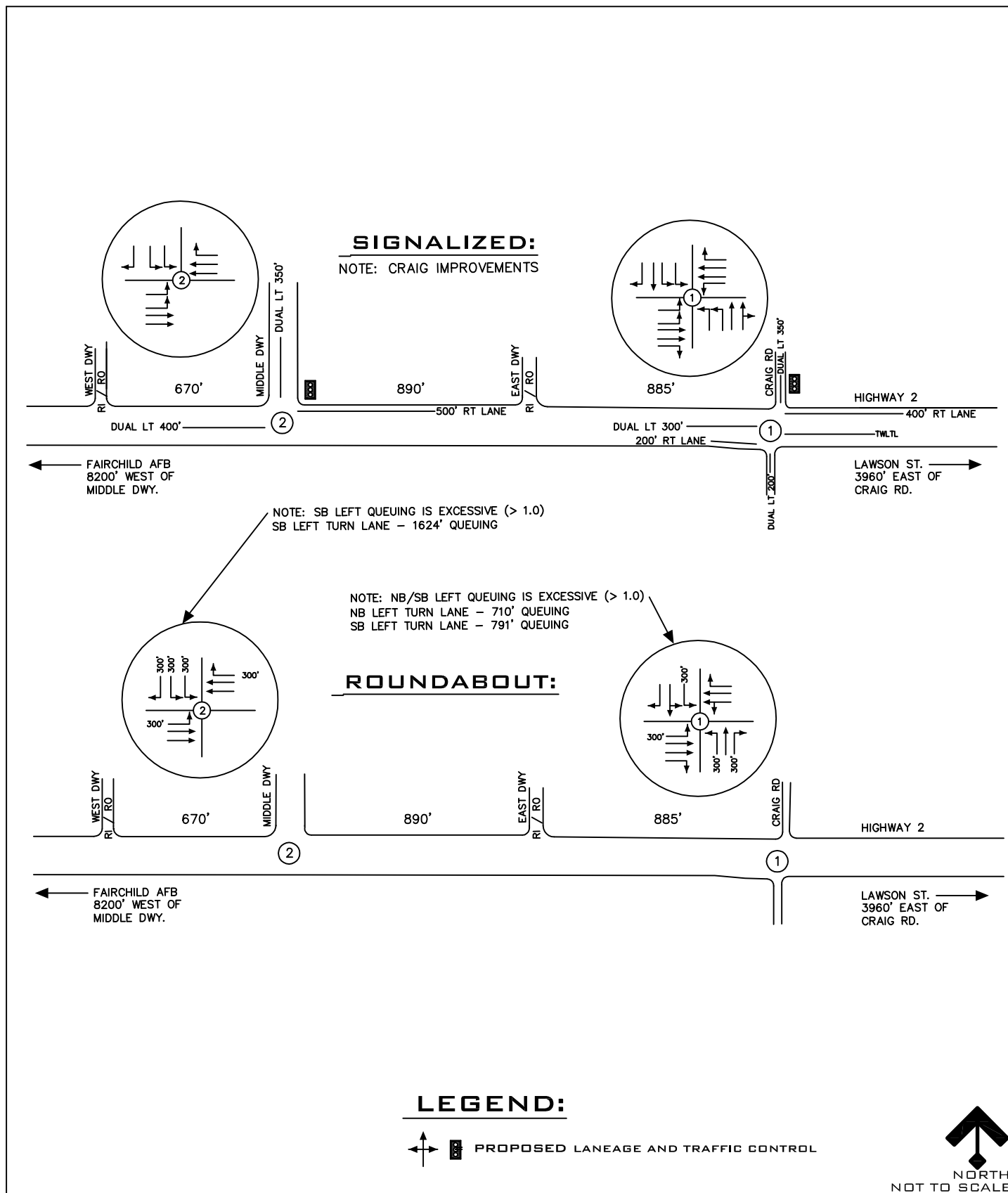


- Hwy 2 / Fairchild AFB: Modify signal timing. Add NB left turn lane and WB thru lane.
Project Proportional Share: 6.9%
Resulting LOS & Delay (sec): D/48.9

General Recommendations Applying to All Project Alternatives

Roadway frontage improvements and driveway approaches including curb & gutter and sidewalks or shared use pathways should be constructed along the site frontages and comply with current County, WSDOT and/or City of Airway Heights roadway standards. Said improvements should be constructed as adjacent areas of the subject site are developed.

The Spokane Tribe should work with the Spokane Transit Authority to identify opportunities (if any) to provide transit access near the project site. Furthermore, the Tribe should look to reduce vehicular trips to/from the site through employee trip reductions programs, employee shuttles and other similar means of achieving commute trip reduction.



Appendix A: Traffic Count Data
Appendix B: Pipeline Projects
Appendix C: Trip Generation/Internal Capture Worksheets
Appendix D: Project Trips
Appendix E: Synchro Worksheets
Appendix F: Sidra Analysis Worksheets
Appendix G: Signal Warrants

APPENDIX A

TRAFFIC COUNT DATA



PM PEAK HOURS

15 Minute Period Beginning @

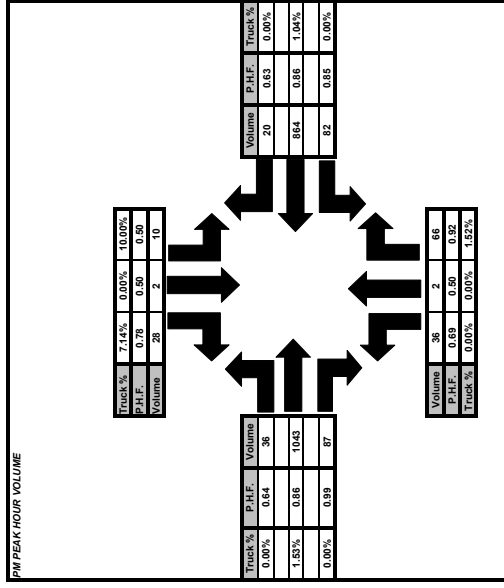
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Intersection Total One Hour Volumes	Pct Trucks
3,000	1986
3,151	2079
3,208	2106
3,320	2135
3,445	2213
3,541	2254
4,000	2254

Intersection	Total	Pct
One Hour Volumes	Trucks	
4:15	2220	0.866
4:30	2276	1.274
4:45	2133	1.219
5:00	1985	1.310

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	4.30			4.45			5.00			5.15			TOTAL	P.H.E.
		Pass	Trk	Pass	Trk	Pass	Trk	Pass	Trk	Pass	Trk				
Eastbound	Left	14	0	12	0	4	0	6	0	36	0	36	0.02857	0	
	Through	28	4	258	1	249	4	222	7	193	0.03431	193	0.03431	0	
	Right	0	0	0	0	0	0	0	0	0	0	0	0.00000	0	
	App. Total	42	334	4	261	1	275	4	230	0	119	0.02466	119	0.02466	0
	Pet Trucks	20	118	0	93	1	143	0	272	0	1372213	0	1372213	0	
Westbound	Left	20	0	18	0	24	0	20	0	32	0.05107	32	0.05107	0	
	Through	241	1	212	2	158	2	240	4	86	0.04646	86	0.04646	0	
	Right	3	0	8	0	5	0	4	0	23	0.026	23	0.026	0	
	App. Total	244	1	239	2	215	2	270	4	966	0.051387	966	0.051387	0	
	Pet Trucks	0.43	0	0.83	0	0.92	0	1.46	0	0.931867	0	0.931867	0		
Northbound	Left	9	0	10	0	13	0	4	0	36	0.02338	36	0.02338	0	
	Through	1	0	1	0	0	0	0	0	2	0.5	2	0.5	0	
	Right	17	1	14	0	0	0	17	0	65	0.916867	65	0.916867	0	
	App. Total	27	1	25	0	30	0	21	0	104	0.866867	104	0.866867	0	
	Pet Trucks	3.57	0	0.00	0	0.00	0	0.00	0	0.981538	0	0.981538	0		
Southbound	Left	2	0	2	0	1	0	4	1	10	0.5	10	0.5	0	
	Through	0	0	1	0	0	0	1	0	2	0.5	2	0.5	0	
	Right	6	0	6	0	7	0	7	2	28	0.77778	28	0.77778	0	
	App. Total	8	0	9	0	8	0	12	3	40	0.666867	40	0.666867	0	
	Pet Trucks	0.00	0	0.00	0	0.00	0	20.00	0	7.5	0	7.5	0		
Intersection Volume		603	6	563	3	528	6	553	14	2276	0.934319	2276	0.934319	0	
Intersection Pet Trucks		0.99	0	0.93	0	1.12	0	1.27	0	1.241058	0	1.241058	0	0	





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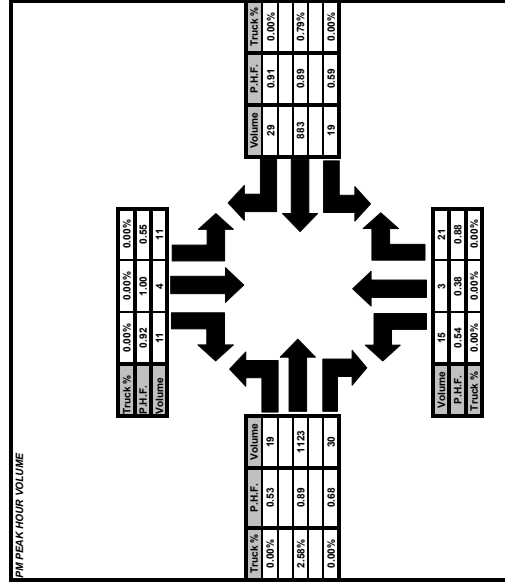
PM PEAK HOURS

Intersection Total One Hour Volumes	Pct Trucks
300	1806
315	1953
330	2043
345	2166
400	2166

Intersection	Total One Hour Volumes	Pct Trucks
4:15	2140	1.402
4:30	2099	1.048
4:45	1960	0.765
5:00	1838	0.490

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT				4.30				4.15				4.30				4.45				P.H.E.
	pass	htk	pass	htk	pass	htk	pass	htk	pass	htk	pass	htk	pass	htk	pass	htk	pass	htk			
Eastbound	Left	2	0	2	0	0	9	0	6	0	19	0.52778									
	Through	247	6	280	3	358	6	259	9	1123	0.84108										
	Right	11	0	9	0	3	0	7	0	3	0.061618										
	Appr. Total	260	6	291	3	360	6	272	9	1127	0.88773										
	Pct. Trucks	228	6	258	3	320	6	222	9	1124	0.8375										
Westbound	Left	8	0	3	0	4	0	4	0	16	0.0375										
	Through	245	2	200	2	262	1	229	2	893	0.83728										
	Right	16	0	6	0	1	0	1	0	23	0.04901										
	Appr. Total	261	2	211	2	273	1	240	2	932	0.84681										
	Pct. Trucks	7	0.76	2	0.34	3	0.47	3	0.33	7	0.75108										
Northbound	Left	2	0	3	0	0	0	2	0	5	0.55714										
	Through	2	0	1	0	0	0	0	0	3	0.375										
	Right	4	0	6	0	6	0	5	0	21	0.875										
	Appr. Total	13	0	10	0	9	0	7	0	39	0.76										
	Pct. Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
Southbound	Left	1	0	5	0	4	0	1	0	11	0.55										
	Through	1	0	1	0	1	0	1	0	4	1										
	Right	3	0	3	0	2	0	2	0	11	0.91667										
	Appr. Total	5	0	9	0	8	0	4	0	26	0.72222										
	Pct. Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										
Intersection Volume		539	14.6	8	921	10	549	7	923	11	2168										
Intersection Pct. Trucks		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00										



PROJECT: West Plains Development
JOB NO. SPTR0000001
INTERSECTION: US23/Jaxon Street

DATE OF COUNT: July 7, 2009

DAVID EVANS AND ASSOCIATES INC.
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TRAFFIC COUNT REDUCTION WORKSHEET

PM PEAK HOURS

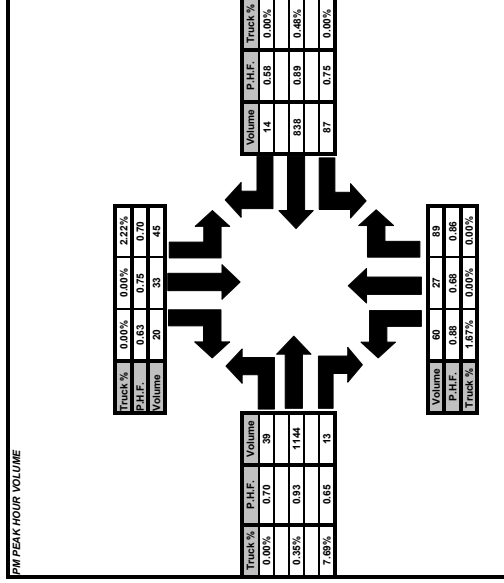
APPROACH	MOVEMENT	15 Minute Period Beginning @												Pct Trucks
		3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	
Eastbound	Left	6	0	4	0	6	0	7	0	14	0	8	0	4
	Through	178	2	215	5	246	6	246	0	261	0	217	2	190
	Right	2	0	6	0	3	1	2	0	3	0	4	0	8
	App. Total	186	2	226	5	255	7	255	0	278	0	229	2	211
Westbound	Left	17	0	19	0	19	0	27	0	14	0	23	0	18
	Through	169	2	166	0	150	4	162	3	220	2	222	0	185
	Right	8	0	9	0	5	0	5	0	4	0	5	0	7
	App. Total	194	2	194	0	174	4	214	3	236	2	241	1	208
Northbound	Left	6	0	8	1	14	0	5	0	16	0	12	0	15
	Through	7	0	17	0	17	0	15	0	20	0	19	0	18
	Right	22	0	28	1	41	0	27	0	41	0	44	1	30
	App. Total	35	0	50	1	72	0	47	0	67	0	75	1	53
Southbound	Left	8	0	9	0	14	0	6	0	6	0	11	0	13
	Through	9	0	4	0	8	0	9	0	5	0	8	0	7
	Right	5	0	7	0	5	0	7	0	3	0	4	0	3
	App. Total	22	0	20	0	27	0	22	0	16	0	23	0	18
Total Intersection Volume		424	4	408	6	495	11	518	3	570	2	607	4	471
Intersection Pct Trucks		0.93	1.27	2.16	0.88	0.36	0.52	0.31	0.66	0.21	0.54	1.28	0.63	

Intersection Total		Pct Trucks	
One Hour Volumes	1933	1242	0.43
3:00	1933	1242	0.43
3:15	2071	1059	0.43
3:30	2170	0.872	
3:45	2319	0.431	
4:00	2401	0.457	

Intersection Total		Pct Trucks	
One Hour Volumes	1933	1242	0.43
4:15	2264	0.43	
4:30	2366	0.43	
4:45	2124	0.65	
5:00	1987	0.64	

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	PM PEAK HOUR BREAKDOWN												TOTAL	P.H.F.
		4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45		
Eastbound	Left	14	0	6	0	14	0	5	0	39	0.66429				
	Through	261	0	307	1	288	2	284	2	1144	0.928571				
	Right	1	0	3	0	5	0	3	1	13	0.05				
	App. Total	276	0	316	1	307	3	292	3	1196	0.943216				
Westbound	Left	14	0	19	0	23	0	25	0	87	0.75				
	Through	220	2	169	1	235	0	210	1	838	0.891489				
	Right	1	0	4	0	3	0	6	0	14	0.05				
	App. Total	235	2	186	1	263	0	241	1	939	0.883333				
Northbound	Left	16	0	9	0	17	0	17	0	60	0.82385				
	Through	5	0	10	0	4	0	5	0	27	0.675				
	Right	20	0	25	0	26	0	18	0	89	0.855769				
	App. Total	41	0	44	1	47	0	43	0	176	0.83517				
Southbound	Left	6	0	11	0	15	1	12	0	45	0.703125				
	Through	9	0	5	0	8	0	11	0	33	0.75				
	Right	3	0	5	0	4	0	6	0	20	0.625				
	App. Total	18	0	21	0	27	1	31	0	98	0.790323				
Intersection Volume		570	2	573	3	643	2	607	4	2449	1.020408				
Intersection Pct Trucks		0.35	0.52	0.31	0.65	0.36	0.52	0.31	0.65	0.36	0.52				



PROJECT: West Plains Development
JOB NO: SPTR0000001
INTERSECTION: US2/Garfield Road
DATE OF COUNT: July 2, 2009

DAVID EVANS AND ASSOCIATES INC.
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Spokane, Wa 99021



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TRAFFIC COUNT REDUCTION WORKSHEET

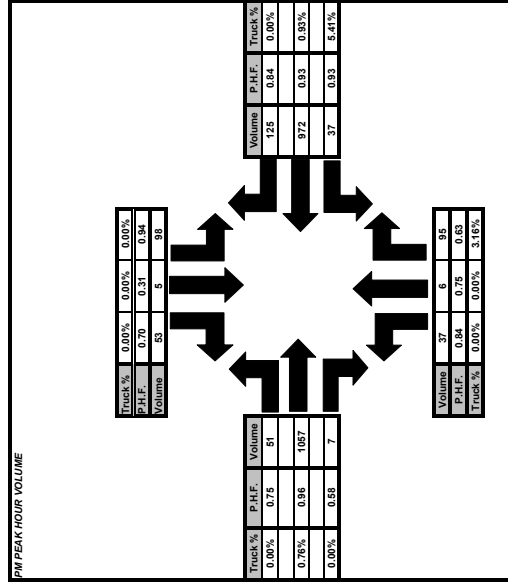
APPROACH	MOVEMENT	15 Minute Period Beginning @											
		3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45
Eastbound	Left	10	1	13	0	17	0	12	0	15	0	15	0
	Through	250	3	239	4	252	1	237	2	238	2	234	5
	Right	4	1	3	0	3	0	1	0	2	0	3	0
	App. Total	264	4	255	4	270	1	244	2	253	2	252	5
Westbound	Left	6	1	8	1	10	0	7	1	8	0	10	1
	Through	216	4	202	2	202	2	200	2	201	0	203	2
	Right	29	0	37	0	28	0	28	0	32	1	36	1
	App. Total	251	5	247	3	240	2	236	3	241	1	249	4
Northbound	Left	12	0	5	0	8	0	11	0	14	0	12	0
	Through	5	0	3	0	2	0	2	0	3	0	5	0
	Right	16	0	10	3	24	1	36	2	20	0	16	0
	App. Total	33	0	18	3	34	1	46	2	37	0	33	0
Southbound	Left	25	1	28	1	22	0	25	0	32	0	21	0
	Through	4	0	3	0	0	0	0	0	4	0	1	0
	Right	7	0	14	0	14	0	19	0	11	0	9	0
	App. Total	36	1	45	1	36	0	44	0	47	0	31	0
Total Intersection Volume		270	217	217	0.00	217	0.00	217	0.00	217	0.00	217	0.00
Intersection Pct Trucks		554	11	598	11	612	4	677	6	633	8	607	7
Intersection Pct Trucks		4.85	1.81	4.65	0.88	4.89	0.94	5.14	0.47	4.92	1.32	4.70	1.12

Intersection Total		Pct
One Hour Volumes		Trucks
3:00	2501	1.275
3:15	2511	1.075
3:30	2543	0.955
3:45	2540	0.944
4:00	2497	0.881

Intersection Total		Pct
One Hour Volumes		Trucks
4:15	2506	0.918
4:30	2475.075	1.010
4:45	2430	0.905
5:00	2326	1.075

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	PM PEAK HOUR BREAKDOWN											
		3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	5:55	6:05
Eastbound	Left	17	0	12	0	8	0	14	0	51	0	51	0
	Through	252	1	257	2	275	1	255	4	1057	428	1057	428
	Right	3	0	1	0	1	0	2	0	7	0	7	0
	App. Total	272	1	270	2	284	1	271	4	1115	432	1115	432
Westbound	Left	10	0	10	0	7	1	8	1	37	0	37	0
	Through	232	2	230	2	219	4	252	1	172	0	172	0
	Right	28	0	37	0	28	0	32	0	125	0	125	0
	App. Total	270	2	277	2	244	5	292	2	334	0	334	0
Northbound	Left	8	0	8	0	11	13	10	0	27	0	27	0
	Through	2	0	2	0	0	0	0	0	4	0	4	0
	Right	24	1	36	2	13	0	19	0	95	0	95	0
	App. Total	34	1	44	2	24	13	29	0	136	0	136	0
Southbound	Left	22	0	25	0	25	0	26	0	98	0	98	0
	Through	0	0	0	0	4	0	1	0	5	0	5	0
	Right	14	0	19	0	8	0	12	0	53	0	53	0
	App. Total	36	0	44	0	37	0	39	0	156	0	156	0
Total Intersection Volume		612	4	677	6	598	6	633	6	3450	6	3450	6
Intersection Pct Trucks		0.65	0.86	0.89	0.94	0.89	0.94	0.89	0.94	0.89	0.94	0.89	0.94





TRAFFIC COUNT REDUCTION WORKSHEET

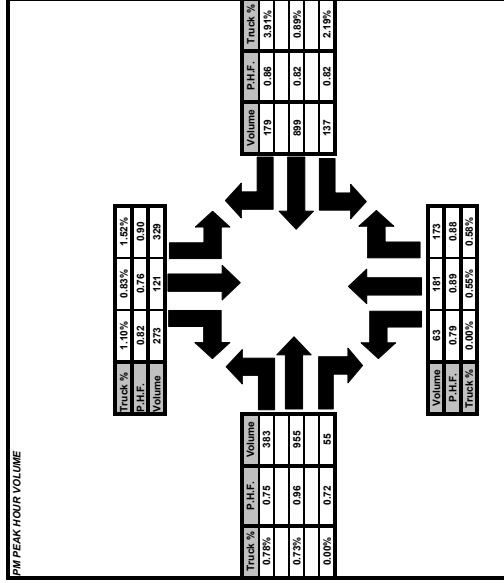
APPROACH	MOVEMENT	15 MINUTE PERIODS												PER HOUR													
		3:05 PM						3:45 PM						4:05 PM						4:45 PM							
		pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk	pass	tk		
Eastbound	Left	52	0	75	0	83	0	91	0	101	0	125	2	79	1	001	0	75	0	69	1	60	0	84	0		
	Through	164	2	164	3	224	0	204	4	237	3	228	2	247	1	239	1	234	3	61	3	166	3	153	3		
	Right	12	0	13	0	18	0	10	0	18	0	14	0	10	0	12	0	19	0	16	0	12	0	9	0		
	App. Total	228	2	252	4	325	0	305	4	356	3	367	4	336	2	352	1	328	3	286	4	237	3	226	3		
	Pet Trucks			0.87		1.06		2.90		1.26		0.84		1.08		0.06		0.26		0.01		1.38		1.22		1.31	
Westbound	Left	32	2	32	1	26	1	41	1	37	0	37	0	19	2	41	1	37	0	30	0	29	0	27	1		
	Through	162	3	156	3	210	2	119	1	152	2	186	1	269	4	239	0	197	3	213	0	211	0	195	0		
	Right	47	1	54	4	50	3	30	2	24	0	38	4	42	2	51	1	41	0	69	0	53	2	69	0		
	App. Total	241	6	241	8	286	6	190	2	213	2	261	1	330	6	331	2	275	3	312	0	293	2	291	1		
	Pet Trucks			2.25		3.21		2.06		3.0		0.33		1.8		0.27		0.65		1.02		0.09		0.62		0.34	
Northbound	Left	13	2	15	1	18	0	13	0	20	0	12	0	11	0	20	0	20	0	20	0	16	0	14	0		
	Through	38	0	33	0	39	0	36	0	42	0	42	0	48	0	51	0	38	1	52	0	57	0	44	0		
	Right	31	2	34	4	36	0	23	0	28	0	36	1	47	0	38	0	46	0	28	0	52	1	19	0		
	App. Total	80	4	82	5	91	0	72	0	90	0	92	1	106	0	109	0	109	1	90	0	125	1	77	0		
	Pet Trucks			4.76		5.75		0.00		0.00		1.08		0.00		0.00		0.02		0.00		0.78		0.00		0.00	
Southbound	Left	67	6	53	3	71	1	81	2	104	0	69	1	88	2	89	2	78	0	85	1	62	0	68	1		
	Through	25	1	26	0	21	0	25	2	32	2	25	0	31	0	39	1	25	0	32	0	22	0	26	0		
	Right	61	0	69	0	55	1	57	1	59	0	51	0	62	1	69	1	69	1	64	0	49	0	64	1		
	App. Total	153	7	148	3	147	2	163	3	196	2	145	1	201	3	197	4	171	1	162	1	132	0	166	2		
	Pet Trucks			4.38		1.96		1.34		2.83		1.01		0.65		1.47		0.85		0.85		0.61		0.00		1.27	
Total Intersection Value		722	15	723	20	849	18	730	17	855	7	863	1	973	13	988	7	862	9	850	5	787	2	765	6		
	Intersection Pet Trucks			2.56		2.68		2.08		1.72		1.25		1.32		1.33		0.70		0.90		0.56		0.78		0.79	
	Intersection Pet Trucks																										

Intersection Total One Hour Volumes	Pct Trucks
3:00	3094
3:15	3215
3:30	3348
3:45	3467
4:00	3720

Intersection	Total One Hour Volumes	Pct Trucks
4:15	3748	1.041
4:30	3731	0.885
4:45	3534	0.736
5:00	3204	0.759

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT			4:15		4:30		4:45		5:00		TOTAL	P.H.F.
	Pass	Ink	Subs	Ink	Subs	Ink	Subs	Ink	Subs	Ink	Subs		
Eastbound	Left	125	2	79	1	101	0	75	0	383	0.75937	0.37	
	Through	228	2	247	1	239	1	224	3	955	0.96202	0.35	
	Right	14	0	10	0	2	0	19	0	37	0.23604	0.25	
	Appx. Total	367	4	336	2	342	1	318	3	1275	0.98679	0.97	
	Pct Trucks	108		0.30		0.28		0.31		0.27625			
Westbound	Left	37	0	19	2	41	1	37	0	137	0.81546	0.81	
	Through	159	1	209	4	239	0	197	0	925	0.9535	0.37	
	Right	36	0	47	2	51	1	41	0	171	0.6505	0.37	
	Appx. Total	231	1	476	6	331	2	274	1	1233	0.88669	0.97	
	Pct Trucks	148		0.23		0.40		0.28		0.44813			
Northbound	Left	12	0	11	0	20	0	30	1	63	0.7875	0.83	
	Through	42	0	48	0	51	0	39	1	181	0.897205	0.81	
	Right	38	1	47	0	38	0	49	0	173	0.65203	0.49	
	Appx. Total	92	1	106	0	109	0	108	1	417	0.95642	0.97	
	Pct Trucks	138		0.00		0.00		0.32		0.479516			
Southbound	Left	69	1	88	2	89	2	78	0	303	0.903846	0.90	
	Through	25	0	31	0	39	1	25	0	121	0.7625	0.21	
	Right	51	0	82	1	69	1	68	1	273	0.622209	0.73	
	Appx. Total	145	1	201	3	197	4	171	1	723	0.880209	0.97	
	Pct Trucks	0.68		1.07		1.99		0.58		1.248413			
Intersection Volume													
Intersection Pct Trucks													
1.26													
0.94													
1.00458													
0.94703													



PROJECT: West Plains Development
JOB NO. SPTR0000001
INTERSECTION: Craig Road/Deno Road

DATE OF COUNT: July 2, 2009

DAVID EVANS AND ASSOCIATES INC.
908 N Howard St. #600
Spokane, Wa 99021



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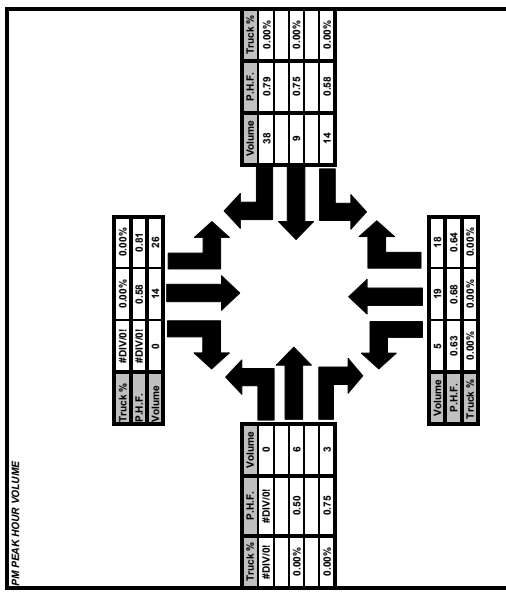
APPROACH		TRAFFIC COUNT REDUCTION WORKSHEET												PM PEAK HOURS																				
		15 Minute Period Beginning @																																
		3:00			3:15			3:30			3:45			4:00			4:15			4:30			4:45			5:00			5:15			5:30		
MOVEMENT	bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		bass	h/k		
		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1		0	1	0
Eastbound	Left	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	2	0	0	0	1	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	App. Total	2	0	0	0	2	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Pot Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	#DV/VI																																	
Westbound	Left	10	0	1	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	
	Through	2	0	1	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1		
	Right	5	1	7	0	11	0	7	0	5	0	9	0	9	0	9	0	9	0	9	0	9	0	9	0	6	0	6	0	6	0	12	0	
	App. Total	17	1	9	0	15	0	11	0	10	0	12	0	11	0	13	0	13	0	13	0	13	0	17	0	6	0	14	0	20	0	20	0	20
	Pot Trucks	5.95	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	6.00	0	
	#DV/VI																																	
Northbound	Left	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	7	0	2	0	2	0	6	0	7	0	3	0	1	0	3	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0	
	Right	7	0	5	0	1	0	4	0	9	0	9	0	7	0	7	0	7	0	5	0	5	0	5	0	4	0	2	0	7	0	7	0	
	App. Total	14	0	7	0	4	0	10	0	16	0	10	0	9	0	9	0	9	0	9	0	9	0	11	0	6	0	9	0	11	0	11	0	11
	Pot Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	#DV/VI																																	
Southbound	Left	7	0	3	0	5	0	4	0	5	0	5	0	5	0	4	0	4	0	4	0	4	0	6	0	8	0	8	0	4	0	4	0	
	Through	2	0	3	0	3	0	4	0	4	0	2	0	7	0	2	0	4	0	4	0	4	0	1	0	4	0	3	0	6	0	6	0	
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	App. Total	9	0	6	0	1	0	8	0	8	0	8	0	12	0	8	0	8	0	8	0	8	0	7	0	12	0	12	0	11	0	16	0	16
	Pot Trucks	0.00	0.00	14.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	#DV/VI																																	
Total Intersection Volume		42	1	22	1	25	0	30	0	33	0	30	0	37	0	37	0	32	0	32	0	37	0	6	0	37	0	37	0	41	0	41	0	41
Intersection Pot Trucks		2.33	0.00	4.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Intersection Total		Pot	
One Hour Volumes		Trucks	
3:00	125	1.00	0.00
3:15	115	0.875	0.00
3:30	120	0.00	0.00
3:45	120	0.00	0.00
4:00	131	0.00	0.00

Intersection Total		Pot	
One Hour Volumes		Trucks	
4:15	135	0.00	0.00
4:30	135	0.00	0.00
4:45	143	0.00	0.00
5:00	152	0.00	0.00

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	5:00		5:15		5:30		5:45		TOTAL		P.H.F.	
		bass	h/k	bass	h/k	bass	h/k	bass	h/k	bass	h/k	#DIV/0!	P.H.F.
Eastbound	Left	0	0	0	0	0	0	0	0	0	0	0	0
	Through	1	0	3	0	2	0	0	0	5	0	0.5	0.5
	Right	1	0	1	0	1	0	0	0	3	0	0.75	0.75
	App. Total	2	0	4	0	3	0	0	0	9	0	0.8625	0.8625
	Pot Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
Westbound	Left	4	0	1	0	3	0	0	0	8	0	0.983333	0.983333
	Through	1	0	3	0	3	0	2	0	9	0	0.75	0.75
	Right	12	0	6	0	5	0	12	0	35	0	0.791667	0.791667
	App. Total	17	0	10	0	11	0	20	0	52	0	0.725	0.725
	Pot Trucks	1	0.00	0	0.00	0	0.00	0	0.00	0	0	0	0
Northbound	Left	5	0	2	0	0	0	2	0	7	0	0.875	0.875
	Through	5	0	5	0	7	0	2	0	19	0	0.678571	0.678571
	Right	5	0	4	0	2	0	7	0	18	0	0.642857	0.642857
	App. Total	11	0	11	0	9	0	11	0	42	0	0.864545	0.864545
	Pot Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
Southbound	Left	6	0	6	0	8	0	4	0	26	0	0.8125	0.8125
	Through	1	0	4	0	3	0	6	0	14	0	0.893333	0.893333
	Right	0	0	0	0	0	0	0	0	0	0	0	0
	App. Total	7	0	12	0	11	0	10	0	40	0	0.833333	0.833333
	Pot Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
Intersection Volume		37	0	37	0	37	0	41	0	152	0	0.92625	0.92625
Intersection Pot Trucks		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0





DAVID EVANS
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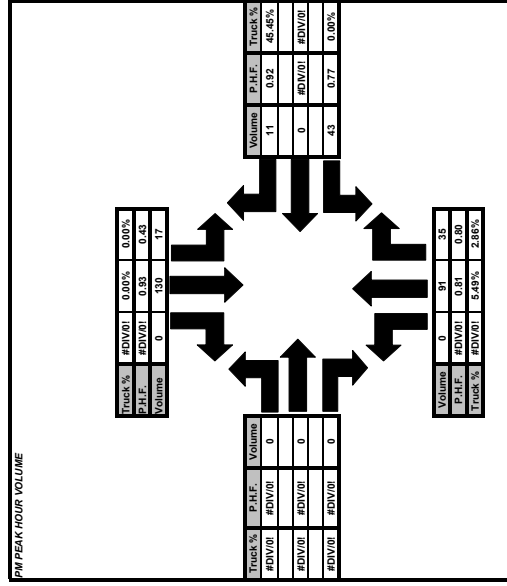
TRAFFIC COUNT REDUCTION WORKSHEET

Intersection Total One Hour Volumes	Pct Trucks
4,115	281
4,330	305
4,435	327
5,000	310
5,258	

Intersection	Total	Pct
One Hour Volumes		Trucks
4:15	281	4.81%
4:30	305	3.60%
4:45	327	3.36%
5:00	310	2.25%

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT				4-45		500		518		535		TOTAL	P.H.F.
	pass	hik	pass	hik	pass	hik	pass	hik	pass	hik	pass	hik		
Eastbound	Left	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	Through	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	Right	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	App. Total	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	Pct Trucks	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Westbound	Left	14	0	0	10	0	0	12	0	7	0	43	70.857	
	Through	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	Right	0	0	1	0	0	0	0	0	0	0	1	0.06667	
	App. Total	14	2	1	10	2	15	6	8	4	7	44	0.84375	
	Pct Trucks	12.50	0	0	10.38	0	0	0.00	0	10.00	0	2.252625		
Northbound	Left	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	Through	25	2	16	2	18	0	27	1	97	0.8125	97	0.8125	
	Right	11	0	4	0	11	0	8	1	35	0.5445	35	0.5445	
	App. Total	36	2	20	2	29	6	35	2	132	0.89847	132	0.89847	
	Pct Trucks	5.25	0	9.09	2	4.00	0	5.41	4.719505					
Southbound	Left	1	0	2	0	4	0	10	0	17	0.425	17	0.425	
	Through	32	0	35	0	31	0	32	0	130	0.95571	130	0.95571	
	Right	0	0	0	0	0	0	0	0	0	0	0	#DIV/0!	
	App. Total	33	0	37	0	35	6	42	0	147	0.875	147	0.875	
	Pct Trucks	0.00	0	0.00	0	0.00	0	0.00	0.00	0	0	0		
Intersection Volume		83	4	68	4	79	0	86	3	327	0.91853	327	0.91853	
Intersection Pct Trucks		4.60	0	5.96	0	3.37	0.00	3.37	0.00	3.37	0.00	3.37	0.00	



PROJECT: West Plains Development
JOB NO: SPTR0000001
INTERSECTION: Craig Road/Thorne Road East

DATE OF COUNT: July 2, 2009

DAVID EVANS AND ASSOCIATES INC.
908 N Howard St. #600
Spokane, Wa 99021



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TRAFFIC COUNT REDUCTION WORKSHEET

APPROACH	MOVEMENT	15 Minute Period Beginning @												PM PEAK HOURS																	
		3:00			3:15			3:30			3:45			4:00			4:15			4:30			4:45			5:00			5:15		
		pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k
Eastbound	Left	32	2	29	1	20	1	27	0	23	0	32	2	32	1	29	1	17	2	30	0	37	2	21	0	0	0	0	0	0	0
	Through	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	App. Total	32	2	30	1	20	1	27	0	23	0	32	2	32	1	29	1	17	2	30	0	37	2	21	0	0	0	0	0	0	0
Westbound	Pct Trucks		9.68		3.23		4.76		0.00		5.88		0.00		3.03		3.33		10.53		0.00		5.13		0.00		0.00		0.00		0.00
	Left	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Right	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Northbound	App. Total	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Pct Trucks		0.00		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		0		1		0.00		2		0.00		0		0		0		1		0.00
	Left	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Southbound	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Pct Trucks	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	Left	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Intersection Volume	Through	41	1	30	2	40	0	37	0	51	3	32	1	32	0	48	0	42	0	40	0	43	0	39	0	0	0	0	0	0	0
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	App. Total	41	1	30	2	40	0	37	0	51	3	32	1	32	0	48	0	42	0	40	0	43	0	39	0	0	0	0	0	0	0
	Pct Trucks		2.26		6.25		6.00		0.00		0.00		5.68		3.03		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Intersection Pct Trucks	Total Intersection Volume	74	3	60	3	61	1	64	3	74	3	64	3	64	3	65	1	77	1	61	3	70	0	80	2	61	0	0	0	0	0
	Intersection Pct Trucks	3.90		3.00		4.76		1.61		0.00		0.00		3.90		4.45		1.52		3.17		0.00		2.44		0.00		0.00		0.00	

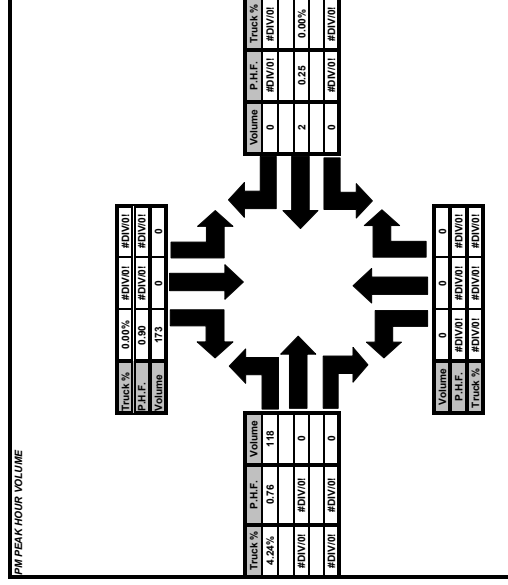
Intersection Total		Pct
One Hour Volumes		Trucks
4:15	274	2.55
4:30	271	1.44
4:45	253	1.70
5:00	276	1.45
5:15	268	2.78

Pct		Pct
One Hour Volumes		Trucks
3:00	265	2.52
3:15	266	2.52
3:30	270	2.53
3:45	274	2.55
4:00	268	2.78

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	4:45						5:00						5:15						5:30						TOTAL	P.H.F.
		pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k	pass	h/k	h/k					
Eastbound	Left	29	1	17	2	30	0	37	2	118	0	75641	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	App. Total	29	1	17	2	30	0	37	2	118	0	75641	0	0	0	0	0	0	0	0	0	0	0	0	0		
Westbound	Left	0	3.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	App. Total	0	3.33	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Northbound	Left	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Right	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Southbound	Left	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Through	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Right	48	0	42	0	40	0	43	0	173	0	91042	0	0	0	0	0	0	0	0	0	0	0	0	0		
	App. Total	48	0	42	0	40	0	43	0	173	0	91042	0	0	0	0	0	0	0	0	0	0	0	0	0		
Intersection Volume		77	1	61	2	70	0	80	2	293	0	883293	0	0	0	0	0	0	0	0	0	0	0	0	0		
Intersection Pct Trucks		1.28		3.17		0.00		2.44		0.00		0.00		0.83293		0.00		0.00		0.00		0.00		0.00		0.00	

PM PEAK HOUR VOLUME





DATE OF COUNT: July 2, 2009

Ph: (509) 327-8697
Fax: (509) 327-7345

TRAFFIC COUNT REDUCTION WORKSHEET

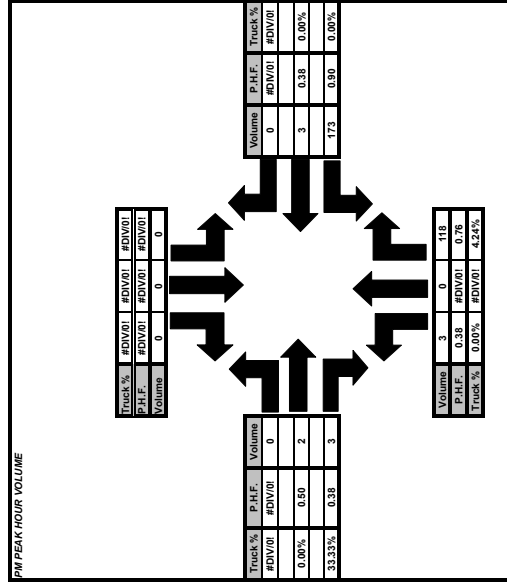
[illegible]

Intersection Total One Hour Volumes	Pct Trucks
3,000	245
3,115	244
3,266	243
3,320	274
3,445	281
3,523	283
3,613	283

Intersection	Total One Hour Volumes	Pct Trucks
4:15	279	3.226
4:30	283	2.120
4:45	302	1.987
5:00	291	1.718

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	4-65		500		515		535		TOTAL	P.H.F.
		pass	hit	pass	hit	pass	hit	pass	hit		
Eastbound	Left	0	0	0	0	0	0	0	0	#DIV/0!	
	Through	0	0	1	0	0	0	1	0	2	0.5
	Right	0	0	1	0	0	0	1	1	3	0.375
	App. Total	0	0	2	0	0	0	2	1	5	0.41667
	Pct Trucks	#DIV/0!	#DIV/0!	0.00	0.00	#DIV/0!	#DIV/0!	33.33	33.33	20	
Westbound	Left	48	0	42	0	40	0	43	0	173	0.01042
	Through	0	0	0	0	1	0	2	0	3	0.375
	Right	0	0	0	0	0	0	0	0	0	#DIV/0!
	App. Total	48	0	42	0	41	0	45	0	176	0.16667
	Pct Trucks	0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	3	0.375
Northbound	Left	0	0	0	0	0	0	0	0	0	#DIV/0!
	Through	0	0	0	0	0	0	0	0	0	#DIV/0!
	Right	29	1	17	2	39	0	37	2	119	0.5641
	App. Total	29	1	17	2	31	6	39	2	121	0.73805
	Pct Trucks	3.33	10.53	0.00	4.88	0.00	0.00	4.88	13.22333	4	
Southbound	Left	0	0	0	0	0	0	0	0	0	#DIV/0!
	Through	0	0	0	0	0	0	0	0	0	#DIV/0!
	Right	0	0	0	0	0	0	0	0	0	#DIV/0!
	App. Total	0	0	0	0	0	0	0	0	0	#DIV/0!
	Pct Trucks	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	
Intersection Volume	Left	77	1	61	2	72	0	66	3	302	0.88315
	Intersection Pct Trucks	1.28	3.17	0.00	0.33	0.00	0.00	0.33	1.00	1.96750	



PROJECT: DAVID EVANS and ASSOCIATES, INC.
 Project Location: Spokane County, WA
 INTERSECTION: CRAIG RD & HWY 902

DATE OF COUNT: SEPTEMBER 03, 2009

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	4:15 PM		4:30 PM		4:45 PM		5:00 PM		TOTAL	P.H.F.	Pct. Trucks
		pass	trk	pass	trk	pass	trk	pass	trk			
Eastbound	Left	13	0	11	0	16	0	10	0	50	0.78125	
	Through	85	1	75	1	58	1	63	0	284	0.825581	
	Right	0	0	4	0	3	0	2	0	9	0.5625	
	Total	98	1	90	1	77	1	75	0	343		
	App. Total		99		91		78		75			0.87463557
Westbound	Left	5	0	4	0	0	0	5	0	14	0.7	
	Through	55	0	74	0	70	0	85	0	284	0.835294	
	Right	6	0	6	0	5	0	5	0	22	0.916667	
	Total	66	0	84	0	75	0	95	0	320		
	App. Total		66		84		75		95			0
Northbound	Left	2	0	0	1	0	0	2	0	5	0.625	
	Through	7	0	16	0	9	0	15	0	47	0.734375	
	Right	3	0	0	0	0	0	2	0	5	0.416667	
	Total	12	0	16	1	9	0	19	0	57		
	App. Total		12		17		9		19			1.75438596
Southbound	Left	8	0	9	0	15	0	11	0	43	0.716667	
	Through	19	1	16	0	11	0	33	0	80	0.606061	
	Right	49	3	36	0	31	0	49	0	168	0.807692	
	Total	76	4	61	0	57	0	93	0	291		
	App. Total		80		61		57		93			1.37457045
Total Vehicle Volume		252	5	251	2	218	1	282	0	1011	0.896277	
Total Intersection Volume			257		253		219		282			0.79129575

PROJECT: DAVID EVANS and ASSOCIATES, INC.
 Project Location: Spokane County, WA
 INTERSECTION: FAIRCHILD AFB ENTRY & HWY 2

DATE OF COUNT: SEPTEMBER 03, 2009

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	4:30 PM		4:45 PM		5:00 PM		5:15 PM		TOTAL	P.H.F.	Pct. Trucks
		pass	trk	pass	trk	pass	trk	pass	trk			
Eastbound	Left									0	#DIV/0!	
	Through	79	3	28	1	60	5	167	5	348	0.505814	
	Right	19	0	3	0	17	0	10	0	49	0.644737	
	Total	98	3	31	1	77	5	177	5	397		
	App. Total		101		32		82		182			3.52644836
Westbound	Left	60	0	62	1	48	0	44	1	216	0.857143	
	Through	66	1	33	0	79	0	262	1	442	0.420152	
	Right									0	#DIV/0!	
	Total	126	1	95	1	127	0	306	2	658		
	App. Total		127		96		127		308			0.60790274
Northbound	Left	254	0	28	0	50	0	29	0	361	0.355315	
	Through									0	#DIV/0!	
	Right	234	0	155	2	151	1	101	1	645	0.689103	
	Total	488	0	183	2	201	1	130	1	1006		
	App. Total		488		185		202		131			0.39761431
Southbound	Left									0	#DIV/0!	
	Through									0	#DIV/0!	
	Right									0	#DIV/0!	
	Total	0	0	0	0	0	0	0	0	0		#DIV/0!
	App. Total		0		0		0		0			
Total Vehicle Volume		712	4	309	4	405	6	613	8	2061	0.719623	
Total Intersection Volume			716		313		411		621			1.06744299

PROJECT: DAVID EVANS and ASSOCIATES, INC
Project Location Spokane County
INTERSECTION: Hwy 2 & Spoko Fuel Driveway (Turning movements onl)
DATE OF COUNT: May 19, 2010

PM PEAK HOUR BREAKDOWN

APPROACH	MOVEMENT	3:15 PM		3:30 PM		3:45 PM		4:00 PM		TOTAL	P.H.F.	Pct. Trucks
		pass	lrk	pass	lrk	pass	lrk	pass	lrk			
Eastbound	Left	13	0	18	1	15	0	19	0	66	0.868421	
	Through									0	#VALUE!	
	Right									0	#DIV/0!	
	Total	13	0	18	1	15	0	19	0	66		
	App. Total		13		19		15		19			1.515152
Westbound	Left									0	#DIV/0!	
	Through									0	#DIV/0!	
	Right	48		46		39	0	45	1	179	0.932292	
	Total	48	0	46	0	39	0	45	1	179		
	App. Total		48		46		39		46			0.558659
Northbound	Left									0	#DIV/0!	
	Through									0	#DIV/0!	
	Right									0	#DIV/0!	
	Total	0	0	0	0	0	0	0	0	0		
	App. Total		0		0		0		0			#DIV/0!
Southbound	Left	30		25		33	1	22		111	0.816176	
	Through									0	#DIV/0!	
	Right	37	0	35	0	28	0	32	0	132	0.891892	
	Total	67	0	60	0	61	1	54	0	243		
	App. Total		67		60		62		54			0.411523
Total Vehicle Volume		128	0	124	1	115	1	118	1	488	0.953125	
Total Intersection Volume			128				116		119			0.614754

APPENDIX B PIPELINE PROJECTS

Pipeline (Year 2012)

Int. #	INTERSECTION	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND		
		LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT
1	Highway 2 and Craig Road	51	51	0	0	43	70	0	0	0	51	0	37
2	Highway 2 and Lundstrom Street	5	91	0	0	115	0	0	0	0	0	0	4
3	Highway 2 and Lawson Street	5	85	0	0	45	9	0	4	0	11	1	5
4	Highway 2 and Garfield Street	0	96	0	0	121	13	0	3	0	15	3	0
5	Highway 2 and Hayford Road	23	75	9	0	122	15	2	10	0	15	7	10
6	Craig Road and Deno Road	0	0	0	0	0	0	0	1	0	0	1	0
7	Craig Road and McFarlane Road	0	0	0	0	0	0	0	0	0	0	0	0
8	Craig Road and Thorpe (East)	0	0	0	0	0	0	0	0	0	0	0	0
9	Craig Road and Thorpe (West)	0	0	0	0	0	0	0	0	0	0	0	0
10	SR-902 and Craig Road	0	0	0	0	0	0	0	0	0	0	0	0
11	Highway 2 and Fairchild AFB	0	42	0	49	31	0	0	0	59	0	0	0
12	Highway 2 and West Access	0	102	0	0	80	0	0	0	0	0	0	0
13	Highway 2 and Middle Access	0	102	0	0	80	0	0	0	0	0	0	0
14	Highway 2 and East Access	0	102	0	0	80	0	0	0	0	0	0	0
15	Craig Road and North Access	0	0	0	0	0	0	0	105	0	0	79	0
16	Craig Road and Middle Access	0	0	0	0	0	0	0	112	0	0	83	0
17	Craig Road and South Access	0	0	0	0	0	0	0	112	0	0	86	0
18	Craig Road and 6th Avenue (Future)	0	0	0	30	0	0	0	64	41	0	49	0

Assumes pipeline project traffic volume throughout year 2012

Source: David Evans and Associates

Existing Traffic Volumes + Pipeline (Year 2012)
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100
4200
4300
4400
4500
4600
4700
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7400
7500
7600
7700
7800
7900
8000
8100
8200
8300
8400
8500
8600
8700
8800
8900
9000
9100
9200
9300
9400
9500
9600
9700
9800
9900
10000

Year 2012 Existing + Pipeline Projects

Pipeline (Year 2015)

Int. #	INTERSECTION	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND		
		LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT
1	Highway 2 and Craig Road	100	139	0	4	104	137	0	0	7	100	0	73
2	Highway 2 and Lundstrom Street	8	226	0	0	251	0	0	0	0	0	0	6
3	Highway 2 and Lawson Street	8	217	0	6	112	14	0	7	5	19	2	9
4	Highway 2 and Garfield Street	58	183	0	1	234	60	0	10	2	44	7	32
5	Highway 2 and Hayford Road	39	167	24	0	255	15	8	11	0	15	8	24
6	Craig Road and Deno Road	0	0	0	0	0	0	0	1	0	0	1	0
7	Craig Road and McFarlane Road	0	0	0	0	0	0	0	7	0	0	4	0
8	Craig Road and Thorpe (East)	7	0	0	0	0	0	0	0	0	0	0	4
9	Craig Road and Thorpe (West)	0	0	0	4	0	0	0	0	7	0	0	0
10	SR-902 and Craig Road	2	0	0	0	0	2	0	2	0	1	1	1
11	Highway 2 and Fairchild AFB	0	89	0	107	70	0	0	0	150	0	0	0
12	Highway 2 and West Access	0	239	0	0	177	120	0	0	0	0	0	132
13	Highway 2 and Middle Access	106	239	0	0	177	59	0	0	0	111	0	0
14	Highway 2 and East Access	0	239	0	0	177	0	0	0	0	0	0	0
15	Craig Road and North Access	0	0	0	0	0	0	0	207	0	0	156	0
16	Craig Road and Middle Access	0	0	0	0	0	0	0	221	0	0	164	0
17	Craig Road and South Access	0	0	0	0	0	0	0	221	0	0	171	0
18	Craig Road and 6th Avenue (Future)	0	0	0	59	0	0	0	127	80	0	97	0

Assumes pipeline project traffic volume throughout year 2015

Source: David Evans and Associates

Pipeline (Year 2019)

Int. #	INTERSECTION	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND		
		LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT
1	Highway 2 and Craig Road	249	234	0	5	169	337	0	0	9	245	0	182
2	Highway 2 and Lundstrom Street	19	437	0	0	527	0	0	0	0	0	0	15
3	Highway 2 and Lawson Street	21	414	0	6	179	32	0	17	5	42	6	22
4	Highway 2 and Garfield Street	58	403	0	1	519	88	0	18	2	77	14	32
5	Highway 2 and Hayford Road	75	349	51	0	547	26	13	23	1	28	17	41
6	Craig Road and Deno Road	0	0	0	0	0	0	0	1	0	0	1	0
7	Craig Road and McFarlane Road	0	0	0	0	0	0	0	9	0	0	5	0
8	Craig Road and Thorpe (East)	9	0	0	0	0	0	0	0	0	0	0	5
9	Craig Road and Thorpe (West)	0	0	0	5	0	0	0	0	9	0	0	0
10	SR-902 and Craig Road	3	0	0	0	0	3	0	3	0	2	2	1
11	Highway 2 and Fairchild AFB	0	180	0	217	134	0	0	0	302	0	0	0
12	Highway 2 and West Access	0	483	0	0	351	0	0	0	0	0	0	0
13	Highway 2 and Middle Access	0	483	0	0	351	0	0	0	0	0	0	0
14	Highway 2 and East Access	0	483	0	0	351	0	0	0	0	0	0	0
15	Craig Road and North Access	0	0	0	0	0	0	0	515	0	0	386	0
16	Craig Road and Middle Access	0	0	0	0	0	0	0	550	0	0	406	0
17	Craig Road and South Access	0	0	0	0	0	0	0	550	0	0	425	0
18	Craig Road and 6th Avenue (Future)	0	0	0	146	0	0	0	316	199	0	240	0

Assumes pipeline project traffic volume throughout year 2019

Source: David Evans and Associates

APPENDIX C
TRIP GENERATION/INTERNAL
CAPTURE WORKSHEETS

TRIP GENERATION

LAND USE: Casino ALT1

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
JOURNAL - MAY 2002 - *Recalibration of Trip Gen Model for Las Vegas Hotels/Casinos*

PH 1	PH 2	PH 3			
1878	2468	3040			
			gaming positions		
			42 tables	9/per table	PH1
			52 tables	9/per table	PH2
			60 tables	9/per table	PH3

PH 1 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.794 * \ln(X) + 1.28$

	T =	1,427 VPH
ENTER: 52%		742 VPH
EXIT: 48%		685 VPH

PH 2 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.794 * \ln(X) + 1.28$

	T =	1,772 VPH
ENTER: 52%		922 VPH
EXIT: 48%		850 VPH

PH 3 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.794 * \ln(X) + 1.28$

	T =	2,091 VPH
ENTER: 52%		1088 VPH
EXIT: 48%		1003 VPH

TRIP GENERATION

LAND USE: SHOPPING CENTER

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
SHOPPING CENTER (820)

PH 1	PH 2	PH 2	PH 3
155.145	0	96.634	205.000 ksf

PH 1 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 0.67 * \ln(X) + 3.37$

	T =	854 VPD
ENTER: 49%		418 VPD
EXIT: 51%		436 VPD

PH X PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 0.67 * \ln(X) + 3.37$

	T =	#NUM! VPH
ENTER: 49%		#NUM! VPH
EXIT: 51%		#NUM! VPH

PH X PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 0.67 * \ln(X) + 3.37$

	T =	- VPH
ENTER: 49%		- VPH
EXIT: 51%		- VPH

PH 2 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 2.40(X) + 21.48$

	T =	253 VPH
ENTER: 44%		111 VPH
EXIT: 56%		142 VPH

Note: Specialty Retail Center (ITE Code:814)

PH 3 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 2.40(X) + 21.48$

	T =	513 VPH
ENTER: 44%		226 VPH
EXIT: 56%		287 VPH

Note: Specialty Retail Center (ITE Code:814)

TRIP GENERATION

LAND USE: MEDICAL-DENTAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
MEDICAL-DENTAL OFFICE BUILDING (720)

PH 1

41.633 **ksf**

PH I PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.88 * \ln(X) + 1.59$

	T =	131 VPH
ENTER: 27%		35 VPH
EXIT: 73%		96 VPH

TRIP GENERATION

LAND USE: Quality Sit-down Restaurant

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
Quality Sit-down Restaurant (931)

PH 1

9.208 ksf

Quality Sit-down Restaurant

PH 1 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Rate: T=7.49(X)

	T =	69 VPH
ENTER: 67%		46 VPH
EXIT: 33%		23 VPH

PH 2

18 ksf

Quality Sit-down Restaurant

PH 2 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Rate: T=7.49(X)

	T =	135 VPH
ENTER: 67%		90 VPH
EXIT: 33%		45 VPH

TRIP GENERATION

LAND USE: GENERAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
GENERAL OFFICE BUILDING (710)

PH 1

10.480 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

	T =	91 VPH
ENTER: 17%		15 VPH
EXIT: 83%		76 VPH

TRIP GENERATION

LAND USE: POLICE STATION - MULTNOMAH COUNTY

PH 1

14.036 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

	T =	19 VPH
ENTER: 57%		11 VPH
EXIT: 43%		8 VPH

TRIP GENERATION

LAND USE: Casino

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
JOURNAL - MAY 2002 - *Recalibration of Trip Gen Model for Las Vegas Hotels/Casinos*

**Buildout
1878**

**gaming positions
42 tables 9/per table**

PH 1 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.794 * \ln(X) + 1.28$

	T =	1,427 VPH
ENTER: 52%		742 VPH
EXIT: 48%		685 VPH

TRIP GENERATION

LAND USE: SHOPPING CENTER

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
SHOPPING CENTER (820)

Buildout

155.145 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 0.67 * \ln(X) + 3.37$

	T =	854 VPD
ENTER: 49%		418 VPD
EXIT: 51%		436 VPD

TRIP GENERATION

LAND USE: MEDICAL-DENTAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
MEDICAL-DENTAL OFFICE BUILDING (720)

Buildout

41.633 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.88 * \ln(X) + 1.59$

	T =	131 VPH
ENTER: 27%		35 VPH
EXIT: 73%		96 VPH

TRIP GENERATION

LAND USE: Quality Sit-down Restaurant

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
Quality Sit-down Restaurant (931)

Buildout

9.208 ksf

Quality Sit-down Restaurant

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Rate: T=7.49(X)

	T =	69 VPH
ENTER: 67%		46 VPH
EXIT: 33%		23 VPH

TRIP GENERATION

LAND USE: GENERAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
GENERAL OFFICE BUILDING (710)

Buildout

10.480 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

	T =	91 VPH
ENTER: 17%		15 VPH
EXIT: 83%		76 VPH

TRIP GENERATION

LAND USE: POLICE STATION - MULTNOMAH COUNTY

Buildout
14.036 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

	T =	19 VPH
ENTER: 57%		11 VPH
EXIT: 43%		8 VPH

TRIP GENERATION

LAND USE: HOTEL

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
HOTEL LU

Buildout

300

Hotel

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $LN(T) = 1.20 LN(X) - 1.55$

	T =	199 VPH
ENTER: 49%		98 VPH
EXIT: 51%		101 VPH

TRIP GENERATION

LAND USE: SHOPPING CENTER

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
SHOPPING CENTER (820)

Buildout

155.145 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 0.67 * \ln(X) + 3.37$

	T =	854 VPD
ENTER: 49%		418 VPD
EXIT: 51%		436 VPD

TRIP GENERATION

LAND USE: MEDICAL-DENTAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
MEDICAL-DENTAL OFFICE BUILDING (720)

Buildout

41.633 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $\ln(T) = 0.88 * \ln(X) + 1.59$

	T =	131 VPH
ENTER: 27%		35 VPH
EXIT: 73%		96 VPH

TRIP GENERATION

LAND USE: Quality Sit-down Restaurant

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
Quality Sit-down Restaurant (931)

Buildout

9.208 ksf

Quality Sit-down Restaurant

PH 2 PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Rate: T=7.49(X)

	T =	69 VPH
ENTER: 67%		46 VPH
EXIT: 33%		23 VPH

TRIP GENERATION

LAND USE: GENERAL OFFICE BUILDING

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
GENERAL OFFICE BUILDING (710)

Buildout

10.480 **ksf**

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

T = 91 VPH

ENTER: 17% **15 VPH**

EXIT: 83% **76 VPH**

TRIP GENERATION

LAND USE: POLICE STATION - MULTNOMAH COUNTY

Buildout

14.036 ksf

PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 1.12(X) + 78.81$

T = 19 VPH

ENTER: 57% **11 VPH**

EXIT: 43% **8 VPH**

TRIP GENERATION

LAND USE: Bowling Alley

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
Bowling Alley LU

45.02 ksf

Bowling Alley

BUILDOUT PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 3.54(X)$

	T =	159 VPH
ENTER: 35%		56 VPH
EXIT: 65%		103 VPH

LAND USE: Multipurpose Recreational Facility

TRIP GENERATION CALCULATIONS ARE BASED ON THE ITE
TRIP GENERATION, 8TH EDITION. THE ITE LAND USE CODE IS
(LU) ITE-435

55.85 ksf

Multipurpose Recreational Facility

BUILDOUT PM PEAK HOUR (ONE HOUR BETWEEN 4 AND 6 PM)

Equation: $T = 3.58(X)$

	T =	200 VPH
ENTER: 55%		110 VPH
EXIT: 45%		90 VPH

ITE Multi-Use Project Internal Capture Worksheet
(ITE, Chapter 7, Trip Generation Handbook)

Analysis Period: PM Peak
Analyst: cak
Date: 2/7/10

Project Number: ALT 1 - PH1
Project Name: Spokane Tribe - West Plains
Scenario: PM Peak Hour

Land Use: Shopping Center

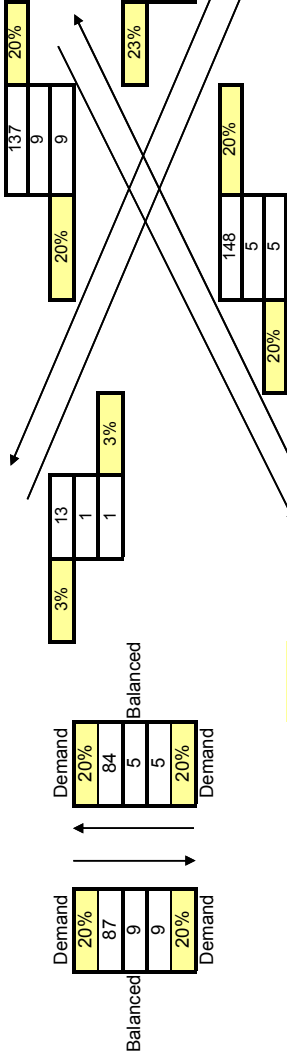
ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	418	110	308
Exit	436	97	339
Total	854	208	646
%	100%	24%	76%

ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	742	114	628
Exit	685	94	591
Total	1,427	208	1,219
%	100%	15%	85%

Land Use B: Casino

ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	742	114	628
Exit	685	94	591
Total	1,427	208	1,219
%	100%	15%	85%

Enter from External	628
Exit to External	591



Land Use C: Restaurant

ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	46	19	27
Exit	23	10	13
Total	69	29	40
%	100%	42%	58%

ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	35	3	32
Exit	96	45	51
Total	131	48	83
%	100%	37%	63%

Land Use D: Office

ITE LUC:			
Size: 1542 gaming positions			
	Total	Internal	External
Enter	35	3	32
Exit	96	45	51
Total	131	48	83
%	100%	37%	63%

Enter from External	32
Exit to External	51

Net External Trips for Multi-Use Development

Net External Trips for Multi-Use Development					
Land Use					
	A	B	C	D	Total
Enter	308	628	27	32	995
Exit	339	591	13	51	994
Total	646	1,219	40	83	1,988
Single Use Trip	854	1,427	69	131	2,481
Internal Capture					20%

ITE Multi-Use Project Internal Capture Worksheet
(ITE, Chapter 7, Trip Generation Handbook)

Analysis Period: PM Peak
Analyst: cak
Date: 2/7/11

Project Number: ALT 1 - PH2
Project Name: Spokane Tribe - West Plains
Scenario: PM Peak Hour

Land Use: Shopping Center/Specialty Retail

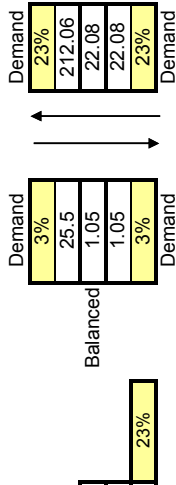
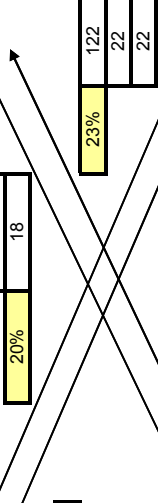
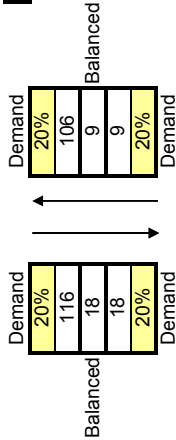
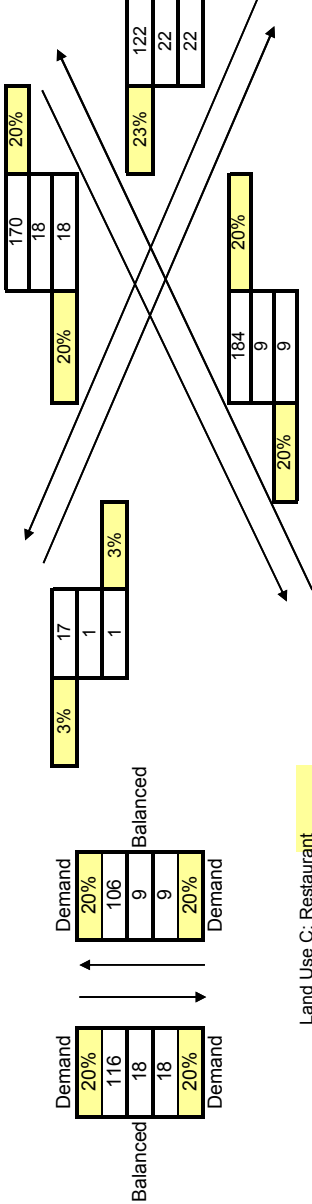
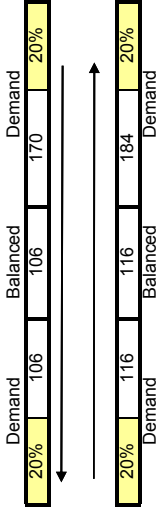
ITE LUC: Size: 2052 gaming positions

	Total	Internal	External
Enter	529	137	392
Exit	578	135	443
Total	1,107	272	835
%	100%	25%	75%

Land Use B: Casino

ITE LUC: Size: 2052 gaming positions

	Total	Internal	External
Enter	922	147	775
Exit	850	125	725
Total	1,772	272	1,500
%	100%	15%	85%



Land Use C: Restaurant

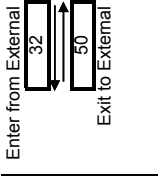
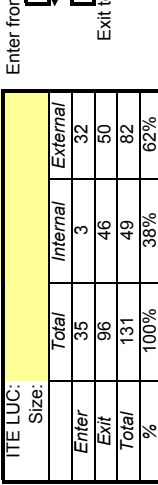
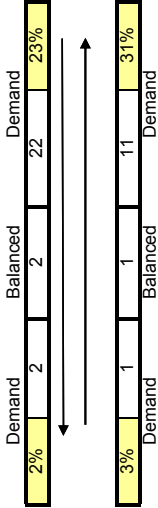
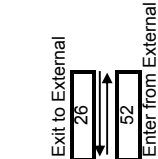
ITE LUC: Size: 2052 gaming positions

	Total	Internal	External
Enter	90	38	52
Exit	45	19	26
Total	135	57	78
%	100%	42%	58%

Land Use D: Office

ITE LUC: Size: 2052 gaming positions

	Total	Internal	External
Enter	35	3	32
Exit	96	46	50
Total	131	49	82
%	100%	38%	62%



Net External Trips for Multi-Use Development

	A	B	C	D	Total
Enter	392	775	52	32	1,251
Exit	443	725	26	50	1,244
Total	835	1,500	78	82	2,495
Single Use Trip	1,107	1,772	135	131	3,145

Internal Capture: 21%

ITE Multi-Use Project Internal Capture Worksheet
(ITE, Chapter 7, Trip Generation Handbook)

Analysis Period: PM Peak
Analyst: cak
Date: 2/7/11

Project Number: ALT 1 - PH3
Project Name: Spokane Tribe - West Plains
Scenario: PM Peak Hour

Land Use: Shopping Center/Specialty Retail

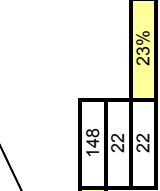
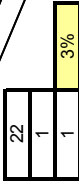
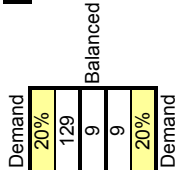
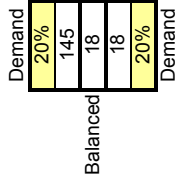
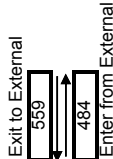
ITE LUC: Size: 2560 gaming positions

	Total	Internal	External
Enter	644	160	484
Exit	723	164	559
Total	1,367	324	1,043
%	100%	24%	76%

Land Use B: Casino

ITE LUC: Size: 2560 gaming positions

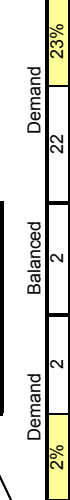
	Total	Internal	External
Enter	1,088	176	912
Exit	1,003	148	855
Total	2,091	324	1,767
%	100%	15%	85%



Land Use C: Restaurant

ITE LUC: Size:

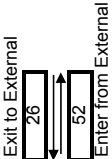
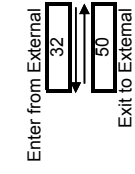
	Total	Internal	External
Enter	90	38	52
Exit	45	19	26
Total	135	57	78
%	100%	42%	58%



Land Use D: Office

ITE LUC: Size:

	Total	Internal	External
Enter	35	3	32
Exit	96	46	50
Total	131	49	82
%	100%	38%	62%



Net External Trips for Multi-Use Development

Land Use					Total
A	B	C	D		
Shopping	Casino	Restaurant	Office		
Enter	484	912	52	32	1,480
Exit	559	855	26	50	1,490
Total	1,043	1,767	78	82	2,970
Single Use Trip	1,367	2,091	135	131	3,724

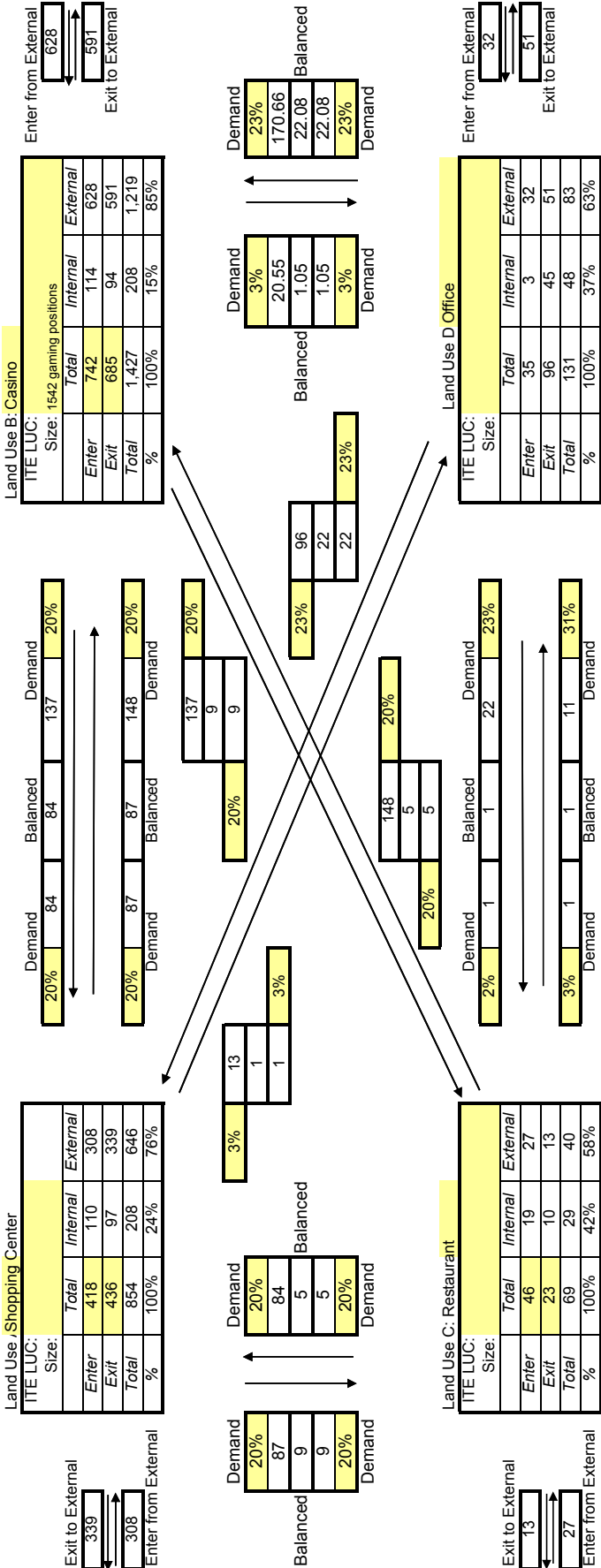
Internal Capture

20%

ITE Multi-Use Project Internal Capture Worksheet
(ITE, Chapter 7, Trip Generation Handbook)

Analysis Period: PM Peak
Analyst: cak
Date: 2/7/11

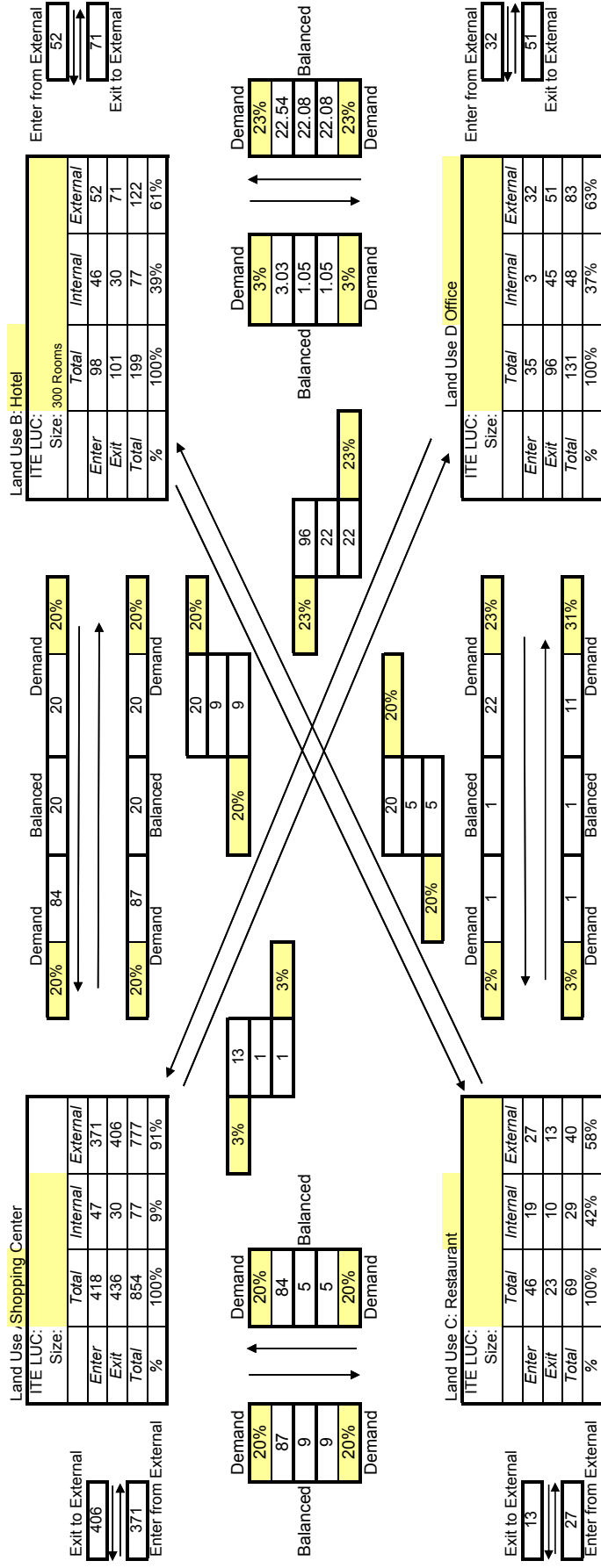
Project Number: ALT 2 - BUILDOUT
Project Name: Spokane Tribe - West Plains
Scenario: PM Peak Hour



Net External Trips for Multi-Use Development					
Land Use					
	A	B	C	D	Total
Enter	308	628	27	32	995
Exit	339	591	13	51	994
Total	646	1,219	40	83	1,988
Single Use Trip	854	1,427	69	131	2,481
Internal Capture					20%

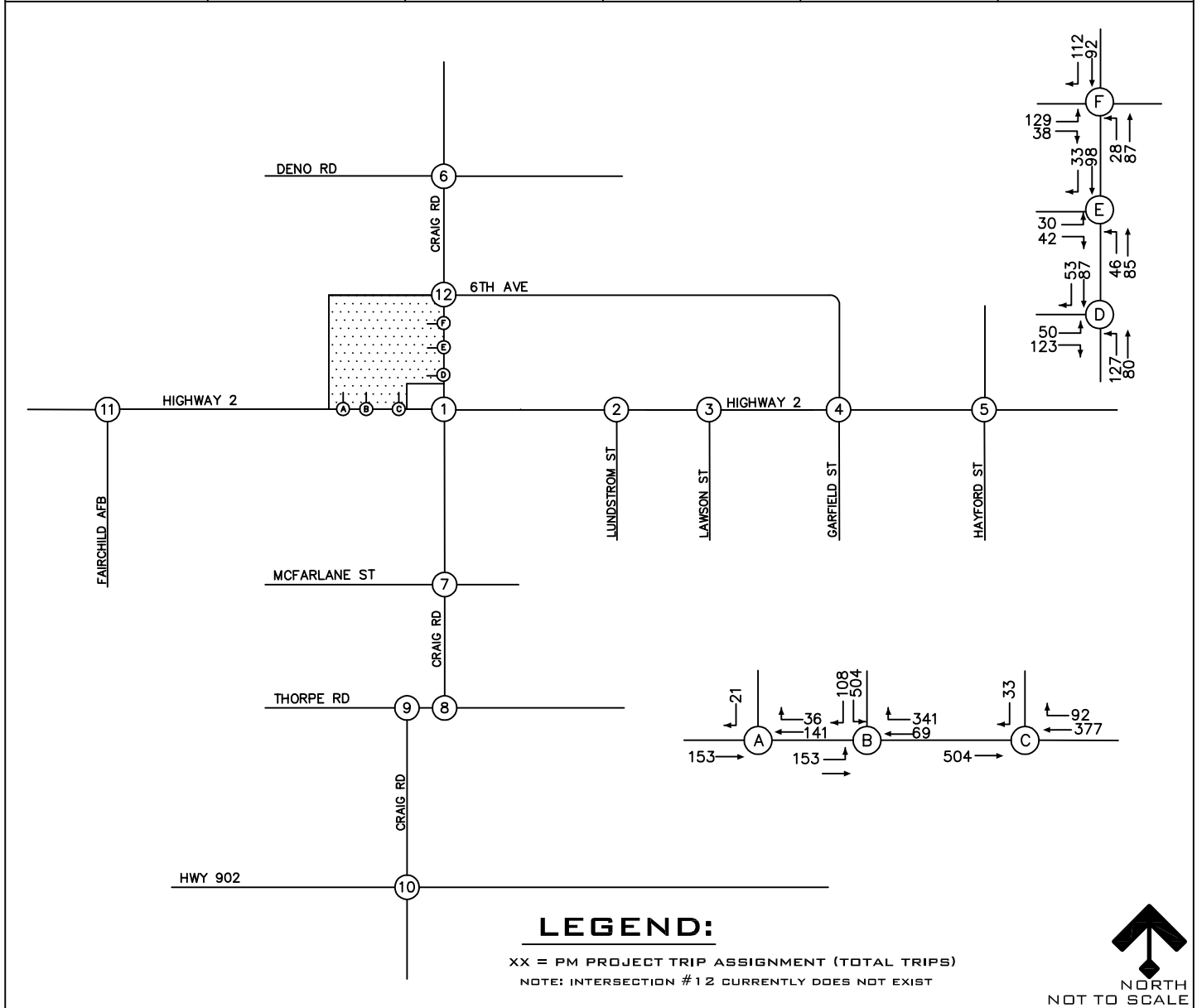
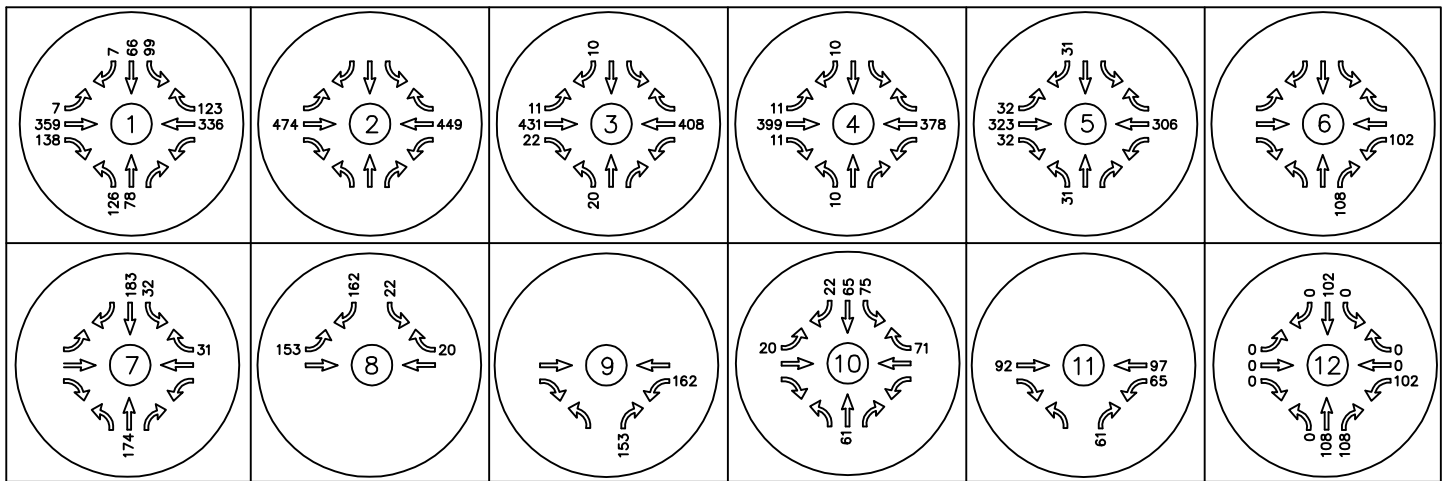
Analysis Period: PM Peak
Analyst: cak
Date: 1/10/10

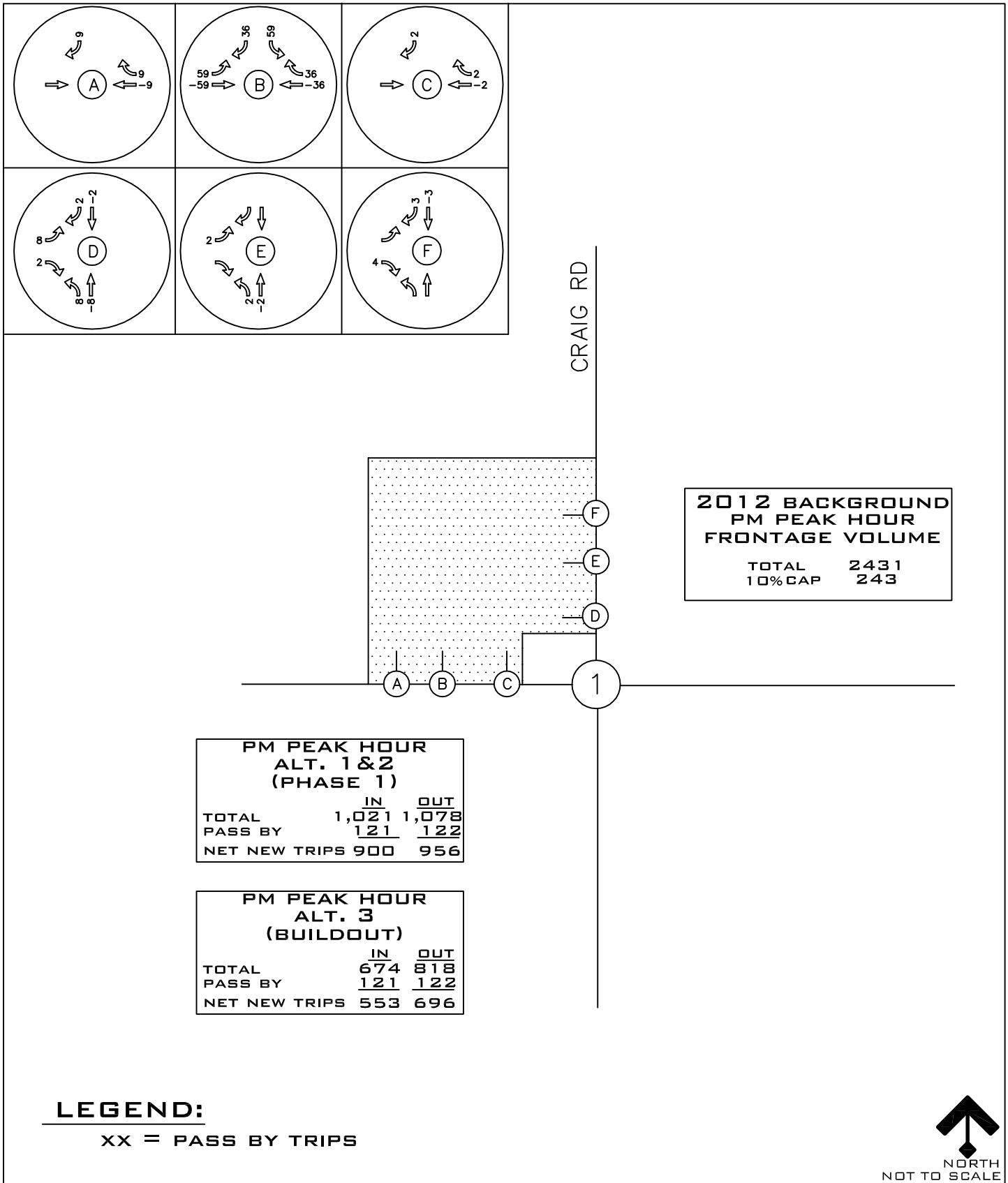
Project Number: ALT 3 - BUILDOUT
Project Name: Spokane Tribe - West Plains
Scenario: PM Peak Hour



Net External Trips for Multi-Use Development					
		Land Use			
		A	B	C	D
		Shopping	Casino	Restaurant	Office
	Enter	371	52	27	32
	Exit	406	71	13	51
	Total	777	122	40	83
	Single Use Trip	854	199	69	131
					1,253

APPENDIX D PROJECT TRIPS



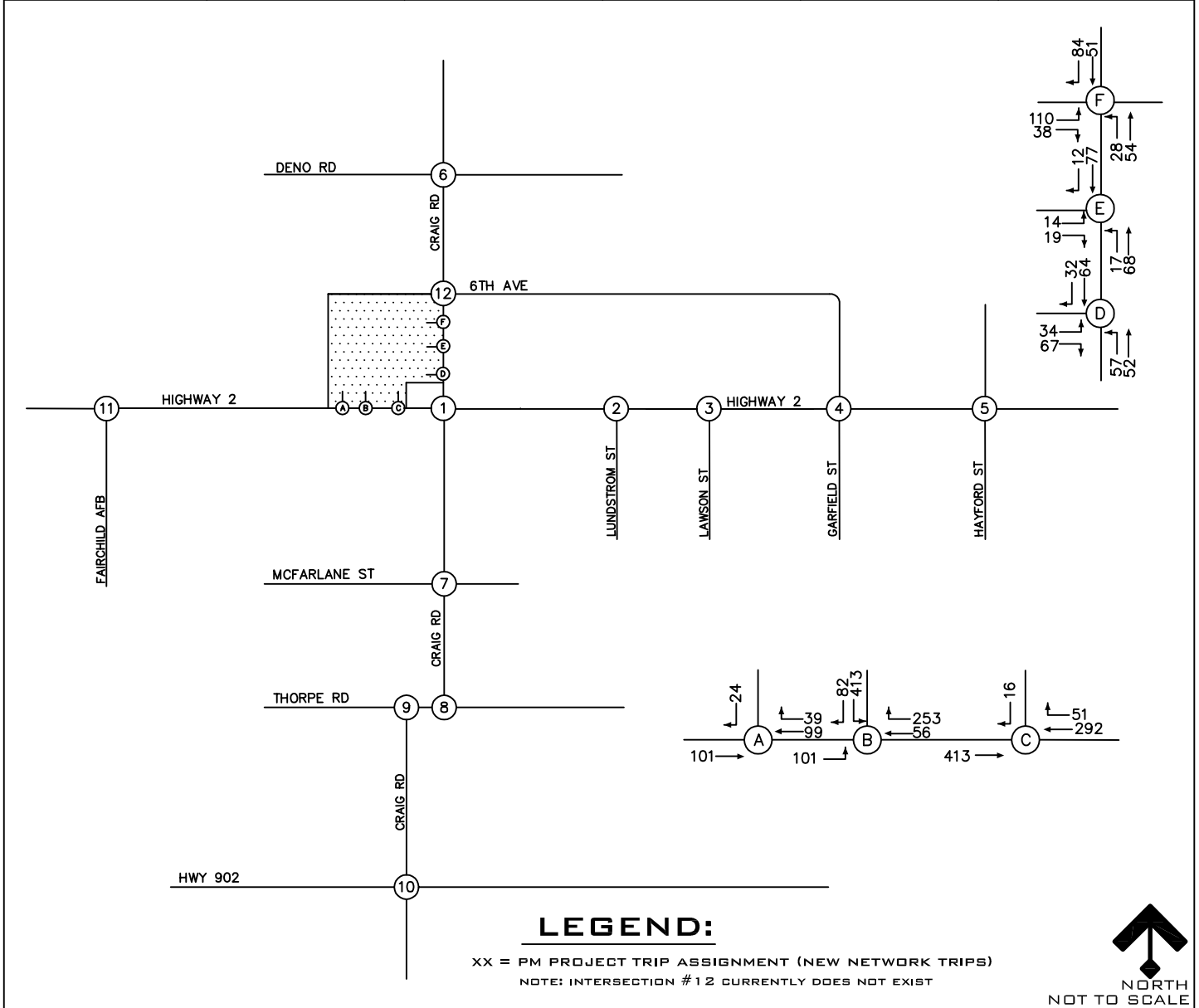
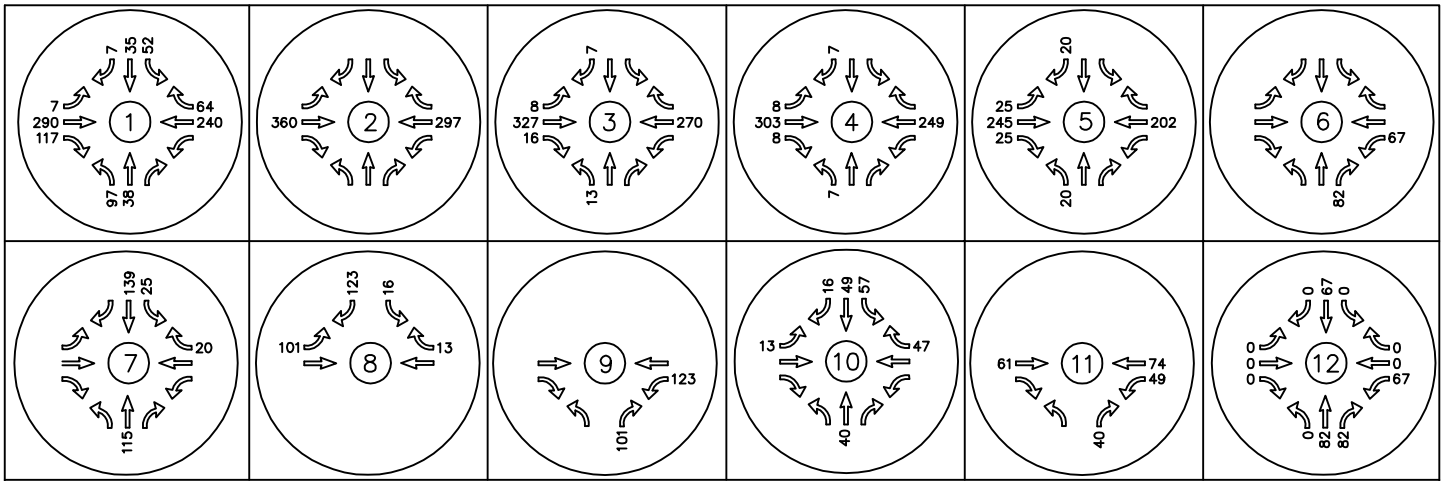


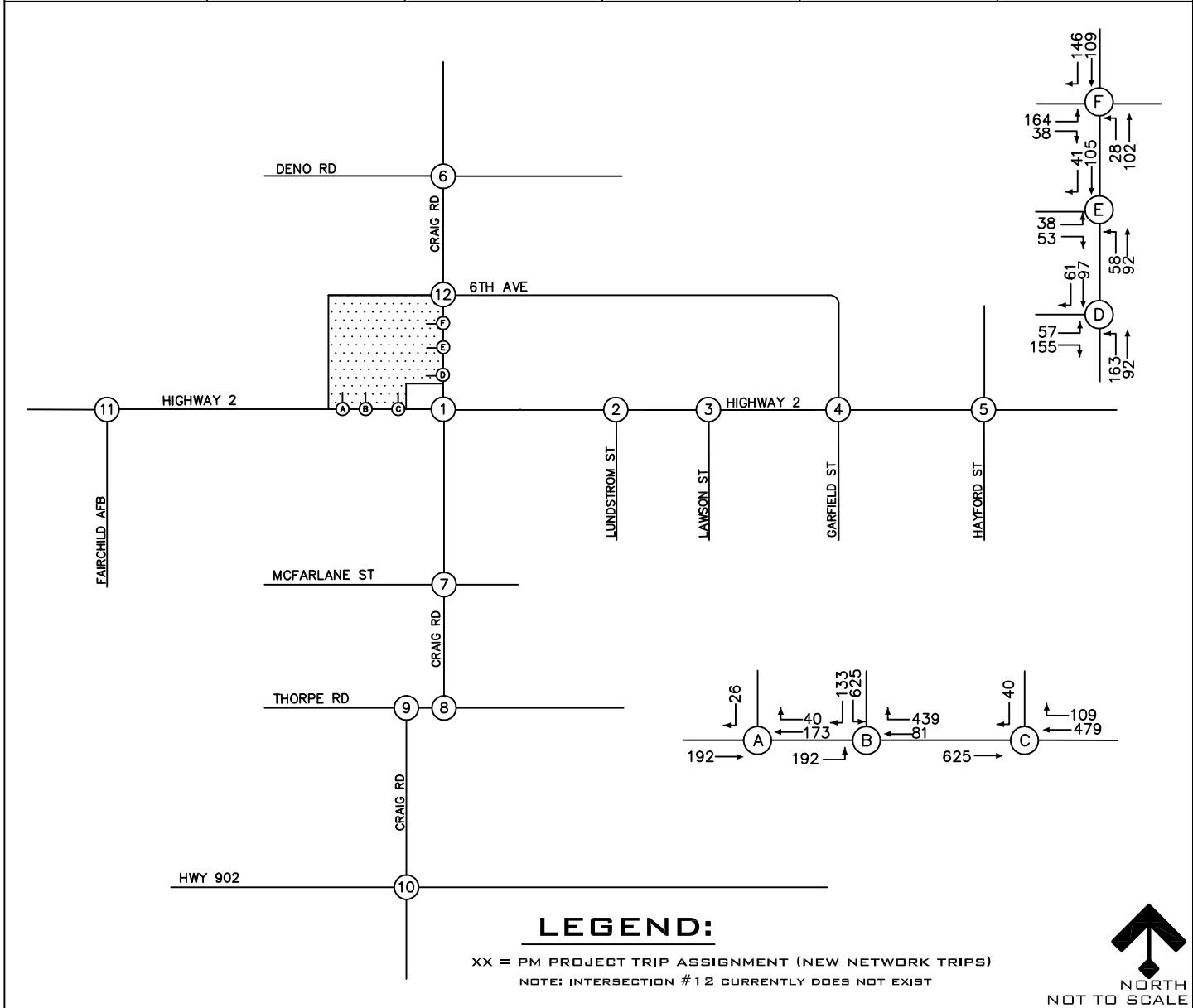
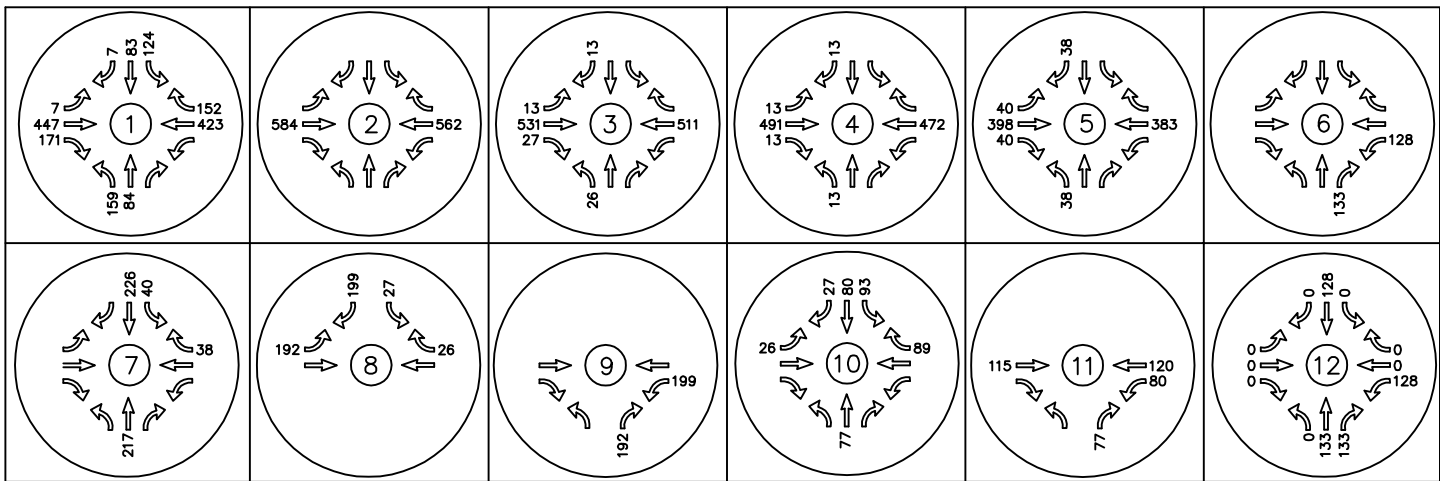
**DAVID EVANS
AND ASSOCIATES INC.**

908 N. Howard St # 300
Spokane, Wa 99021
Phone: 509.327.8697

**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**





**DAVID EVANS
AND ASSOCIATES INC.**

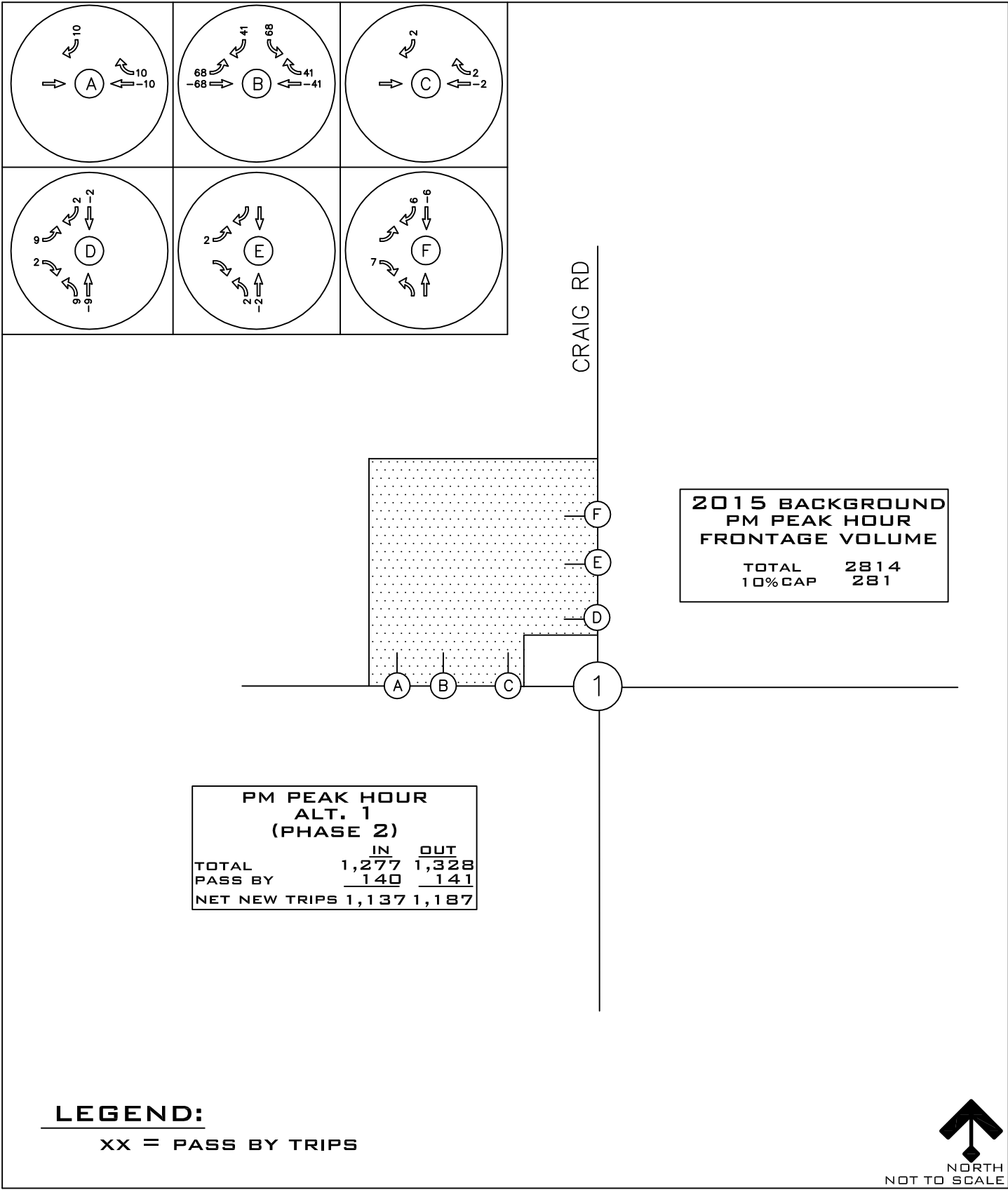
908 N. Howard St # 300
Spokane, Wa 99021
Phone: 509.327.8697

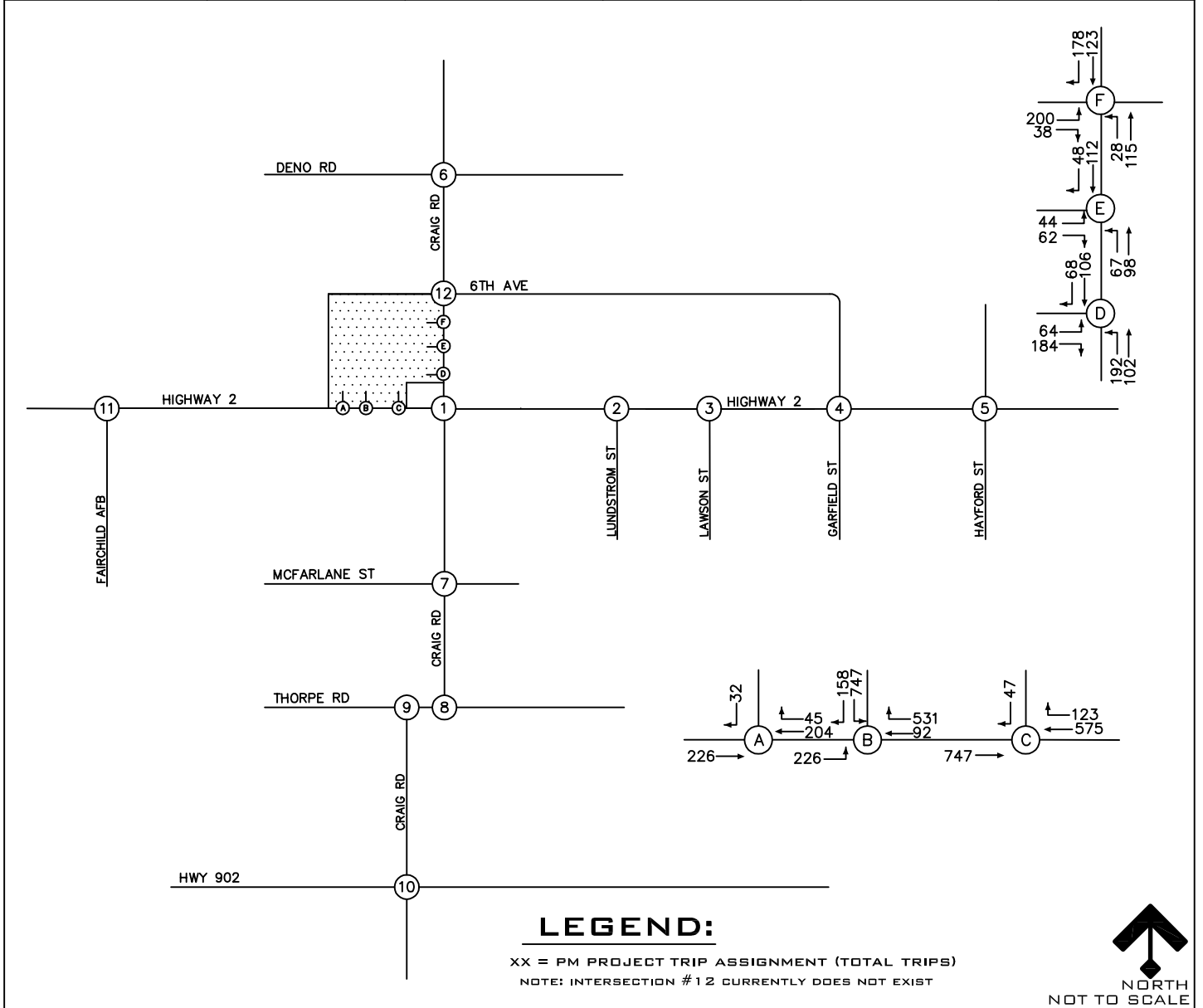
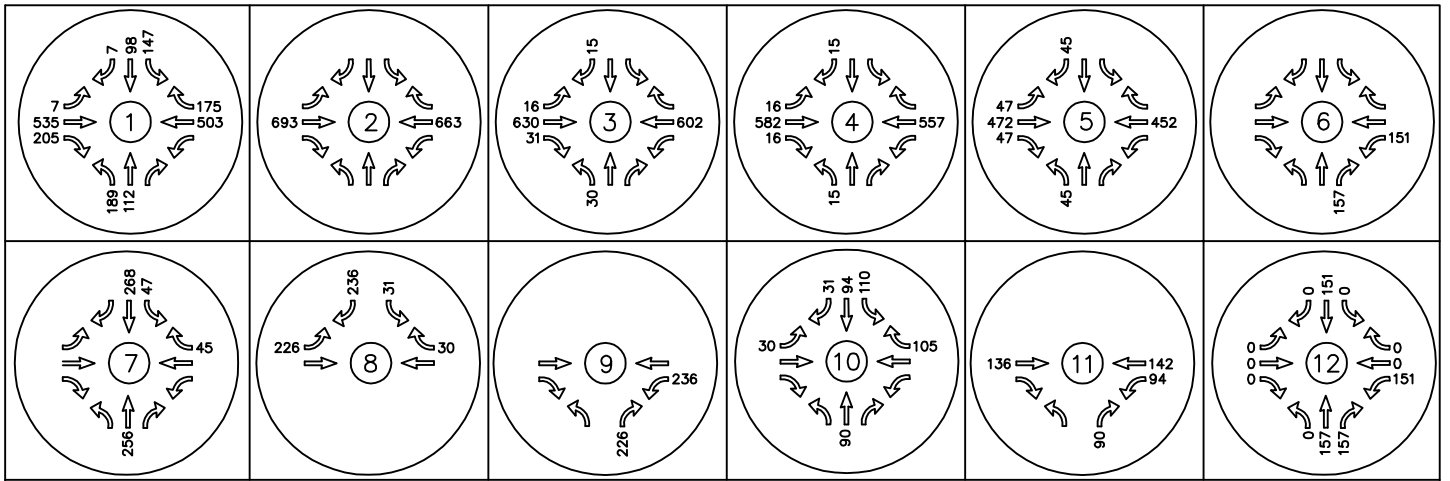
**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR00000001**

FIGURE D5

**PROJECT TRIP
ASSIGNMENT
ALT. 1 - PH 2**





**DAVID EVANS
AND ASSOCIATES INC.**

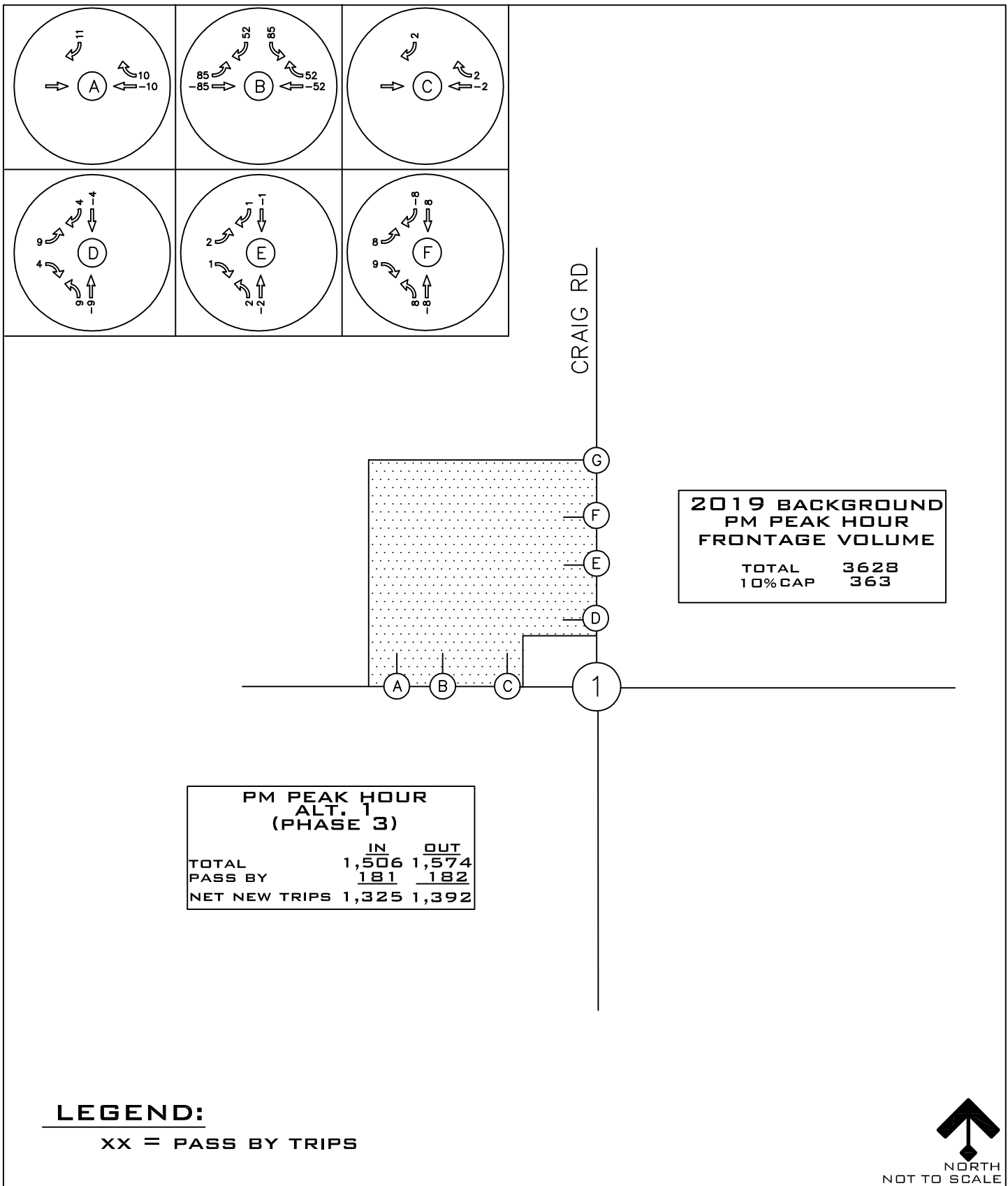
908 N. Howard St # 300
 Spokane, Wa 99021
 Phone: 509.327.8697

**WEST PLAINS DEVELOPMENT
CITY OF AIRWAY HEIGHTS, WA**

**TRAFFIC IMPACT ANALYSIS
PROJECT NO. SPTR000000001**

FIGURE D7

**PROJECT TRIP
ASSIGNMENT
ALT. 1 - PH 3**



APPENDIX E

SYNCHRO WORKSHEETS




















APPENDIX E1

EXISTING CONDITIONS

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	1043	87	82	864	20	36	2	66	10	2	28
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	39	1122	94	88	929	22	39	2	71	11	2	30
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL				TWLTL							
Median storage (veh)	2				2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	951			1215			1871	2326	561	1826	2409	475
vC1, stage 1 conf vol							1199	1199		1116	1116	
vC2, stage 2 conf vol							672	1127		710	1292	
vCu, unblocked vol	951			1215			1871	2326	561	1826	2409	475
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			85			75	99	85	93	98	94
cM capacity (veh/h)	724			575			156	152	474	144	115	538
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1			
Volume Total	39	561	561	94	88	619	331	112	43			
Volume Left	39	0	0	0	88	0	0	39	11			
Volume Right	0	0	0	94	0	0	22	71	30			
cSH	724	1700	1700	1700	575	1700	1700	271	288			
Volume to Capacity	0.05	0.33	0.33	0.06	0.15	0.36	0.19	0.41	0.15			
Queue Length 95th (ft)	4	0	0	0	13	0	0	48	13			
Control Delay (s)	10.2	0.0	0.0	0.0	12.4	0.0	0.0	27.3	19.7			
Lane LOS	B				B			D	C			
Approach Delay (s)	0.3				1.1			27.3	19.7			
Approach LOS								D	C			
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			52.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	1123	30	19	883	29	15	3	21	11	4	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	20	1158	31	20	910	30	15	3	22	11	4	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	940			1189			1720	2192	594	1606	2192	470
vC1, stage 1 conf vol							1212	1212		964	964	
vC2, stage 2 conf vol							508	979		641	1228	
vCu, unblocked vol	940			1189			1720	2192	594	1606	2192	470
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			97			91	98	95	95	98	98
cM capacity (veh/h)	725			589			176	191	453	221	184	545
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	20	772	417	20	607	333	40	27				
Volume Left	20	0	0	20	0	0	15	11				
Volume Right	0	0	31	0	0	30	22	11				
cSH	725	1700	1700	589	1700	1700	265	284				
Volume to Capacity	0.03	0.45	0.25	0.03	0.36	0.20	0.15	0.09				
Queue Length 95th (ft)	2	0	0	3	0	0	13	8				
Control Delay (s)	10.1	0.0	0.0	11.3	0.0	0.0	21.0	19.0				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.2			0.2			21.0	19.0				
Approach LOS							C	C				
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			42.0%			ICU Level of Service			A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St

1/24/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	1144	13	87	838	14	60	27	89	45	33	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3568		1787	3565			1818	1599		1828	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.75	1.00		0.79	1.00
Satd. Flow (perm)	1787	3568		1787	3565			1406	1599		1486	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	42	1230	14	94	901	15	65	29	96	48	35	22
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	61	0	0	16
Lane Group Flow (vph)	42	1244	0	94	915	0	0	94	35	0	83	6
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	4.2	44.7		11.1	51.6			12.9	12.9		12.9	12.9
Effective Green, g (s)	4.2	44.7		11.1	51.6			12.9	12.9		12.9	12.9
Actuated g/C Ratio	0.05	0.54		0.13	0.62			0.16	0.16		0.16	0.16
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	91	1929		240	2224			219	249		232	249
v/s Ratio Prot	0.02	c0.35		0.05	c0.26							
v/s Ratio Perm								c0.07	0.02		0.06	0.00
v/c Ratio	0.46	0.64		0.39	0.41			0.43	0.14		0.36	0.02
Uniform Delay, d1	38.2	13.4		32.7	7.9			31.6	30.1		31.2	29.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.7	0.8		1.1	0.1			1.4	0.3		0.9	0.0
Delay (s)	41.8	14.2		33.8	8.0			32.9	30.4		32.1	29.6
Level of Service	D	B		C	A			C	C		C	C
Approach Delay (s)		15.1			10.4			31.6			31.6	
Approach LOS		B			B			C			C	

Intersection Summary





















HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

1/24/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	1057	7	37	972	125	37	6	95	98	5	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.95	1.00
Satd. Flow (prot)	1787	3571		1787	3574	1599		1667			1813	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.89			0.62	1.00
Satd. Flow (perm)	1787	3571		1787	3574	1599		1505			1180	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	55	1137	8	40	1045	134	40	6	102	105	5	57
RTOR Reduction (vph)	0	0	0	0	0	66	0	65	0	0	0	45
Lane Group Flow (vph)	55	1145	0	40	1045	68	0	83	0	0	110	12
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	4.9	38.5		4.4	38.0	38.0		16.0			16.0	16.0
Effective Green, g (s)	4.9	38.5		4.4	38.0	38.0		16.0			16.0	16.0
Actuated g/C Ratio	0.07	0.51		0.06	0.51	0.51		0.21			0.21	0.21
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	117	1836		105	1813	811		321			252	345
v/s Ratio Prot	c0.03	c0.32		0.02	0.29							
v/s Ratio Perm						0.04		0.05			c0.09	0.01
v/c Ratio	0.47	0.62		0.38	0.58	0.08		0.26			0.44	0.04
Uniform Delay, d1	33.7	13.0		33.9	12.8	9.5		24.5			25.5	23.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	3.0	0.7		2.3	0.5	0.0		0.4			1.2	0.0
Delay (s)	36.7	13.7		36.2	13.3	9.5		24.9			26.8	23.4
Level of Service	D	B		D	B	A		C			C	C
Approach Delay (s)		14.7			13.6			24.9			25.6	
Approach LOS		B			B			C			C	

Intersection Summary























HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	10.5
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	955	55	137	899	179	63	181	173	329	121	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Flt Protected	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.90	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.51	1.00		0.24	1.00	
Satd. Flow (prot)	3467	3545		1787	3574	1599	1805	3346		3467	3203	
Satd. Flow (perm)	3467	3545		1787	3574	1599	963	3346		892	3203	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	407	1016	59	146	956	190	67	193	184	350	129	290
RTOR Reduction (vph)	0	2	0	0	0	128	0	105	0	0	219	0
Lane Group Flow (vph)	407	1073	0	146	956	62	67	272	0	350	200	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	20.4	42.3		16.0	37.9	37.9	24.0	17.2		40.8	28.5	
Effective Green, g (s)	20.4	42.3		16.0	37.9	37.9	24.0	17.2		40.8	28.5	
Actuated g/C Ratio	0.18	0.37		0.14	0.33	0.33	0.21	0.15		0.35	0.25	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	2.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	612	1297		247	1172	524	249	498		718	790	
v/s Ratio Prot	c0.12	c0.30		0.08	0.27		0.02	0.08		c0.08	0.06	
v/s Ratio Perm						0.04	0.04			c0.10		
v/c Ratio	0.67	0.83		0.59	0.82	0.12	0.27	0.55		0.49	0.25	
Uniform Delay, d1	44.4	33.3		46.7	35.6	27.2	37.7	45.6		27.7	35.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	4.4		3.8	4.3	0.0	0.6	1.2		0.5	0.2	
Delay (s)	47.1	37.7		50.5	39.9	27.2	38.3	46.8		28.2	35.2	
Level of Service	D	D		D	D	C	D	D		C	D	
Approach Delay (s)		40.3			39.2			45.5			32.0	
Approach LOS		D			D			D			C	
Intersection Summary												
HCM Average Control Delay			38.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			115.6			Sum of lost time (s)				16.5		
Intersection Capacity Utilization			74.1%			ICU Level of Service				D		
Analysis Period (min)			15									
Description: Add SB Left Turn Lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	14	9	38	5	19	18	26	14	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	15	10	41	5	20	19	28	15	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	158	122	15	118	112	30	15			40		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	158	122	15	118	112	30	15			40		
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 %	100	99	100	98	99	96	100			98		
cM capacity (veh/h)	762	756	1070	840	766	1050	1616			1583		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	66	45	43								
Volume Left	0	15	5	28								
Volume Right	3	41	19	0								
cSH	838	944	1616	1583								
Volume to Capacity	0.01	0.07	0.00	0.02								
Queue Length 95th (ft)	1	6	0	1								
Control Delay (s)	9.3	9.1	0.9	4.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.3	9.1	0.9	4.8								
Approach LOS	A	A										
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			24.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

1/18/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	11	0	91	35	17	130	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	12	0	99	38	18	141	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	308	315	141	296	296	118	141			137		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	308	315	141	296	296	118	141			137		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	93	100	99	100			99		
cM capacity (veh/h)	630	593	907	636	596	915	1423			1459		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	59	137	160								
Volume Left	0	47	0	18								
Volume Right	0	12	38	0								
cSH	1700	678	1423	1459								
Volume to Capacity	0.00	0.09	0.00	0.01								
Queue Length 95th (ft)	0	7	0	1								
Control Delay (s)	0.0	10.8	0.0	1.0								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	10.8	0.0	1.0								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			28.0%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

1/18/2011












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	118	0	2	0	0	173
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	0	2	0	0	188
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	2				259	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				259	2
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				100	83
cM capacity (veh/h)	1614				672	1082
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	128	2	188			
Volume Left	128	0	0			
Volume Right	0	0	188			
cSH	1614	1700	1082			
Volume to Capacity	0.08	0.00	0.17			
Queue Length 95th (ft)	6	0	16			
Control Delay (s)	7.4	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.3			
Intersection Capacity Utilization			30.6%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















1/18/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	173	3	3	118
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	208	4	4	142
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			6		425	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		425	4
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		99	87
cM capacity (veh/h)			1628		510	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	212	146			
Volume Left	0	208	4			
Volume Right	4	0	142			
cSH	1700	1628	1047			
Volume to Capacity	0.00	0.13	0.14			
Queue Length 95th (ft)	0	11	12			
Control Delay (s)	0.0	7.4	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.4	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			7.9			
Intersection Capacity Utilization			30.5%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	284	9	14	284	22	5	47	5	43	80	168
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	56	316	10	16	316	24	6	52	6	48	89	187
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	340			326			1009	803	321	817	796	328
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340			326			1009	803	321	817	796	328
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 %	95			99			95	83	99	80	71	74
cM capacity (veh/h)	1225			1245			120	299	720	244	303	716
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	56	326	16	340	63	323						
Volume Left	56	0	16	0	6	48						
Volume Right	0	10	0	24	6	187						
cSH	1225	1700	1245	1700	277	431						
Volume to Capacity	0.05	0.19	0.01	0.20	0.23	0.75						
Queue Length 95th (ft)	4	0	1	0	22	154						
Control Delay (s)	8.1	0.0	7.9	0.0	21.8	34.5						
Lane LOS	A		A		C	D						
Approach Delay (s)	1.2		0.3		21.8	34.5						
Approach LOS					C	D						
Intersection Summary												
Average Delay			11.7									
Intersection Capacity Utilization			53.2%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: Add Southbound Right Turn Lane (100')												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

1/24/2011




















	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	348	49	216	442	361	645
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	483	68	300	614	501	896
RTOR Reduction (vph)	0	54	0	0	0	0
Lane Group Flow (vph)	483	14	300	614	501	896
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	12.3	12.3	8.1	26.4	22.3	58.7
Effective Green, g (s)	12.3	12.3	8.1	26.4	22.3	58.7
Actuated g/C Ratio	0.21	0.21	0.14	0.45	0.38	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	727	325	478	846	686	1615
v/s Ratio Prot	0.14		0.09	c0.33	c0.28	
v/s Ratio Perm		0.01				0.55
v/c Ratio	0.66	0.04	0.63	0.73	0.73	0.55
Uniform Delay, d1	21.3	18.5	23.9	13.2	15.6	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.1	2.6	3.1	4.0	1.4
Delay (s)	23.6	18.6	26.5	16.3	19.6	1.4
Level of Service	C	B	C	B	B	A
Approach Delay (s)	23.0			19.6	7.9	
Approach LOS	C			B	A	
Intersection Summary						
HCM Average Control Delay			14.6		HCM Level of Service	B
HCM Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			58.7		Sum of lost time (s)	10.0
Intersection Capacity Utilization			51.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

**APPENDIX E2
YEAR 2012 EXISTING
PLUS PIPELINE**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	87	1094	87	82	907	90	36	2	66	61	2	65
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	94	1176	94	88	975	97	39	2	71	66	2	70
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1072			1270			2098	2612	588	2047	2657	536
vC1, stage 1 conf vol							1363	1363		1200	1200	
vC2, stage 2 conf vol							735	1248		847	1457	
vCu, unblocked vol	1072			1270			2098	2612	588	2047	2657	536
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	86			84			63	98	84	39	97	86
cM capacity (veh/h)	652			548			105	94	455	107	72	492
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1			
Volume Total	94	588	588	94	88	650	422	112	138			
Volume Left	94	0	0	0	88	0	0	39	66			
Volume Right	0	0	0	94	0	0	97	71	70			
cSH	652	1700	1700	1700	548	1700	1700	204	175			
Volume to Capacity	0.14	0.35	0.35	0.06	0.16	0.38	0.25	0.55	0.78			
Queue Length 95th (ft)	12	0	0	0	14	0	0	73	130			
Control Delay (s)	11.4	0.0	0.0	0.0	12.8	0.0	0.0	42.2	75.0			
Lane LOS	B				B			E	F			
Approach Delay (s)	0.8				1.0			42.2	75.0			
Approach LOS								E	F			
Intersection Summary												
Average Delay			6.2									
Intersection Capacity Utilization			56.0%			ICU Level of Service			B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	1214	30	19	998	29	15	3	21	11	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	1252	31	20	1029	30	15	3	22	11	4	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1059			1282			1888	2414	641	1781	2415	529
vC1, stage 1 conf vol							1316	1316		1083	1083	
vC2, stage 2 conf vol							571	1098		698	1332	
vCu, unblocked vol	1059			1282			1888	2414	641	1781	2415	529
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			96			90	98	95	94	97	97
cM capacity (veh/h)	654			542			150	164	422	188	159	499
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	25	834	448	20	686	373	40	31				
Volume Left	25	0	0	20	0	0	15	11				
Volume Right	0	0	31	0	0	30	22	15				
cSH	654	1700	1700	542	1700	1700	232	264				
Volume to Capacity	0.04	0.49	0.26	0.04	0.40	0.22	0.17	0.12				
Queue Length 95th (ft)	3	0	0	3	0	0	15	10				
Control Delay (s)	10.7	0.0	0.0	11.9	0.0	0.0	23.7	20.4				
Lane LOS	B			B			C	C				
Approach Delay (s)	0.2			0.2			23.7	20.4				
Approach LOS							C	C				
Intersection Summary												
Average Delay			0.8									
Intersection Capacity Utilization			44.5%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	44	1229	13	87	883	23	60	31	89	56	34	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3569		1787	3560			1821	1599		1825	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.62	1.00		0.62	1.00
Satd. Flow (perm)	1787	3569		1787	3560			1162	1599		1175	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	47	1322	14	94	949	25	65	33	96	60	37	27
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	60	0	0	17
Lane Group Flow (vph)	47	1336	0	94	973	0	0	98	36	0	97	10
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	7.8	91.4		12.4	96.0			16.2	16.2		16.2	16.2
Effective Green, g (s)	7.8	91.4		12.4	96.0			16.2	16.2		16.2	16.2
Actuated g/C Ratio	0.06	0.68		0.09	0.72			0.12	0.12		0.12	0.12
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	104	2434		165	2550			140	193		142	193
v/s Ratio Prot	0.03	c0.37		c0.05	c0.27							
v/s Ratio Perm								c0.08	0.02		0.08	0.01
v/c Ratio	0.45	0.55		0.57	0.38			0.70	0.19		0.68	0.05
Uniform Delay, d1	61.0	10.8		58.2	7.4			56.6	53.0		56.4	52.1
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.1	0.9		4.5	0.4			14.2	0.5		12.7	0.1
Delay (s)	64.1	11.7		62.7	7.9			70.8	53.5		69.2	52.2
Level of Service	E	B		E	A			E	D		E	D
Approach Delay (s)		13.5			12.7			62.2			65.5	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM Average Control Delay			18.9	HCM Level of Service			B					
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			134.0	Sum of lost time (s)			19.0					
Intersection Capacity Utilization			62.5%	ICU Level of Service			B					
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	1153	7	37	1093	138	37	9	95	113	8	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3571		1787	3574	1599		1672			1815	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.89			0.60	1.00
Satd. Flow (perm)	1787	3571		1787	3574	1599		1505			1132	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	55	1240	8	40	1175	148	40	10	102	122	9	57
RTOR Reduction (vph)	0	0	0	0	0	69	0	60	0	0	0	45
Lane Group Flow (vph)	55	1248	0	40	1175	79	0	92	0	0	131	12
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	6.8	46.7		4.5	44.4	44.4		17.9			17.9	17.9
Effective Green, g (s)	6.8	46.7		4.5	44.4	44.4		17.9			17.9	17.9
Actuated g/C Ratio	0.08	0.55		0.05	0.52	0.52		0.21			0.21	0.21
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	143	1960		94	1865	834		317			238	340
v/s Ratio Prot	c0.03	c0.35		0.02	0.33							
v/s Ratio Perm						0.05		0.06			c0.12	0.01
v/c Ratio	0.38	0.64		0.43	0.63	0.09		0.29			0.55	0.04
Uniform Delay, d1	37.2	13.3		39.0	14.5	10.2		28.3			30.0	26.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	1.7	0.7		3.1	0.7	0.1		0.5			2.7	0.0
Delay (s)	38.9	14.0		42.1	15.2	10.3		28.8			32.7	26.8
Level of Service	D	B		D	B	B		C			C	C
Approach Delay (s)		15.1			15.5			28.8			30.9	
Approach LOS		B			B			C			C	

Intersection Summary























HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	10.5
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	406	1030	64	137	1021	194	65	191	173	344	128	283
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3543		1787	3574	1599	1805	3353		3467	3205	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.50	1.00		0.19	1.00	
Satd. Flow (perm)	3467	3543		1787	3574	1599	947	3353		700	3205	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	432	1096	68	146	1086	206	69	203	184	366	136	301
RTOR Reduction (vph)	0	2	0	0	0	123	0	102	0	0	223	0
Lane Group Flow (vph)	432	1162	0	146	1086	83	69	285	0	366	214	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	22.4	54.0		16.6	48.2	48.2	26.0	17.0		41.6	27.1	
Effective Green, g (s)	22.4	54.0		16.6	48.2	48.2	26.0	17.0		41.6	27.1	
Actuated g/C Ratio	0.17	0.42		0.13	0.37	0.37	0.20	0.13		0.32	0.21	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	2.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	603	1487		230	1339	599	251	443		637	675	
v/s Ratio Prot	c0.12	c0.33		0.08	0.30		0.02	0.09		c0.09	0.07	
v/s Ratio Perm						0.05	0.04			c0.10		
v/c Ratio	0.72	0.78		0.63	0.81	0.14	0.27	0.64		0.57	0.32	
Uniform Delay, d1	50.2	32.2		53.2	36.2	26.6	42.6	53.0		33.9	43.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	2.6		5.6	3.7	0.0	0.6	3.2		1.3	0.3	
Delay (s)	54.2	34.9		58.8	39.8	26.6	43.2	56.2		35.2	43.2	
Level of Service	D	C		E	D	C	D	E		D	D	
Approach Delay (s)		40.1			39.9			54.2			39.6	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM Average Control Delay			41.4			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			128.7			Sum of lost time (s)				16.5		
Intersection Capacity Utilization			78.8%			ICU Level of Service				D		
Analysis Period (min)			15									
Description: Add SB Left Turn Lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	14	9	38	5	20	18	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	15	10	41	5	22	19	28	16	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	160	124	16	120	114	31	16			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160	124	16	120	114	31	16			41		
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 %	100	99	100	98	99	96	100			98		
cM capacity (veh/h)	759	754	1069	838	764	1049	1615			1582		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	66	46	44								
Volume Left	0	15	5	28								
Volume Right	3	41	19	0								
cSH	836	942	1615	1582								
Volume to Capacity	0.01	0.07	0.00	0.02								
Queue Length 95th (ft)	1	6	0	1								
Control Delay (s)	9.4	9.1	0.9	4.7								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.4	9.1	0.9	4.7								
Approach LOS	A	A										
Intersection Summary												
Average Delay			5.6									
Intersection Capacity Utilization			25.1%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

1/18/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	11	0	91	35	17	130	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	12	0	99	38	18	141	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	308	315	141	296	296	118	141			137		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	308	315	141	296	296	118	141			137		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	93	100	99	100			99		
cM capacity (veh/h)	630	593	907	636	596	915	1423			1459		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	59	137	160								
Volume Left	0	47	0	18								
Volume Right	0	12	38	0								
cSH	1700	678	1423	1459								
Volume to Capacity	0.00	0.09	0.00	0.01								
Queue Length 95th (ft)	0	7	0	1								
Control Delay (s)	0.0	10.8	0.0	1.0								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	10.8	0.0	1.0								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			28.0%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

1/18/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	118	0	2	0	0	173
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	0	2	0	0	188
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	2				259	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				259	2
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				100	83
cM capacity (veh/h)	1614				672	1082
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	128	2	188			
Volume Left	128	0	0			
Volume Right	0	0	188			
cSH	1614	1700	1082			
Volume to Capacity	0.08	0.00	0.17			
Queue Length 95th (ft)	6	0	16			
Control Delay (s)	7.4	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.3			
Intersection Capacity Utilization			30.6%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















1/18/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕			↕	↘↙	
Volume (veh/h)	2	3	173	3	3	118
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	208	4	4	142
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			6		425	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		425	4
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		99	87
cM capacity (veh/h)			1628		510	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	212	146			
Volume Left	0	208	4			
Volume Right	4	0	142			
cSH	1700	1628	1047			
Volume to Capacity	0.00	0.13	0.14			
Queue Length 95th (ft)	0	11	12			
Control Delay (s)	0.0	7.4	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.4	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay		7.9				
Intersection Capacity Utilization		30.5%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	284	9	14	284	22	5	47	5	43	80	168
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	56	316	10	16	316	24	6	52	6	48	89	187
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	340			326			1009	803	321	817	796	328
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340			326			1009	803	321	817	796	328
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 %	95			99			95	83	99	80	71	74
cM capacity (veh/h)	1225			1245			120	299	720	244	303	716
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	56	326	16	340	63	323						
Volume Left	56	0	16	0	6	48						
Volume Right	0	10	0	24	6	187						
cSH	1225	1700	1245	1700	277	431						
Volume to Capacity	0.05	0.19	0.01	0.20	0.23	0.75						
Queue Length 95th (ft)	4	0	1	0	22	154						
Control Delay (s)	8.1	0.0	7.9	0.0	21.8	34.5						
Lane LOS	A		A		C	D						
Approach Delay (s)	1.2		0.3		21.8	34.5						
Approach LOS					C	D						
Intersection Summary												
Average Delay			11.7									
Intersection Capacity Utilization			53.2%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: Add Southbound Right Turn Lane (100')												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB











1/24/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	390	49	265	473	361	704
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	542	68	368	657	501	978
RTOR Reduction (vph)	0	53	0	0	0	0
Lane Group Flow (vph)	542	15	368	657	501	978
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	14.1	14.1	9.6	29.7	22.9	62.6
Effective Green, g (s)	14.1	14.1	9.6	29.7	22.9	62.6
Actuated g/C Ratio	0.23	0.23	0.15	0.47	0.37	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	782	350	532	892	660	1615
v/s Ratio Prot	0.16		0.11	c0.35	c0.28	
v/s Ratio Perm		0.01				0.61
v/c Ratio	0.69	0.04	0.69	0.74	0.76	0.61
Uniform Delay, d1	22.3	19.0	25.1	13.3	17.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.1	3.9	3.2	5.0	1.7
Delay (s)	24.9	19.0	29.0	16.5	22.4	1.7
Level of Service	C	B	C	B	C	A
Approach Delay (s)	24.3			21.0	8.7	
Approach LOS	C			C	A	
Intersection Summary						
HCM Average Control Delay			15.8		HCM Level of Service	B
HCM Volume to Capacity ratio			0.75			
Actuated Cycle Length (s)			62.6		Sum of lost time (s)	10.0
Intersection Capacity Utilization			53.2%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road






















1/18/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	0	122	41	0	89
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	0	133	45	0	97
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	252	155			177	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252	155			177	
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)	737	891			1399	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1		
Volume Total	33	0	177	97		
Volume Left	33	0	0	0		
Volume Right	0	0	45	0		
cSH	737	1700	1700	1399		
Volume to Capacity	0.04	0.00	0.10	0.00		
Queue Length 95th (ft)	3	0	0	0		
Control Delay (s)	10.1	0.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	10.1		0.0	0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			18.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road

1/25/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	1094	87	82	907	90	32	2	66	61	2	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3526		1787	1607		1787	1607	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	1.00		0.57	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3526		1336	1607		1075	1607	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	94	1176	94	88	975	97	34	2	71	66	2	70
RTOR Reduction (vph)	0	0	14	0	5	0	0	65	0	0	63	0
Lane Group Flow (vph)	94	1176	80	88	1067	0	34	8	0	66	9	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	16.0	76.4	76.4	8.3	68.7		10.5	10.5		11.7	11.7	
Effective Green, g (s)	16.0	76.4	76.4	8.3	68.7		10.5	10.5		11.7	11.7	
Actuated g/C Ratio	0.13	0.63	0.63	0.07	0.57		0.09	0.09		0.10	0.10	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		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)	236	2259	1010	123	2004		129	140		132	156	
v/s Ratio Prot	0.05	c0.33		0.05	c0.30		c0.01	0.01		c0.02	0.01	
v/s Ratio Perm			0.05				0.02			c0.03		
v/c Ratio	0.40	0.52	0.08	0.72	0.53		0.26	0.06		0.50	0.06	
Uniform Delay, d1	48.0	12.2	8.6	55.1	16.2		51.7	50.7		51.2	49.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.9	0.2	17.9	1.0		1.1	0.2		3.0	0.2	
Delay (s)	49.1	13.1	8.8	73.0	17.2		52.8	50.8		54.2	49.7	
Level of Service	D	B	A	E	B		D	D		D	D	
Approach Delay (s)		15.3			21.4			51.5			51.9	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM Average Control Delay			21.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			120.9			Sum of lost time (s)				10.5		
Intersection Capacity Utilization			58.2%			ICU Level of Service				B		
Analysis Period (min)			15									
Description: Signalized, NB/SB Left turn lanes												
c Critical Lane Group												

**APPENDIX E3
YEAR 2015 EXISTING
PLUS PIPELINE**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	136	1185	87	86	996	158	36	2	73	111	2	101
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	146	1274	94	92	1071	170	39	2	78	119	2	109
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1241			1368			2397	2992	637	2350	3001	620
vC1, stage 1 conf vol							1567	1567		1341	1341	
vC2, stage 2 conf vol							830	1426		1009	1660	
vCu, unblocked vol	1241			1368			2397	2992	637	2350	3001	620
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	74			82			15	88	81	0	90	75
cM capacity (veh/h)	563			503			45	18	422	54	21	433
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1			
Volume Total	146	637	637	94	92	714	527	119	230			
Volume Left	146	0	0	0	92	0	0	39	119			
Volume Right	0	0	0	94	0	0	170	78	109			
cSH	563	1700	1700	1700	503	1700	1700	103	90			
Volume to Capacity	0.26	0.37	0.37	0.06	0.18	0.42	0.31	1.16	2.56			
Queue Length 95th (ft)	26	0	0	0	17	0	0	195	538			
Control Delay (s)	13.6	0.0	0.0	0.0	13.8	0.0	0.0	216.6	806.7			
Lane LOS	B				B			F	F			
Approach Delay (s)	1.3				1.0			216.6	806.7			
Approach LOS								F	F			
Intersection Summary												
Average Delay			67.2									
Intersection Capacity Utilization			69.2%		ICU Level of Service					C		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	1353	30	19	1165	31	15	3	21	12	4	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	28	1395	31	20	1201	32	15	3	22	12	4	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1233			1426			2125	2738	713	2032	2738	616
vC1, stage 1 conf vol							1466	1466		1256	1256	
vC2, stage 2 conf vol							659	1272		776	1481	
vCu, unblocked vol	1233			1426			2125	2738	713	2032	2738	616
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			96			87	98	94	92	97	96
cM capacity (veh/h)	561			478			120	132	379	149	129	438
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	28	930	496	20	801	432	40	34				
Volume Left	28	0	0	20	0	0	15	12				
Volume Right	0	0	31	0	0	32	22	18				
cSH	561	1700	1700	478	1700	1700	192	220				
Volume to Capacity	0.05	0.55	0.29	0.04	0.47	0.25	0.21	0.15				
Queue Length 95th (ft)	4	0	0	3	0	0	19	13				
Control Delay (s)	11.8	0.0	0.0	12.9	0.0	0.0	28.7	24.4				
Lane LOS	B			B			D	C				
Approach Delay (s)	0.2			0.2			28.7	24.4				
Approach LOS							D	C				
Intersection Summary												
Average Delay			0.9									
Intersection Capacity Utilization			48.4%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	1366	13	93	983	30	60	34	94	65	35	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3569		1787	3559			1823	1599		1822	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.59	1.00		0.61	1.00
Satd. Flow (perm)	1787	3569		1787	3559			1110	1599		1147	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	51	1469	14	100	1057	32	65	37	101	70	38	31
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	60	0	0	17
Lane Group Flow (vph)	51	1483	0	100	1088	0	0	102	41	0	108	14
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	8.1	90.3		12.8	95.0			16.9	16.9		16.9	16.9
Effective Green, g (s)	8.1	90.3		12.8	95.0			16.9	16.9		16.9	16.9
Actuated g/C Ratio	0.06	0.67		0.10	0.71			0.13	0.13		0.13	0.13
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	108	2405		171	2523			140	202		145	202
v/s Ratio Prot	0.03	c0.42		c0.06	c0.31							
v/s Ratio Perm								0.09	0.03		c0.09	0.01
v/c Ratio	0.47	0.62		0.58	0.43			0.73	0.20		0.74	0.07
Uniform Delay, d1	60.9	12.2		58.1	8.2			56.3	52.5		56.5	51.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	1.2		5.0	0.5			17.2	0.5		18.6	0.1
Delay (s)	64.1	13.4		63.1	8.7			73.5	53.0		75.1	51.7
Level of Service	E	B		E	A			E	D		E	D
Approach Delay (s)		15.1			13.3			63.3			69.9	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM Average Control Delay			20.1			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			134.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			67.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	1246	7	38	1241	187	37	16	97	143	12	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3571		1787	3574	1599		1679			1816	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.88			0.55	1.00
Satd. Flow (perm)	1787	3571		1787	3574	1599		1504			1047	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	117	1340	8	41	1334	201	40	17	104	154	13	91
RTOR Reduction (vph)	0	0	0	0	0	83	0	54	0	0	0	72
Lane Group Flow (vph)	117	1348	0	41	1334	118	0	107	0	0	167	19
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	12.7	62.5		5.0	54.8	54.8		22.1			22.1	22.1
Effective Green, g (s)	12.7	62.5		5.0	54.8	54.8		22.1			22.1	22.1
Actuated g/C Ratio	0.12	0.59		0.05	0.52	0.52		0.21			0.21	0.21
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	215	2114		85	1855	830		315			219	338
v/s Ratio Prot	c0.07	c0.38		0.02	c0.37						c0.16	0.01
v/s Ratio Perm						0.07		0.07				0.01
v/c Ratio	0.54	0.64		0.48	0.72	0.14		0.34			0.76	0.06
Uniform Delay, d1	43.7	14.1		49.0	19.5	13.2		35.5			39.3	33.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	2.8	0.6		4.3	1.4	0.1		0.6			14.5	0.1
Delay (s)	46.5	14.8		53.3	20.9	13.3		36.2			53.8	33.5
Level of Service	D	B		D	C	B		D			D	C
Approach Delay (s)		17.3			20.7			36.2			46.6	
Approach LOS		B			C			D			D	

Intersection Summary























HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	21.5
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	422	1129	79	141	1191	199	71	192	173	345	129	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3539		1787	3574	1599	1805	3353		3467	3200	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.42	1.00		0.18	1.00	
Satd. Flow (perm)	3467	3539		1787	3574	1599	790	3353		643	3200	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	449	1201	84	150	1267	212	76	204	184	367	137	316
RTOR Reduction (vph)	0	2	0	0	0	99	0	103	0	0	241	0
Lane Group Flow (vph)	449	1283	0	150	1267	113	76	285	0	367	212	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	23.2	66.6		17.1	60.5	60.5	26.9	17.2		41.9	26.7	
Effective Green, g (s)	23.2	66.6		17.1	60.5	60.5	26.9	17.2		41.9	26.7	
Actuated g/C Ratio	0.16	0.47		0.12	0.43	0.43	0.19	0.12		0.29	0.19	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	2.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	566	1659		215	1522	681	219	406		571	601	
v/s Ratio Prot	c0.13	c0.36		0.08	c0.35		0.02	0.09		c0.09	0.07	
v/s Ratio Perm						0.07	0.04			c0.10		
v/c Ratio	0.79	0.77		0.70	0.83	0.17	0.35	0.70		0.64	0.35	
Uniform Delay, d1	57.1	31.5		60.0	36.3	25.2	48.8	60.0		40.6	50.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.5	2.2		9.5	3.9	0.1	1.0	5.4		2.5	0.4	
Delay (s)	64.7	33.7		69.5	40.2	25.3	49.7	65.4		43.1	50.5	
Level of Service	E	C		E	D	C	D	E		D	D	
Approach Delay (s)		41.7			40.9			62.9			47.2	
Approach LOS		D			D			E			D	
Intersection Summary												
HCM Average Control Delay			44.5			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			142.1			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			84.0%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Add SB Left Turn Lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	14	9	38	5	20	18	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	15	10	41	5	22	19	28	16	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	160	124	16	120	114	31	16			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160	124	16	120	114	31	16			41		
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 %	100	99	100	98	99	96	100			98		
cM capacity (veh/h)	759	754	1069	838	764	1049	1615			1582		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	66	46	44								
Volume Left	0	15	5	28								
Volume Right	3	41	19	0								
cSH	836	942	1615	1582								
Volume to Capacity	0.01	0.07	0.00	0.02								
Queue Length 95th (ft)	1	6	0	1								
Control Delay (s)	9.4	9.1	0.9	4.7								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.4	9.1	0.9	4.7								
Approach LOS	A	A										
Intersection Summary												
Average Delay			5.6									
Intersection Capacity Utilization			25.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

1/18/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	11	0	98	35	17	134	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	12	0	107	38	18	146	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	320	327	146	308	308	126	146			145		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	320	327	146	308	308	126	146			145		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	93	100	99	100			99		
cM capacity (veh/h)	618	584	901	625	587	906	1418			1450		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	59	145	164								
Volume Left	0	47	0	18								
Volume Right	0	12	38	0								
cSH	1700	667	1418	1450								
Volume to Capacity	0.00	0.09	0.00	0.01								
Queue Length 95th (ft)	0	7	0	1								
Control Delay (s)	0.0	10.9	0.0	0.9								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	10.9	0.0	0.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			28.6%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

1/18/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	125	0	2	0	0	177
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	0	2	0	0	192
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	2				274	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				274	2
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				100	82
cM capacity (veh/h)	1614				655	1082
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	136	2	192			
Volume Left	136	0	0			
Volume Right	0	0	192			
cSH	1614	1700	1082			
Volume to Capacity	0.08	0.00	0.18			
Queue Length 95th (ft)	7	0	16			
Control Delay (s)	7.4	0.0	9.0			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.3			
Intersection Capacity Utilization			31.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















1/18/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	177	3	3	125
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	213	4	4	151
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			6		434	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		434	4
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		99	86
cM capacity (veh/h)			1628		501	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	217	154			
Volume Left	0	213	4			
Volume Right	4	0	151			
cSH	1700	1628	1048			
Volume to Capacity	0.00	0.13	0.15			
Queue Length 95th (ft)	0	11	13			
Control Delay (s)	0.0	7.4	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.4	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.0			
Intersection Capacity Utilization			31.2%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig







1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	284	9	14	284	24	5	49	5	44	81	169
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	316	10	16	316	27	6	54	6	49	90	188
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	342			326			1016	809	321	824	801	329
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	342			326			1016	809	321	824	801	329
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 %	95			99			95	82	99	80	70	74
cM capacity (veh/h)	1222			1245			117	296	720	239	300	715
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	58	326	16	342	66	327						
Volume Left	58	0	16	0	6	49						
Volume Right	0	10	0	27	6	188						
cSH	1222	1700	1245	1700	274	426						
Volume to Capacity	0.05	0.19	0.01	0.20	0.24	0.77						
Queue Length 95th (ft)	4	0	1	0	23	162						
Control Delay (s)	8.1	0.0	7.9	0.0	22.2	36.4						
Lane LOS	A		A		C	E						
Approach Delay (s)	1.2		0.3		22.2	36.4						
Approach LOS					C	E						
Intersection Summary												
Average Delay				12.3								
Intersection Capacity Utilization				53.5%	ICU Level of Service			A				
Analysis Period (min)				15								
Description: Add Southbound Right Turn Lane (100')												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB











1/24/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑↑	↑	↑	↑
Volume (vph)	437	49	323	512	361	795
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	607	68	449	711	501	1104
RTOR Reduction (vph)	0	52	0	0	0	0
Lane Group Flow (vph)	607	16	449	711	501	1104
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	16.1	16.1	11.7	33.8	23.7	67.5
Effective Green, g (s)	16.1	16.1	11.7	33.8	23.7	67.5
Actuated g/C Ratio	0.24	0.24	0.17	0.50	0.35	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	828	370	601	942	634	1615
v/s Ratio Prot	0.17		0.13	0.38	0.28	
v/s Ratio Perm		0.01				c0.68
v/c Ratio	0.73	0.04	0.75	0.75	0.79	0.68
Uniform Delay, d1	23.7	19.8	26.5	13.5	19.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.4	0.0	5.0	3.5	6.7	2.4
Delay (s)	27.1	19.8	31.5	17.0	26.3	2.4
Level of Service	C	B	C	B	C	A
Approach Delay (s)	26.4			22.6	9.8	
Approach LOS	C			C	A	
Intersection Summary						
HCM Average Control Delay			17.4		HCM Level of Service	B
HCM Volume to Capacity ratio			0.68			
Actuated Cycle Length (s)			67.5		Sum of lost time (s)	0.0
Intersection Capacity Utilization			55.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road






















1/18/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	59	0	186	80	0	138
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	0	202	87	0	150
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	396	246			289	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	396	246			289	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	89	100			100	
cM capacity (veh/h)	609	793			1273	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1		
Volume Total	64	0	289	150		
Volume Left	64	0	0	0		
Volume Right	0	0	87	0		
cSH	609	1700	1700	1273		
Volume to Capacity	0.11	0.00	0.17	0.00		
Queue Length 95th (ft)	9	0	0	0		
Control Delay (s)	11.6	0.0	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s)	11.6		0.0	0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			24.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road




















1/25/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	1185	87	86	996	158	36	2	73	111	2	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3501		1787	1606		1787	1604	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.68	1.00		0.56	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3501		1278	1606		1060	1604	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	146	1274	94	92	1071	170	39	2	78	119	2	119
RTOR Reduction (vph)	0	0	13	0	8	0	0	71	0	0	106	0
Lane Group Flow (vph)	146	1274	81	92	1233	0	39	9	0	119	15	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	11.2	75.1	75.1	8.3	72.2		10.6	10.6		13.0	13.0	
Effective Green, g (s)	11.2	75.1	75.1	8.3	72.2		10.6	10.6		13.0	13.0	
Actuated g/C Ratio	0.09	0.62	0.62	0.07	0.60		0.09	0.09		0.11	0.11	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		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)	166	2220	993	123	2091		127	141		149	172	
v/s Ratio Prot	c0.08	0.36		0.05	c0.35		c0.01	0.01		c0.04	0.01	
v/s Ratio Perm			0.05				0.02			c0.05		
v/c Ratio	0.88	0.57	0.08	0.75	0.59		0.31	0.06		0.80	0.09	
Uniform Delay, d1	54.2	13.5	9.1	55.3	15.1		51.9	50.6		52.3	48.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	37.2	1.1	0.2	21.7	1.2		1.4	0.2		25.0	0.2	
Delay (s)	91.4	14.6	9.3	77.0	16.4		53.3	50.8		77.3	48.8	
Level of Service	F	B	A	E	B		D	D		E	D	
Approach Delay (s)		21.6			20.6			51.6			62.9	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM Average Control Delay			25.4			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			120.9			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			66.3%			ICU Level of Service				C		
Analysis Period (min)			15									
Description: Signalized, NB/SB Left turn lanes												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

1/25/2011




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	52	284	9	14	284	24	5	49	5	44	81	169
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	316	10	16	316	27	6	54	6	49	90	188
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	342			326			922	809	321	824	801	329
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	342			326			922	809	321	824	801	329
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 %	95			99			96	82	99	80	70	74
cM capacity (veh/h)	1222			1245			136	296	720	239	300	715
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	58	326	16	342	66	327						
Volume Left	58	0	16	0	6	49						
Volume Right	0	10	0	27	6	188						
cSH	1222	1700	1245	1700	282	655						
Volume to Capacity	0.05	0.19	0.01	0.20	0.23	0.50						
Queue Length 95th (ft)	4	0	1	0	22	70						
Control Delay (s)	8.1	0.0	7.9	0.0	21.6	19.6						
Lane LOS	A		A		C	C						
Approach Delay (s)	1.2		0.3		21.6	19.6						
Approach LOS					C	C						
Intersection Summary												
Average Delay			7.4									
Intersection Capacity Utilization			43.1%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: Add Southbound Right Turn Lane (100')												

**APPENDIX E4
YEAR 2019 EXISTING
PLUS PIPELINE**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	285	1286	87	90	1103	360	36	2	75	257	2	210
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	306	1383	94	97	1186	387	39	2	81	276	2	226
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL				TWLTL							
Median storage veh)	2				2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1573			1476			3009	3762	691	2959	3662	787
vC1, stage 1 conf vol							1996	1996		1573	1573	
vC2, stage 2 conf vol							1013	1767		1386	2089	
vCu, unblocked vol	1573			1476			3009	3762	691	2959	3662	787
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	27			79			0	0	79	0	0	33
cM capacity (veh/h)	420			457			0	1	389	0	1	337
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1	SB 1			
Volume Total	306	691	691	94	97	791	782	122	504			
Volume Left	306	0	0	0	97	0	0	39	276			
Volume Right	0	0	0	94	0	0	387	81	226			
cSH	420	1700	1700	1700	457	1700	1700	0	0			
Volume to Capacity	0.73	0.41	0.41	0.06	0.21	0.47	0.46	Err	Err			
Queue Length 95th (ft)	144	0	0	0	20	0	0	Err	Err			
Control Delay (s)	33.5	0.0	0.0	0.0	15.0	0.0	0.0	Err	Err			
Lane LOS	D				B			F	F			
Approach Delay (s)	5.8				0.9			Err	Err			
Approach LOS								F	F			
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			101.7%		ICU Level of Service					G		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	1571	30	19	1480	33	15	3	21	13	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	39	1620	31	20	1526	34	15	3	22	13	4	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1560			1651			2544	3312	825	2493	3311	780
vC1, stage 1 conf vol							1713	1713		1582	1582	
vC2, stage 2 conf vol							831	1599		911	1729	
vCu, unblocked vol	1560			1651			2544	3312	825	2493	3311	780
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			95			81	96	93	86	95	92
cM capacity (veh/h)	420			392			79	84	320	96	87	342
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	39	1080	571	20	1017	543	40	44				
Volume Left	39	0	0	20	0	0	15	13				
Volume Right	0	0	31	0	0	34	22	27				
cSH	420	1700	1700	392	1700	1700	134	167				
Volume to Capacity	0.09	0.64	0.34	0.05	0.60	0.32	0.30	0.27				
Queue Length 95th (ft)	8	0	0	4	0	0	29	25				
Control Delay (s)	14.5	0.0	0.0	14.7	0.0	0.0	42.8	34.2				
Lane LOS	B			B			E	D				
Approach Delay (s)	0.3			0.2			42.8	34.2				
Approach LOS							E	D				
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			54.4%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	1571	13	93	1097	52	60	44	94	89	39	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3570		1787	3550			1828	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.57	1.00		0.60	1.00
Satd. Flow (perm)	1787	3570		1787	3550			1070	1599		1122	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	65	1689	14	100	1180	56	65	47	101	96	42	45
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	53	0	0	20
Lane Group Flow (vph)	65	1703	0	100	1234	0	0	112	48	0	138	25
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	9.0	87.0		12.8	90.8			20.2	20.2		20.2	20.2
Effective Green, g (s)	9.0	87.0		12.8	90.8			20.2	20.2		20.2	20.2
Actuated g/C Ratio	0.07	0.65		0.10	0.68			0.15	0.15		0.15	0.15
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	120	2318		171	2406			161	241		169	241
v/s Ratio Prot	0.04	c0.48		c0.06	c0.35							
v/s Ratio Perm								0.10	0.03		c0.12	0.02
v/c Ratio	0.54	0.73		0.58	0.51			0.70	0.20		0.82	0.11
Uniform Delay, d1	60.5	15.8		58.1	10.7			54.0	49.8		55.1	49.1
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	4.9	2.1		5.0	0.8			12.3	0.4		25.3	0.2
Delay (s)	65.4	17.9		63.1	11.5			66.3	50.2		80.4	49.3
Level of Service	E	B		E	B			E	D		F	D
Approach Delay (s)		19.6			15.3			58.7			72.7	
Approach LOS		B			B			E			E	
Intersection Summary												
HCM Average Control Delay			23.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			134.0			Sum of lost time (s)			19.0			
Intersection Capacity Utilization			74.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.






















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	1475	7	38	1577	219	37	24	97	177	19	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3572		1787	3574	1599		1689			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.81			0.54	1.00
Satd. Flow (perm)	1787	3572		1787	3574	1599		1381			1029	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	117	1586	8	41	1696	235	40	26	104	190	20	91
RTOR Reduction (vph)	0	0	0	0	0	75	0	45	0	0	0	62
Lane Group Flow (vph)	117	1594	0	41	1696	160	0	125	0	0	210	29
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	13.0	70.6		5.4	63.0	63.0		27.4			27.4	27.4
Effective Green, g (s)	13.0	70.6		5.4	63.0	63.0		27.4			27.4	27.4
Actuated g/C Ratio	0.11	0.59		0.05	0.53	0.53		0.23			0.23	0.23
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	195	2112		81	1886	844		317			236	371
v/s Ratio Prot	c0.07	c0.45		0.02	c0.47						c0.20	0.02
v/s Ratio Perm						0.10		0.09				0.02
v/c Ratio	0.60	0.75		0.51	0.90	0.19		0.39			0.89	0.08
Uniform Delay, d1	50.7	18.0		55.7	25.3	14.8		39.0			44.5	36.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	4.9	1.6		4.9	6.2	0.1		0.8			30.7	0.1
Delay (s)	55.6	19.6		60.6	31.6	14.9		39.8			75.3	36.2
Level of Service	E	B		E	C	B		D			E	D
Approach Delay (s)		22.1			30.2			39.8			63.4	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM Average Control Delay			29.6			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			119.4			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			87.2%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	458	1321	106	147	1538	217	76	204	175	360	138	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3534		1787	3574	1599	1805	3360		3467	3202	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.37	1.00		0.17	1.00	
Satd. Flow (perm)	3467	3534		1787	3574	1599	709	3360		611	3202	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	487	1405	113	156	1636	231	81	217	186	383	147	334
RTOR Reduction (vph)	0	3	0	0	0	86	0	96	0	0	236	0
Lane Group Flow (vph)	487	1515	0	156	1636	145	81	307	0	383	245	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	25.3	67.9		17.9	60.5	60.5	28.6	18.4		43.9	28.2	
Effective Green, g (s)	25.3	67.9		17.9	60.5	60.5	28.6	18.4		43.9	28.2	
Actuated g/C Ratio	0.17	0.46		0.12	0.41	0.41	0.20	0.13		0.30	0.19	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	2.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	600	1641		219	1479	662	215	423		574	618	
v/s Ratio Prot	c0.14	c0.43		0.09	c0.46		0.03	0.09		c0.09	0.08	
v/s Ratio Perm						0.09	0.05			c0.11		
v/c Ratio	0.81	0.92		0.71	1.11	0.22	0.38	0.73		0.67	0.40	
Uniform Delay, d1	58.2	36.7		61.7	42.8	27.6	49.6	61.5		41.5	51.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.2	9.1		10.4	58.2	0.1	1.1	6.1		2.9	0.4	
Delay (s)	66.4	45.8		72.1	101.0	27.7	50.7	67.6		44.4	52.0	
Level of Service	E	D		E	F	C	D	E		D	D	
Approach Delay (s)		50.8			90.4			64.7			48.6	
Approach LOS		D			F			E			D	
Intersection Summary												
HCM Average Control Delay			66.6			HCM Level of Service			E			
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			146.2			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			95.4%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Add SB Left Turn Lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	14	9	38	5	20	18	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	15	10	41	5	22	19	28	16	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	160	124	16	120	114	31	16			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160	124	16	120	114	31	16			41		
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 %	100	99	100	98	99	96	100			98		
cM capacity (veh/h)	759	754	1069	838	764	1049	1615			1582		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	66	46	44								
Volume Left	0	15	5	28								
Volume Right	3	41	19	0								
cSH	836	942	1615	1582								
Volume to Capacity	0.01	0.07	0.00	0.02								
Queue Length 95th (ft)	1	6	0	1								
Control Delay (s)	9.4	9.1	0.9	4.7								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.4	9.1	0.9	4.7								
Approach LOS	A	A										
Intersection Summary												
Average Delay			5.6									
Intersection Capacity Utilization			25.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	11	0	100	35	17	135	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	12	0	109	38	18	147	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	330	147	311	311	128	147			147		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	323	330	147	311	311	128	147			147		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	92	100	99	100			99		
cM capacity (veh/h)	615	581	900	622	585	904	1417			1448		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	59	147	165								
Volume Left	0	47	0	18								
Volume Right	0	12	38	0								
cSH	1700	664	1417	1448								
Volume to Capacity	0.00	0.09	0.00	0.01								
Queue Length 95th (ft)	0	7	0	1								
Control Delay (s)	0.0	10.9	0.0	0.9								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	10.9	0.0	0.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.2									
Intersection Capacity Utilization			28.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

1/18/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	127	0	2	0	0	178
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	138	0	2	0	0	193
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	2				278	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				278	2
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				100	82
cM capacity (veh/h)	1614				651	1082
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	138	2	193			
Volume Left	138	0	0			
Volume Right	0	0	193			
cSH	1614	1700	1082			
Volume to Capacity	0.09	0.00	0.18			
Queue Length 95th (ft)	7	0	16			
Control Delay (s)	7.4	0.0	9.1			
Lane LOS	A		A			
Approach Delay (s)	7.4	0.0	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay		8.3				
Intersection Capacity Utilization		31.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















1/18/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	178	3	3	127
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	214	4	4	153
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			6		437	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		437	4
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		99	86
cM capacity (veh/h)			1628		499	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	218	157			
Volume Left	0	214	4			
Volume Right	4	0	153			
cSH	1700	1628	1048			
Volume to Capacity	0.00	0.13	0.15			
Queue Length 95th (ft)	0	11	13			
Control Delay (s)	0.0	7.4	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.4	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			8.0			
Intersection Capacity Utilization			31.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

1/18/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	284	9	14	284	25	5	50	5	45	82	169
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	59	316	10	16	316	28	6	56	6	50	91	188
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	343			326			1018	813	321	827	804	329
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	343			326			1018	813	321	827	804	329
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 %	95			99			95	81	99	79	69	74
cM capacity (veh/h)	1221			1245			116	294	720	236	299	714
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	59	326	16	343	67	329						
Volume Left	59	0	16	0	6	50						
Volume Right	0	10	0	28	6	188						
cSH	1221	1700	1245	1700	273	422						
Volume to Capacity	0.05	0.19	0.01	0.20	0.24	0.78						
Queue Length 95th (ft)	4	0	1	0	23	168						
Control Delay (s)	8.1	0.0	7.9	0.0	22.4	37.8						
Lane LOS	A		A		C	E						
Approach Delay (s)	1.2		0.3		22.4	37.8						
Approach LOS					C	E						
Intersection Summary												
Average Delay			12.8									
Intersection Capacity Utilization			53.6%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: Add Southbound Right Turn Lane (100')												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB











1/24/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	528	49	433	576	361	947
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	733	68	601	800	501	1315
RTOR Reduction (vph)	0	50	0	0	0	0
Lane Group Flow (vph)	733	18	601	800	501	1315
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	19.6	19.6	15.4	41.0	24.4	75.4
Effective Green, g (s)	19.6	19.6	15.4	41.0	24.4	75.4
Actuated g/C Ratio	0.26	0.26	0.20	0.54	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	902	404	708	1023	584	1615
v/s Ratio Prot	0.21		0.17	0.43	0.28	
v/s Ratio Perm		0.01				c0.81
v/c Ratio	0.81	0.04	0.85	0.78	0.86	0.81
Uniform Delay, d1	26.2	20.9	28.9	13.7	23.9	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.6	0.0	9.3	4.0	11.9	4.6
Delay (s)	31.8	20.9	38.2	17.6	35.8	4.6
Level of Service	C	C	D	B	D	A
Approach Delay (s)	30.9			26.5	13.2	
Approach LOS	C			C	B	
Intersection Summary						
HCM Average Control Delay			21.4		HCM Level of Service	C
HCM Volume to Capacity ratio			0.81			
Actuated Cycle Length (s)			75.4		Sum of lost time (s)	0.0
Intersection Capacity Utilization			60.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road






















1/18/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	146	0	377	199	0	282
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	159	0	410	216	0	307
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	824	518			626	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	824	518			626	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	54	100			100	
cM capacity (veh/h)	343	558			956	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1		
Volume Total	159	0	626	307		
Volume Left	159	0	0	0		
Volume Right	0	0	216	0		
cSH	343	1700	1700	956		
Volume to Capacity	0.46	0.00	0.37	0.00		
Queue Length 95th (ft)	59	0	0	0		
Control Delay (s)	24.3	0.0	0.0	0.0		
Lane LOS	C	A				
Approach Delay (s)	24.3		0.0	0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			46.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road




















1/25/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	285	1286	87	90	1103	360	36	2	75	257	2	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3442		1787	1606		1787	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3442		1881	1606		1881	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	306	1383	94	97	1186	387	39	2	81	276	2	226
RTOR Reduction (vph)	0	0	12	0	19	0	0	75	0	0	202	0
Lane Group Flow (vph)	306	1383	82	97	1554	0	39	8	0	276	26	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	22.5	82.1	82.1	10.3	69.9		10.6	10.6		14.4	14.4	
Effective Green, g (s)	22.5	82.1	82.1	10.3	69.9		10.6	10.6		14.4	14.4	
Actuated g/C Ratio	0.17	0.61	0.61	0.08	0.52		0.08	0.08		0.11	0.11	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5		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)	298	2174	972	136	1782		148	126		201	171	
v/s Ratio Prot	c0.17	0.39		0.05	c0.45		0.01	0.01		0.11	0.02	
v/s Ratio Perm			0.05				c0.01			c0.04		
v/c Ratio	1.03	0.64	0.08	0.71	0.87		0.26	0.07		1.37	0.15	
Uniform Delay, d1	56.2	16.9	10.9	60.9	28.6		58.2	57.6		60.6	54.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	59.2	1.4	0.2	16.2	6.2		1.0	0.2		196.1	0.4	
Delay (s)	115.5	18.3	11.1	77.1	34.8		59.1	57.8		256.7	55.2	
Level of Service	F	B	B	E	C		E	E		F	E	
Approach Delay (s)		34.6			37.3			58.3			165.5	
Approach LOS		C			D			E			F	
Intersection Summary												
HCM Average Control Delay			52.6			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			135.0			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			94.3%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Signalized, NB/SB Left turn lanes, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.






















1/25/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	1571	30	19	1480	33	15	3	21	13	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	39	1620	31	20	1526	34	15	3	22	13	4	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									4			
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1560			1651			2544	3312	825	2472	3311	780
vC1, stage 1 conf vol							1713	1713		1582	1582	
vC2, stage 2 conf vol							831	1599		890	1729	
vCu, unblocked vol	1560			1651			2544	3312	825	2472	3311	780
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			95			81	96	93	86	95	92
cM capacity (veh/h)	420			392			79	84	320	96	87	342
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	39	1080	571	20	1017	543	40	44				
Volume Left	39	0	0	20	0	0	15	13				
Volume Right	0	0	31	0	0	34	22	27				
cSH	420	1700	1700	392	1700	1700	174	167				
Volume to Capacity	0.09	0.64	0.34	0.05	0.60	0.32	0.23	0.26				
Queue Length 95th (ft)	8	0	0	4	0	0	21	25				
Control Delay (s)	14.5	0.0	0.0	14.7	0.0	0.0	38.2	34.1				
Lane LOS	B			B			E	D				
Approach Delay (s)	0.3			0.2			38.2	34.1				
Approach LOS							E	D				
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			61.0%			ICU Level of Service		B				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.




















1/25/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	458	1321	106	147	1538	217	76	204	175	360	138	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3534		1787	3574	1599	1805	3360		3467	3202	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.23	1.00		0.28	1.00	
Satd. Flow (perm)	3467	3534		1787	3574	1599	434	3360		1034	3202	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	487	1405	113	156	1636	231	81	217	186	383	147	334
RTOR Reduction (vph)	0	4	0	0	0	122	0	133	0	0	191	0
Lane Group Flow (vph)	487	1514	0	156	1636	109	81	270	0	383	290	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	17.3	60.2		12.6	55.5	55.5	22.8	17.5		22.8	17.5	
Effective Green, g (s)	17.3	60.2		12.6	55.5	55.5	22.8	17.5		22.8	17.5	
Actuated g/C Ratio	0.15	0.51		0.11	0.47	0.47	0.19	0.15		0.19	0.15	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	2.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	510	1809		191	1687	755	146	500		310	476	
v/s Ratio Prot	c0.14	c0.43		0.09	c0.46		0.03	0.08		c0.06	0.09	
v/s Ratio Perm						0.07	0.08			c0.18		
v/c Ratio	0.95	0.84		0.82	0.97	0.14	0.55	0.54		1.24	0.61	
Uniform Delay, d1	49.8	24.5		51.4	30.2	17.6	40.5	46.3		46.3	46.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	28.6	3.5		22.9	15.1	0.0	4.5	1.2		130.7	2.2	
Delay (s)	78.3	28.0		74.3	45.3	17.6	45.1	47.5		176.9	49.1	
Level of Service	E	C		E	D	B	D	D		F	D	
Approach Delay (s)		40.2			44.4			47.1			105.7	
Approach LOS		D			D			D			F	
Intersection Summary												
HCM Average Control Delay			52.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			1.10									
Actuated Cycle Length (s)			117.6			Sum of lost time (s)			27.5			
Intersection Capacity Utilization			95.4%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Add SB Left Turn Lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

1/25/2011





















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	284	9	14	284	25	5	50	5	45	82	169
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	59	316	10	16	316	28	6	56	6	50	91	188
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	343			326			924	813	321	827	804	329
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	343			326			924	813	321	827	804	329
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 %	95			99			96	81	99	79	69	74
cM capacity (veh/h)	1221			1245			134	294	720	236	299	714
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	59	326	16	343	67	329						
Volume Left	59	0	16	0	6	50						
Volume Right	0	10	0	28	6	188						
cSH	1221	1700	1245	1700	280	645						
Volume to Capacity	0.05	0.19	0.01	0.20	0.24	0.51						
Queue Length 95th (ft)	4	0	1	0	23	73						
Control Delay (s)	8.1	0.0	7.9	0.0	21.8	20.0						
Lane LOS	A		A		C	C						
Approach Delay (s)	1.2		0.3		21.8	20.0						
Approach LOS					C	C						
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization			43.3%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: Add Southbound Right Turn Lane (100')												

**APPENDIX E5
ALTERNATIVE 1
YEAR 2012-PHASE 1**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	1453	225	82	1243	213	162	80	66	160	68	72
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	100	1562	242	88	1337	229	174	86	71	172	73	77
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1566			1804			2721	3504	781	2608	3517	668
vC1, stage 1 conf vol							1762	1762		1513	1513	
vC2, stage 2 conf vol							959	1742		1095	2004	
vCu, unblocked vol	1566			1804			2721	3504	781	2608	3517	668
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			74			0	0	79	0	0	81
cM capacity (veh/h)	423			342			0	4	340	0	3	403
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	100	781	781	242	88	668	668	229	331	323		
Volume Left	100	0	0	0	88	0	0	0	174	172		
Volume Right	0	0	0	242	0	0	0	229	71	77		
cSH	423	1700	1700	1700	342	1700	1700	1700	0	0		
Volume to Capacity	0.24	0.46	0.46	0.14	0.26	0.39	0.39	0.13	Err	Err		
Queue Length 95th (ft)	23	0	0	0	25	0	0	0	Err	Err		
Control Delay (s)	16.1	0.0	0.0	0.0	19.2	0.0	0.0	0.0	Err	Err		
Lane LOS	C				C				F	F		
Approach Delay (s)	0.8				1.0				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			75.8%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	1688	30	19	1447	29	15	3	21	11	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	1740	31	20	1492	30	15	3	22	11	4	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1522			1771			2608	3366	886	2489	3366	761
vC1, stage 1 conf vol							1805	1805		1546	1546	
vC2, stage 2 conf vol							803	1561		943	1821	
vCu, unblocked vol	1522			1771			2608	3366	886	2489	3366	761
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			94			79	96	93	89	95	96
cM capacity (veh/h)	434			352			74	88	292	99	83	352
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	25	1160	611	20	995	527	40	31				
Volume Left	25	0	0	20	0	0	15	11				
Volume Right	0	0	31	0	0	30	22	15				
cSH	434	1700	1700	352	1700	1700	126	149				
Volume to Capacity	0.06	0.68	0.36	0.06	0.59	0.31	0.32	0.21				
Queue Length 95th (ft)	5	0	0	4	0	0	31	19				
Control Delay (s)	13.8	0.0	0.0	15.8	0.0	0.0	46.3	35.5				
Lane LOS	B			C			E	E				
Approach Delay (s)	0.2			0.2			46.3	35.5				
Approach LOS							E	E				
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			57.6%		ICU Level of Service					B		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	1661	35	87	1291	23	80	31	89	56	34	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3563		1787	3565			1816	1599		1825	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.65	1.00		0.63	1.00
Satd. Flow (perm)	1787	3563		1787	3565			1222	1599		1188	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	1786	38	94	1388	25	86	33	96	60	37	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	49	0	0	24
Lane Group Flow (vph)	59	1823	0	94	1412	0	0	119	47	0	97	14
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	6.1	77.4		9.2	80.5			16.6	16.6		16.6	16.6
Effective Green, g (s)	6.1	77.4		9.2	80.5			16.6	16.6		16.6	16.6
Actuated g/C Ratio	0.05	0.66		0.08	0.69			0.14	0.14		0.14	0.14
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	93	2353		140	2449			173	226		168	226
v/s Ratio Prot	0.03	c0.51		0.05	c0.40							
v/s Ratio Perm								c0.10	0.03		0.08	0.01
v/c Ratio	0.63	0.77		0.67	0.58			0.69	0.21		0.58	0.06
Uniform Delay, d1	54.5	13.8		52.5	9.5			47.8	44.5		47.0	43.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	13.3	1.7		12.0	0.3			10.8	0.5		4.7	0.1
Delay (s)	67.8	15.6		64.5	9.8			58.7	44.9		51.8	43.7
Level of Service	E	B		E	A			E	D		D	D
Approach Delay (s)		17.2			13.2			52.5			49.5	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			18.8	HCM Level of Service			B					
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			117.2	Sum of lost time (s)			9.0					
Intersection Capacity Utilization			76.2%	ICU Level of Service			D					
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	1552	18	37	1471	138	47	9	95	113	8	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1787	3568		1787	3574	1599		1679			1815	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.84			0.54	1.00
Satd. Flow (perm)	1787	3568		1787	3574	1599		1439			1027	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	67	1669	19	40	1582	148	51	10	102	122	9	68
RTOR Reduction (vph)	0	0	0	0	0	47	0	51	0	0	0	55
Lane Group Flow (vph)	67	1688	0	40	1582	101	0	112	0	0	131	13
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	6.7	66.4		3.7	63.4	63.4		19.5			19.5	19.5
Effective Green, g (s)	6.7	66.4		3.7	63.4	63.4		19.5			19.5	19.5
Actuated g/C Ratio	0.06	0.63		0.04	0.60	0.60		0.18			0.18	0.18
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	113	2244		63	2146	960		266			190	298
v/s Ratio Prot	c0.04	c0.47		0.02	0.44						c0.13	0.01
v/s Ratio Perm						0.06		0.08				0.01
v/c Ratio	0.59	0.75		0.63	0.74	0.11		0.42			0.69	0.04
Uniform Delay, d1	48.1	13.8		50.3	15.1	9.0		38.0			40.2	35.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	8.1	1.5		19.1	1.4	0.1		1.1			10.0	0.1
Delay (s)	56.2	15.3		69.3	16.5	9.0		39.1			50.2	35.4
Level of Service	E	B		E	B	A		D			D	D
Approach Delay (s)		16.8			17.1			39.1			45.2	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			19.3	HCM Level of Service			B					
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			105.6	Sum of lost time (s)			16.0					
Intersection Capacity Utilization			75.9%	ICU Level of Service			D					
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	439	1354	97	137	1328	194	96	191	173	344	128	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	467	1440	103	146	1413	206	102	203	184	366	136	334
RTOR Reduction (vph)	0	0	27	0	0	85	0	0	14	0	235	0
Lane Group Flow (vph)	467	1440	76	146	1413	121	102	203	170	366	235	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	63.6	9.5	47.0	69.5	11.6	11.9	21.4	22.5	22.8	
Effective Green, g (s)	14.5	52.0	63.6	9.5	47.0	69.5	11.6	11.9	21.4	22.5	22.8	
Actuated g/C Ratio	0.12	0.44	0.54	0.08	0.40	0.59	0.10	0.10	0.18	0.19	0.19	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	426	1576	937	144	1425	943	178	364	368	341	617	
v/s Ratio Prot	c0.13	0.40	0.01	0.08	c0.40	0.02	0.06	0.06	c0.04	c0.20	0.07	
v/s Ratio Perm			0.04			0.05			0.07			
v/c Ratio	1.10	0.91	0.08	1.01	0.99	0.13	0.57	0.56	0.46	1.07	0.38	
Uniform Delay, d1	51.7	30.8	13.1	54.2	35.3	10.8	50.8	50.5	43.1	47.7	41.4	
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	72.2	8.5	0.0	78.7	21.7	0.1	4.4	1.9	0.9	69.6	0.4	
Delay (s)	123.9	39.3	13.1	132.9	57.0	10.8	55.2	52.3	44.0	117.3	41.8	
Level of Service	F	D	B	F	E	B	E	D	D	F	D	
Approach Delay (s)		57.6			57.9			49.8			74.9	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM Average Control Delay	59.8			HCM Level of Service			E					
HCM Volume to Capacity ratio	0.98											
Actuated Cycle Length (s)	117.9			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	91.9%			ICU Level of Service			F					
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	116	9	38	5	20	126	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	125	10	41	5	22	135	28	16	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	218	240	16	178	172	89	16			157		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218	240	16	178	172	89	16			157		
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 %	100	99	100	84	99	96	100			98		
cM capacity (veh/h)	692	650	1069	766	708	974	1615			1435		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	175	162	44								
Volume Left	0	125	5	28								
Volume Right	3	41	135	0								
cSH	748	802	1615	1435								
Volume to Capacity	0.01	0.22	0.00	0.02								
Queue Length 95th (ft)	1	21	0	1								
Control Delay (s)	9.9	10.7	0.3	4.8								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.9	10.7	0.3	4.8								
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			37.7%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

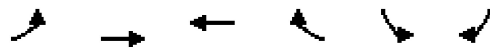
2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	42	0	265	35	49	313	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	46	0	288	38	53	340	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	799	773	340	754	754	307	340			326		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	799	773	340	754	754	307	340			326		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	85	100	94	100			96		
cM capacity (veh/h)	275	316	702	307	316	717	1202			1245		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	92	326	393								
Volume Left	0	47	0	53								
Volume Right	0	46	38	0								
cSH	1700	428	1202	1245								
Volume to Capacity	0.00	0.22	0.00	0.04								
Queue Length 95th (ft)	0	20	0	3								
Control Delay (s)	0.0	15.7	0.0	1.5								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	15.7	0.0	1.5								
Approach LOS	A	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			50.2%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/8/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	271	0	2	20	22	335
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	0	2	22	24	364
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	24				602	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24				602	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	81				94	66
cM capacity (veh/h)	1584				377	1067
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	295	24	388			
Volume Left	295	0	24			
Volume Right	0	22	364			
cSH	1584	1700	959			
Volume to Capacity	0.19	0.01	0.40			
Queue Length 95th (ft)	17	0	50			
Control Delay (s)	7.8	0.0	11.3			
Lane LOS	A		B			
Approach Delay (s)	7.8	0.0	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay		9.4				
Intersection Capacity Utilization		50.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















2/8/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	335	3	3	271
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	404	4	4	327
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			6		815	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		815	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			75		99	70
cM capacity (veh/h)			1628		260	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	407	330			
Volume Left	0	404	4			
Volume Right	4	0	327			
cSH	1700	1628	1041			
Volume to Capacity	0.00	0.25	0.32			
Queue Length 95th (ft)	0	25	34			
Control Delay (s)	0.0	7.9	10.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	7.9	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			8.8			
Intersection Capacity Utilization			49.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	284	9	14	284	93	5	108	5	118	145	190
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	316	10	16	316	103	6	120	6	131	161	211
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	419			326			1114	926	321	935	879	367
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	419			326			1114	926	321	935	879	367
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 %	93			99			91	51	99	8	39	69
cM capacity (veh/h)	1146			1245			62	247	720	143	264	680
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	78	326	16	419	131	503						
Volume Left	78	0	16	0	6	131						
Volume Right	0	10	0	103	6	211						
cSH	1146	1700	1245	1700	225	274						
Volume to Capacity	0.07	0.19	0.01	0.25	0.58	1.84						
Queue Length 95th (ft)	5	0	1	0	82	854						
Control Delay (s)	8.4	0.0	7.9	0.0	41.1	421.4						
Lane LOS	A		A		E	F						
Approach Delay (s)	1.6		0.3		41.1	421.4						
Approach LOS					E	F						
Intersection Summary												
Average Delay			148.3									
Intersection Capacity Utilization			66.9%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/8/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	482	49	330	570	361	765
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	669	68	458	792	501	1062
RTOR Reduction (vph)	0	51	0	0	0	0
Lane Group Flow (vph)	669	17	458	792	501	1062
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	17.5	17.5	12.1	35.6	23.9	69.5
Effective Green, g (s)	17.5	17.5	12.1	35.6	23.9	69.5
Actuated g/C Ratio	0.25	0.25	0.17	0.51	0.34	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	874	391	604	964	621	1615
v/s Ratio Prot	0.19		0.13	c0.42	c0.28	
v/s Ratio Perm		0.01				0.66
v/c Ratio	0.77	0.04	0.76	0.82	0.81	0.66
Uniform Delay, d1	24.1	19.7	27.3	14.3	20.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.0	5.4	5.7	7.6	2.1
Delay (s)	28.1	19.7	32.7	20.0	28.3	2.1
Level of Service	C	B	C	B	C	A
Approach Delay (s)	27.4			24.7	10.5	
Approach LOS	C			C	B	
Intersection Summary						
HCM Average Control Delay			19.0		HCM Level of Service	B
HCM Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			69.5		Sum of lost time (s)	10.0
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/8/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	132	0	230	149	0	191
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	0	250	162	0	208
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	539	331			412	
vC1, stage 1 conf vol	331					
vC2, stage 2 conf vol	208					
vCu, unblocked vol	539	331			412	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	100			100	
cM capacity (veh/h)	662	711			1147	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	143	412	0	208		
Volume Left	143	0	0	0		
Volume Right	0	162	0	0		
cSH	655	1700	1700	1700		
Volume to Capacity	0.22	0.24	0.00	0.12		
Queue Length 95th (ft)	21	0	0	0		
Control Delay (s)	12.0	0.0	0.0	0.0		
Lane LOS	B					
Approach Delay (s)	12.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		35.2%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/8/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1421	961	165	0	162
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1545	1045	179	0	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1224				1817	522
vC1, stage 1 conf vol					1045	
vC2, stage 2 conf vol					772	
vCu, unblocked vol	1224				1817	522
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	65
cM capacity (veh/h)	565				246	499
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	772	772	522	522	179	176
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	179	176
cSH	1700	1700	1700	1700	1700	499
Volume to Capacity	0.45	0.45	0.31	0.31	0.11	0.35
Queue Length 95th (ft)	0	0	0	0	0	39
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	16.1
Lane LOS						C
Approach Delay (s)	0.0		0.0			16.1
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			43.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		 	 						
Volume (veh/h)	318	1103	982	436	674	144			
Sign Control	Free		Free	Stop					
Grade	0%		0%	0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	346	1199	1067	474	733	157			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL		None						
Median storage veh	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	1541				2358	534			
vC1, stage 1 conf vol					1067				
vC2, stage 2 conf vol					1291				
vCu, unblocked vol	1541				2358	534			
tC, single (s)	4.1				6.8	6.9			
tC, 2 stage (s)					5.8				
tF (s)	2.2				3.5	3.3			
p0 queue free %	19				0	68			
cM capacity (veh/h)	427				41	491			
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	
Volume Total	346	599	599	534	534	474	733	157	
Volume Left	346	0	0	0	0	0	733	0	
Volume Right	0	0	0	0	0	474	0	157	
cSH	427	1700	1700	1700	1700	1700	41	491	
Volume to Capacity	0.81	0.35	0.35	0.31	0.31	0.28	18.00	0.32	
Queue Length 95th (ft)	185	0	0	0	0	0	Err	34	
Control Delay (s)	40.7	0.0	0.0	0.0	0.0	0.0	Err	15.7	
Lane LOS	E							F	C
Approach Delay (s)	9.1				0.0				8241.6
Approach LOS							F		
Intersection Summary									
Average Delay			1847.0						
Intersection Capacity Utilization			92.1%	ICU Level of Service				F	
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/8/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1772	1383	94	0	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1926	1503	102	0	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1605				2466	752
vC1, stage 1 conf vol					1503	
vC2, stage 2 conf vol					963	
vCu, unblocked vol	1605				2466	752
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	89
cM capacity (veh/h)	403				147	353
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	963	963	752	752	102	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	102	38
cSH	1700	1700	1700	1700	1700	353
Volume to Capacity	0.57	0.57	0.44	0.44	0.06	0.11
Queue Length 95th (ft)	0	0	0	0	0	9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	16.4
Lane LOS						C
Approach Delay (s)	0.0		0.0			16.4
Approach LOS						C
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road




















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	129	0	42	0	0	0	28	250	0	0	208	115
Sign Control	Stop				Stop			Free			Free	
Grade	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)	140	0	46	0	0	0	30	272	0	0	226	125
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	559	559	226	604	684	272	351			272		
vC1, stage 1 conf vol	226	226		333	333							
vC2, stage 2 conf vol	333	333		272	351							
vCu, unblocked vol	559	559	226	604	684	272	351			272		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	100	94	100	100	100	97			100		
cM capacity (veh/h)	600	569	813	555	517	767	1208			1292		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	140	46	0	30	272	226	125					
Volume Left	140	0	0	30	0	0	0					
Volume Right	0	46	0	0	0	0	125					
cSH	600	813	1700	1208	1700	1700	1700					
Volume to Capacity	0.23	0.06	0.00	0.03	0.16	0.13	0.07					
Queue Length 95th (ft)	23	4	0	2	0	0	0					
Control Delay (s)	12.8	9.7	0.0	8.1	0.0	0.0	0.0					
Lane LOS	B	A	A	A								
Approach Delay (s)	12.1		0.0	0.8		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			31.4%		ICU Level of Service		A					
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road




















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	42	0	0	0	48	252	0	0	220	33
Sign Control	Stop				Stop				Free			
Grade	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)	35	0	46	0	0	0	52	274	0	0	239	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	635	635	257	681	653	274	275				274	
vC1, stage 1 conf vol	257	257		378	378							
vC2, stage 2 conf vol	378	378		303	275							
vCu, unblocked vol	635	635	257	681	653	274	275				274	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	94	100	94	100	100	100	96				100	
cM capacity (veh/h)	556	533	782	509	516	765	1288				1289	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	35	46	0	52	274	275						
Volume Left	35	0	0	52	0	0						
Volume Right	0	46	0	0	0	36						
cSH	556	782	1700	1288	1700	1700						
Volume to Capacity	0.06	0.06	0.00	0.04	0.16	0.16						
Queue Length 95th (ft)	5	5	0	3	0	0						
Control Delay (s)	11.9	9.9	0.0	7.9	0.0	0.0						
Lane LOS	B	A	A	A								
Approach Delay (s)	10.8		0.0	1.3		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay	1.9											
Intersection Capacity Utilization	30.2%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	58	0	125	0	0	0	135	242	0	0	212	55
Sign Control	Stop				Stop				Free			
Grade	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)	63	0	136	0	0	0	147	263	0	0	230	60
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	817	817	260	923	847	263	290				263	
vC1, stage 1 conf vol	260	260		557	557							
vC2, stage 2 conf vol	557	557		366	290							
vCu, unblocked vol	817	817	260	923	847	263	290				263	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	85	100	83	100	100	100	88				100	
cM capacity (veh/h)	427	423	778	334	400	776	1272				1301	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	63	136	0	147	263	0	290					
Volume Left	63	0	0	147	0	0	0					
Volume Right	0	136	0	0	0	0	60					
cSH	427	778	1700	1272	1700	1700	1700					
Volume to Capacity	0.15	0.17	0.00	0.12	0.15	0.00	0.17					
Queue Length 95th (ft)	13	16	0	10	0	0	0					
Control Delay (s)	14.9	10.6	0.0	8.2	0.0	0.0	0.0					
Lane LOS	B	B	A	A								
Approach Delay (s)	12.0		0.0	2.9		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			4.0									
Intersection Capacity Utilization			39.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1453	225	82	1243	213	162	80	66	160	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.93		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1754		1787	1736	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.46	1.00		0.37	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	872	1754		704	1736	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	100	1562	242	88	1337	229	174	86	71	172	73	77
RTOR Reduction (vph)	0	0	57	0	0	95	0	24	0	0	30	0
Lane Group Flow (vph)	100	1562	185	88	1337	134	174	133	0	172	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	12.3	85.5	85.5	8.5	81.7	81.7	24.0	17.0		26.0	18.0	
Effective Green, g (s)	12.3	85.5	85.5	8.5	81.7	81.7	24.0	17.0		26.0	18.0	
Actuated g/C Ratio	0.09	0.61	0.61	0.06	0.58	0.58	0.17	0.12		0.19	0.13	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	157	2183	977	108	2086	933	195	213		193	223	
v/s Ratio Prot	c0.06	c0.44		0.05	0.37		0.04	0.08		c0.05	0.07	
v/s Ratio Perm			0.12			0.08	0.11			c0.11		
v/c Ratio	0.64	0.72	0.19	0.81	0.64	0.14	0.89	0.63		0.89	0.54	
Uniform Delay, d1	61.7	18.8	12.0	65.0	19.4	13.2	56.0	58.5		54.4	57.1	
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	8.2	2.0	0.4	35.7	1.5	0.3	36.1	5.6		36.2	2.5	
Delay (s)	69.9	20.9	12.4	100.7	20.9	13.6	92.1	64.1		90.6	59.6	
Level of Service	E	C	B	F	C	B	F	E		F	E	
Approach Delay (s)		22.4			24.1			78.8			76.2	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM Average Control Delay			31.6			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			79.3%			ICU Level of Service				D		
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.





















2/21/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	439	1354	97	137	1328	194	96	191	173	344	128	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3538		1787	3574	1599	1805	3353		3467	3193	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3467	3538		1787	3574	1599	1805	3353		3467	3193	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	467	1440	103	146	1413	206	102	203	184	366	136	334
RTOR Reduction (vph)	0	3	0	0	0	93	0	138	0	0	269	0
Lane Group Flow (vph)	467	1540	0	146	1413	113	102	249	0	366	201	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		pm+ov	Prot			Prot		
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	18.0	57.8		11.9	51.7	66.0	11.7	13.9		14.3	16.5	
Effective Green, g (s)	18.0	57.8		11.9	51.7	66.0	11.7	13.9		14.3	16.5	
Actuated g/C Ratio	0.15	0.48		0.10	0.43	0.55	0.10	0.12		0.12	0.14	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	520	1706		177	1541	880	176	389		413	439	
v/s Ratio Prot	0.13	c0.44		0.08	c0.40	0.02	0.06	c0.07		c0.11	c0.06	
v/s Ratio Perm						0.06						
v/c Ratio	0.90	0.90		0.82	0.92	0.13	0.58	0.64		0.89	0.46	
Uniform Delay, d1	50.0	28.5		53.0	32.1	13.0	51.7	50.6		52.0	47.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.0	7.1		25.7	8.8	0.1	4.6	3.6		19.8	0.8	
Delay (s)	68.1	35.5		78.7	40.9	13.1	56.3	54.2		71.8	48.3	
Level of Service	E	D		E	D	B	E	D		E	D	
Approach Delay (s)		43.1			40.8			54.6			58.6	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay			45.9			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			119.9			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			88.2%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Dual SB Left Turn Lanes, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	284	9	14	284	93	5	108	5	118	145	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.96		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1830		1770	973		1787	1721	
Flt Permitted	0.28	1.00		0.49	1.00		0.44	1.00		0.58	1.00	
Satd. Flow (perm)	519	1873		931	1830		823	973		1088	1721	
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)	78	316	10	16	316	103	6	120	6	131	161	211
RTOR Reduction (vph)	0	2	0	0	19	0	0	3	0	0	78	0
Lane Group Flow (vph)	78	324	0	16	400	0	6	123	0	131	294	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.3	17.3		16.5	15.9		14.8	14.2		19.6	16.6	
Effective Green, g (s)	19.3	17.3		16.5	15.9		14.8	14.2		19.6	16.6	
Actuated g/C Ratio	0.38	0.34		0.32	0.31		0.29	0.28		0.38	0.32	
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)	246	634		311	569		249	270		458	559	
v/s Ratio Prot	c0.01	0.17		0.00	c0.22		0.00	0.13		c0.02	c0.17	
v/s Ratio Perm	0.11			0.02			0.01			0.09		
v/c Ratio	0.32	0.51		0.05	0.70		0.02	0.46		0.29	0.53	
Uniform Delay, d1	11.0	13.5		11.9	15.5		13.0	15.3		10.5	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.7		0.1	3.9		0.0	1.2		0.3	0.9	
Delay (s)	11.8	14.2		11.9	19.5		13.0	16.5		10.9	14.9	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		13.7			19.2			16.3			13.9	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			15.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			51.1			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			53.8%			ICU Level of Service			A			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	318	1103	982	436	674	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	346	1199	1067	474	733	157
RTOR Reduction (vph)	0	0	0	282	0	116
Lane Group Flow (vph)	346	1199	1067	192	733	41
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	27.3	80.0	48.7	48.7	31.0	31.0
Effective Green, g (s)	27.3	80.0	48.7	48.7	31.0	31.0
Actuated g/C Ratio	0.23	0.67	0.41	0.41	0.26	0.26
Clearance Time (s)	5.0	5.0	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)	403	2359	1436	642	887	409
v/s Ratio Prot	c0.20	0.34	c0.30		c0.21	
v/s Ratio Perm				0.12		0.03
v/c Ratio	0.86	0.51	0.74	0.30	0.83	0.10
Uniform Delay, d1	44.5	10.1	30.3	24.1	42.0	33.9
Progression Factor	1.00	1.00	1.00	1.00	0.98	0.95
Incremental Delay, d2	16.4	0.8	3.5	1.2	8.7	0.5
Delay (s)	60.9	10.9	33.8	25.3	49.8	32.6
Level of Service	E	B	C	C	D	C
Approach Delay (s)		22.1	31.2		46.8	
Approach LOS		C	C		D	

Intersection Summary





















HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

**APPENDIX E6
ALTERNATIVE 1
YEAR 2015-PHASE 2**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	142	1632	258	86	1419	309	195	99	73	236	85	107
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	153	1755	277	92	1526	332	210	106	78	254	91	115
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1858			2032			3169	4103	877	3025	4048	763
vC1, stage 1 conf vol							2060	2060		1711	1711	
vC2, stage 2 conf vol							1109	2043		1315	2338	
vCu, unblocked vol	1858			2032			3169	4103	877	3025	4048	763
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	53			67			0	0	73	0	0	67
cM capacity (veh/h)	326			279			0	1	293	0	1	349
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	153	877	877	277	92	763	763	332	395	460		
Volume Left	153	0	0	0	92	0	0	0	210	254		
Volume Right	0	0	0	277	0	0	0	332	78	115		
cSH	326	1700	1700	1700	279	1700	1700	1700	0	0		
Volume to Capacity	0.47	0.52	0.52	0.16	0.33	0.45	0.45	0.20	Err	Err		
Queue Length 95th (ft)	60	0	0	0	35	0	0	0	Err	Err		
Control Delay (s)	25.4	0.0	0.0	0.0	24.2	0.0	0.0	0.0	Err	Err		
Lane LOS	D				C				F	F		
Approach Delay (s)	1.8				1.1				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			90.0%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	1937	30	19	1727	31	15	3	21	12	4	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	28	1997	31	20	1780	32	15	3	22	12	4	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1812			2028			3017	3920	1014	2913	3919	906
vC1, stage 1 conf vol							2068	2068		1836	1836	
vC2, stage 2 conf vol							949	1852		1077	2084	
vCu, unblocked vol	1812			2028			3017	3920	1014	2913	3919	906
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			93			69	95	91	81	93	94
cM capacity (veh/h)	335			280			49	59	240	65	56	283
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	28	1331	697	20	1187	625	40	34				
Volume Left	28	0	0	20	0	0	15	12				
Volume Right	0	0	31	0	0	32	22	18				
cSH	335	1700	1700	280	1700	1700	88	105				
Volume to Capacity	0.08	0.78	0.41	0.07	0.70	0.37	0.46	0.32				
Queue Length 95th (ft)	7	0	0	6	0	0	48	32				
Control Delay (s)	16.7	0.0	0.0	18.8	0.0	0.0	76.6	55.1				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.2			0.2			76.6	55.1				
Approach LOS							F	F				
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			64.5%			ICU Level of Service			C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	1897	40	93	1494	30	86	34	94	65	35	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3563		1787	3564			1816	1599		1822	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.62	1.00		0.57	1.00
Satd. Flow (perm)	1787	3563		1787	3564			1157	1599		1067	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	66	2040	43	100	1606	32	92	37	101	70	38	45
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	47	0	0	25
Lane Group Flow (vph)	66	2082	0	100	1637	0	0	129	54	0	108	20
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	6.3	80.3		9.1	83.1			17.7	17.7		17.7	17.7
Effective Green, g (s)	6.3	80.3		9.1	83.1			17.7	17.7		17.7	17.7
Actuated g/C Ratio	0.05	0.66		0.08	0.69			0.15	0.15		0.15	0.15
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	93	2363		134	2446			169	234		156	234
v/s Ratio Prot	0.04	c0.58		0.06	c0.46							
v/s Ratio Perm								c0.11	0.03		0.10	0.01
v/c Ratio	0.71	0.88		0.75	0.67			0.76	0.23		0.69	0.09
Uniform Delay, d1	56.5	16.5		54.9	11.0			49.7	45.7		49.1	44.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	21.9	4.3		20.0	0.6			18.3	0.5		12.5	0.2
Delay (s)	78.4	20.9		74.9	11.7			68.0	46.2		61.6	44.9
Level of Service	E	C		E	B			E	D		E	D
Approach Delay (s)		22.6			15.3			58.4			56.7	
Approach LOS		C			B			E			E	
Intersection Summary												
HCM Average Control Delay			22.8			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			121.1			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			83.7%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.
























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	1737	20	38	1713	187	50	16	97	143	12	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1787	3568		1787	3574	1599		1687			1816	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.73			0.52	1.00
Satd. Flow (perm)	1787	3568		1787	3574	1599		1258			989	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	131	1868	22	41	1842	201	54	17	104	154	13	105
RTOR Reduction (vph)	0	0	0	0	0	56	0	44	0	0	0	64
Lane Group Flow (vph)	131	1890	0	41	1842	145	0	131	0	0	167	41
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	77.1		3.9	71.5	71.5		23.5			23.5	23.5
Effective Green, g (s)	9.5	77.1		3.9	71.5	71.5		23.5			23.5	23.5
Actuated g/C Ratio	0.08	0.64		0.03	0.59	0.59		0.20			0.20	0.20
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	141	2283		58	2121	949		245			193	315
v/s Ratio Prot	c0.07	c0.53		0.02	c0.52						c0.17	0.03
v/s Ratio Perm						0.09		0.10				0.03
v/c Ratio	0.93	0.83		0.71	0.87	0.15		0.53			0.87	0.13
Uniform Delay, d1	55.2	16.6		57.7	20.6	11.0		43.6			47.0	40.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	54.1	2.6		32.4	4.1	0.1		2.2			30.8	0.2
Delay (s)	109.3	19.2		90.2	24.6	11.0		45.8			77.8	40.2
Level of Service	F	B		F	C	B		D			E	D
Approach Delay (s)		25.1			24.6			45.8			63.3	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM Average Control Delay			27.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.5			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			83.7%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	462	1528	119	141	1574	199	110	192	173	345	129	336
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3187	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3187	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	491	1626	127	150	1674	212	117	204	184	367	137	357
RTOR Reduction (vph)	0	0	29	0	0	86	0	0	9	0	222	0
Lane Group Flow (vph)	491	1626	98	150	1674	126	117	204	175	367	272	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	13.5	56.0	68.7	8.5	51.0	70.5	12.7	12.5	21.0	19.5	19.3	
Effective Green, g (s)	13.5	56.0	68.7	8.5	51.0	70.5	12.7	12.5	21.0	19.5	19.3	
Actuated g/C Ratio	0.11	0.47	0.58	0.07	0.43	0.59	0.11	0.11	0.18	0.16	0.16	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	395	1689	1001	128	1538	951	193	381	361	294	519	
v/s Ratio Prot	c0.14	0.45	0.01	0.08	c0.47	0.02	0.06	0.06	0.03	c0.21	c0.09	
v/s Ratio Perm			0.05			0.06			0.07			
v/c Ratio	1.24	0.96	0.10	1.17	1.09	0.13	0.61	0.54	0.48	1.25	0.52	
Uniform Delay, d1	52.5	30.2	11.1	55.0	33.8	10.6	50.5	50.2	43.9	49.5	45.4	
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	129.1	14.0	0.0	133.1	51.0	0.1	5.3	1.4	1.0	136.9	1.0	
Delay (s)	181.6	44.3	11.1	188.1	84.8	10.6	55.8	51.7	44.9	186.4	46.4	
Level of Service	F	D	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		72.4			84.7			50.2			106.0	
Approach LOS		E			F			D			F	
Intersection Summary												
HCM Average Control Delay	80.0			HCM Level of Service			E					
HCM Volume to Capacity ratio	1.02											
Actuated Cycle Length (s)	118.5			Sum of lost time (s)			16.5					
Intersection Capacity Utilization	99.4%			ICU Level of Service			F					
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	142	9	38	5	20	151	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	153	10	41	5	22	162	28	16	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	231	267	16	192	185	103	16			184		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	231	267	16	192	185	103	16			184		
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 %	100	99	100	80	99	96	100			98		
cM capacity (veh/h)	677	628	1069	750	696	958	1615			1403		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	203	189	44								
Volume Left	0	153	5	28								
Volume Right	3	41	162	0								
cSH	728	781	1615	1403								
Volume to Capacity	0.01	0.26	0.00	0.02								
Queue Length 95th (ft)	1	26	0	2								
Control Delay (s)	10.0	11.2	0.2	4.9								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.0	11.2	0.2	4.9								
Approach LOS	B	B										
Intersection Summary												
Average Delay			5.9									
Intersection Capacity Utilization			39.9%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/8/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	49	0	315	35	57	360	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	53	0	342	38	62	391	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	930	896	391	877	877	361	391			380		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	930	896	391	877	877	361	391			380		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	81	100	92	100			95		
cM capacity (veh/h)	219	265	657	251	265	668	1151			1189		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	100	380	453								
Volume Left	0	47	0	62								
Volume Right	0	53	38	0								
cSH	1700	376	1151	1189								
Volume to Capacity	0.00	0.27	0.00	0.05								
Queue Length 95th (ft)	0	26	0	4								
Control Delay (s)	0.0	18.0	0.0	1.6								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	18.0	0.0	1.6								
Approach LOS	A	C										
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			56.2%	ICU Level of Service						B		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/8/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	316	0	2	26	27	376
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	343	0	2	28	29	409
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	30				703	16
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				703	16
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	78				91	62
cM capacity (veh/h)	1576				316	1063
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	343	30	438			
Volume Left	343	0	29			
Volume Right	0	28	409			
cSH	1576	1700	917			
Volume to Capacity	0.22	0.02	0.48			
Queue Length 95th (ft)	21	0	66			
Control Delay (s)	7.9	0.0	12.5			
Lane LOS	A		B			
Approach Delay (s)	7.9	0.0	12.5			
Approach LOS			B			
Intersection Summary						
Average Delay			10.1			
Intersection Capacity Utilization			55.6%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















2/8/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	376	3	3	316
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	453	4	4	381
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			6		914	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		914	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			72		98	65
cM capacity (veh/h)			1628		218	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	457	384			
Volume Left	0	453	4			
Volume Right	4	0	381			
cSH	1700	1628	1038			
Volume to Capacity	0.00	0.28	0.37			
Queue Length 95th (ft)	0	29	43			
Control Delay (s)	0.0	8.0	10.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	8.0	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			9.1			
Intersection Capacity Utilization			54.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	78	284	9	14	284	113	5	126	5	137	161	196
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	87	316	10	16	316	126	6	140	6	152	179	218
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	441			326			1148	966	321	974	908	378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			326			1148	966	321	974	908	378
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 %	92			99			88	40	99	0	29	68
cM capacity (veh/h)	1124			1245			47	232	720	112	252	671
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	87	326	16	441	151	549						
Volume Left	87	0	16	0	6	152						
Volume Right	0	10	0	126	6	218						
cSH	1124	1700	1245	1700	207	230						
Volume to Capacity	0.08	0.19	0.01	0.26	0.73	2.39						
Queue Length 95th (ft)	6	0	1	0	120	1113						
Control Delay (s)	8.5	0.0	7.9	0.0	58.4	671.9						
Lane LOS	A		A		F	F						
Approach Delay (s)	1.8		0.3		58.4	671.9						
Approach LOS					F	F						
Intersection Summary												
Average Delay			241.2									
Intersection Capacity Utilization			81.2%	ICU Level of Service				D				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/8/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	552	49	403	632	361	871
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	767	68	560	878	501	1210
RTOR Reduction (vph)	0	50	0	0	0	0
Lane Group Flow (vph)	767	18	560	878	501	1210
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	20.3	20.3	14.6	40.9	24.4	75.3
Effective Green, g (s)	20.3	20.3	14.6	40.9	24.4	75.3
Actuated g/C Ratio	0.27	0.27	0.19	0.54	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	936	419	672	1022	585	1615
v/s Ratio Prot	0.22		0.16	c0.47	0.28	
v/s Ratio Perm		0.01				c0.75
v/c Ratio	0.82	0.04	0.83	0.86	0.86	0.75
Uniform Delay, d1	25.8	20.3	29.2	14.7	23.8	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.7	0.0	8.7	7.3	11.8	3.2
Delay (s)	31.5	20.4	37.9	22.0	35.6	3.2
Level of Service	C	C	D	C	D	A
Approach Delay (s)	30.6			28.2	12.7	
Approach LOS	C			C	B	
Intersection Summary						
HCM Average Control Delay			22.1		HCM Level of Service	C
HCM Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			75.3		Sum of lost time (s)	6.0
Intersection Capacity Utilization			61.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/8/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	187	0	319	212	0	265
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	203	0	347	230	0	288
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	750	462			577	
vC1, stage 1 conf vol	462					
vC2, stage 2 conf vol	288					
vCu, unblocked vol	750	462			577	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	64	100			100	
cM capacity (veh/h)	567	600			996	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	203	577	0	288		
Volume Left	203	0	0	0		
Volume Right	0	230	0	0		
cSH	563	1700	1700	1700		
Volume to Capacity	0.36	0.34	0.00	0.17		
Queue Length 95th (ft)	41	0	0	0		
Control Delay (s)	15.0	0.0	0.0	0.0		
Lane LOS	B					
Approach Delay (s)	15.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.8				
Intersection Capacity Utilization		46.8%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/8/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1599	1117	170	0	168
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1738	1214	185	0	183
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1399				2083	607
vC1, stage 1 conf vol					1214	
vC2, stage 2 conf vol					869	
vCu, unblocked vol	1399				2083	607
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	58
cM capacity (veh/h)	484				202	439
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	869	869	607	607	185	183
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	185	183
cSH	1700	1700	1700	1700	1700	439
Volume to Capacity	0.51	0.51	0.36	0.36	0.11	0.42
Queue Length 95th (ft)	0	0	0	0	0	50
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	18.9
Lane LOS						C
Approach Delay (s)	0.0		0.0			18.9
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			47.9%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations		 	 					
Volume (veh/h)	366	1234	1114	539	804	174		
Sign Control	Free		Free	Stop				
Grade	0%		0%	0%				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	398	1341	1211	586	874	189		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	TWLTL		None					
Median storage veh	2							
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume	1797				2677	605		
vC1, stage 1 conf vol					1211			
vC2, stage 2 conf vol					1466			
vCu, unblocked vol	1797				2677	605		
tC, single (s)	4.1				6.8	6.9		
tC, 2 stage (s)					5.8			
tF (s)	2.2				3.5	3.3		
p0 queue free %	0				0	57		
cM capacity (veh/h)	340				0	440		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	398	671	671	605	605	586	874	189
Volume Left	398	0	0	0	0	0	874	0
Volume Right	0	0	0	0	0	586	0	189
cSH	340	1700	1700	1700	1700	1700	0	440
Volume to Capacity	1.17	0.39	0.39	0.36	0.36	0.34	Err	0.43
Queue Length 95th (ft)	409	0	0	0	0	0	Err	53
Control Delay (s)	138.1	0.0	0.0	0.0	0.0	0.0	Err	19.2
Lane LOS	F						F	C
Approach Delay (s)	31.6				0.0			Err
Approach LOS							F	
Intersection Summary								
Average Delay				Err				
Intersection Capacity Utilization	105.6%			ICU Level of Service			G	
Analysis Period (min)	15							

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/8/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2033	1610	111	0	42
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2210	1750	121	0	46
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1871				2855	875
vC1, stage 1 conf vol					1750	
vC2, stage 2 conf vol					1105	
vCu, unblocked vol	1871				2855	875
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	84
cM capacity (veh/h)	318				110	292
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1105	1105	875	875	121	46
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	121	46
cSH	1700	1700	1700	1700	1700	292
Volume to Capacity	0.65	0.65	0.51	0.51	0.07	0.16
Queue Length 95th (ft)	0	0	0	0	0	14
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	19.6
Lane LOS						C
Approach Delay (s)	0.0		0.0			19.6
Approach LOS						C
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			59.5%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road




















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	164	0	45	0	0	0	28	367	0	0	300	152
Sign Control		Stop			Stop			Free			Free	
Grade		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)	178	0	49	0	0	0	30	399	0	0	326	165
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	786	786	326	835	951	399	491			399		
vC1, stage 1 conf vol	326	326		460	460							
vC2, stage 2 conf vol	460	460		375	491							
vCu, unblocked vol	786	786	326	835	951	399	491			399		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	64	100	93	100	100	100	97			100		
cM capacity (veh/h)	496	485	715	455	429	651	1072			1160		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	178	49	0	30	399	326	165					
Volume Left	178	0	0	30	0	0	0					
Volume Right	0	49	0	0	0	0	165					
cSH	496	715	1700	1072	1700	1700	1700					
Volume to Capacity	0.36	0.07	0.00	0.03	0.23	0.19	0.10					
Queue Length 95th (ft)	40	5	0	2	0	0	0					
Control Delay (s)	16.3	10.4	0.0	8.5	0.0	0.0	0.0					
Lane LOS	C	B	A	A								
Approach Delay (s)	15.0		0.0	0.6		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			38.2%		ICU Level of Service					A		
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road





















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	0	53	0	0	0	60	370	0	0	310	41
Sign Control	Stop				Stop				Free			
Grade	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)	43	0	58	0	0	0	65	402	0	0	337	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	892	892	359	949	914	402	382				402	
vC1, stage 1 conf vol	359	359		533	533							
vC2, stage 2 conf vol	533	533		417	382							
vCu, unblocked vol	892	892	359	949	914	402	382				402	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	90	100	92	100	100	100	94				100	
cM capacity (veh/h)	443	440	685	393	421	648	1177				1156	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	43	58	0	65	402	382						
Volume Left	43	0	0	65	0	0						
Volume Right	0	58	0	0	0	45						
cSH	443	685	1700	1177	1700	1700						
Volume to Capacity	0.10	0.08	0.00	0.06	0.24	0.22						
Queue Length 95th (ft)	8	7	0	4	0	0						
Control Delay (s)	14.0	10.7	0.0	8.2	0.0	0.0						
Lane LOS	B	B	A	A								
Approach Delay (s)	12.1		0.0	1.1		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			35.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road























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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	0	157	0	0	0	172	363	0	0	307	63
Sign Control	Stop			Stop			Free			Free		
Grade	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)	72	0	171	0	0	0	187	395	0	0	334	68
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1136	1136	368	1273	1171	395	402			395		
vC1, stage 1 conf vol	368	368		768	768							
vC2, stage 2 conf vol	768	768		504	402							
vCu, unblocked vol	1136	1136	368	1273	1171	395	402			395		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	100	75	100	100	100	84			100		
cM capacity (veh/h)	308	319	677	198	294	655	1156			1164		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	72	171	0	187	395	0	402					
Volume Left	72	0	0	187	0	0	0					
Volume Right	0	171	0	0	0	0	68					
cSH	308	677	1700	1156	1700	1700	1700					
Volume to Capacity	0.23	0.25	0.00	0.16	0.23	0.00	0.24					
Queue Length 95th (ft)	22	25	0	14	0	0	0					
Control Delay (s)	20.2	12.1	0.0	8.7	0.0	0.0	0.0					
Lane LOS	C	B	A	A								
Approach Delay (s)	14.5		0.0	2.8		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay	4.2											
Intersection Capacity Utilization	49.2%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road




















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	142	1632	258	86	1419	309	195	99	73	236	85	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1762		1787	1724	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.38	1.00		0.38	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	721	1762		720	1724	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	153	1755	277	92	1526	332	210	106	78	254	91	115
RTOR Reduction (vph)	0	0	69	0	0	157	0	26	0	0	45	0
Lane Group Flow (vph)	153	1755	208	92	1526	175	210	158	0	254	161	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.7	64.7	64.7	6.5	60.5	60.5	21.8	16.8		23.8	17.8	
Effective Green, g (s)	10.7	64.7	64.7	6.5	60.5	60.5	21.8	16.8		23.8	17.8	
Actuated g/C Ratio	0.09	0.56	0.56	0.06	0.53	0.53	0.19	0.15		0.21	0.15	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	166	2011	900	101	1880	841	183	257		205	267	
v/s Ratio Prot	c0.09	c0.49		0.05	0.43		0.05	0.09		c0.06	0.09	
v/s Ratio Perm			0.13			0.11	0.17			c0.19		
v/c Ratio	0.92	0.87	0.23	0.91	0.81	0.21	1.15	0.62		1.24	0.60	
Uniform Delay, d1	51.7	21.6	12.6	54.0	22.5	14.5	46.4	46.1		45.2	45.3	
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	47.4	5.6	0.6	61.5	3.9	0.6	111.8	4.3		142.0	3.8	
Delay (s)	99.2	27.2	13.2	115.5	26.5	15.1	158.2	50.4		187.2	49.1	
Level of Service	F	C	B	F	C	B	F	D		F	D	
Approach Delay (s)		30.5			28.7			107.9			125.4	
Approach LOS		C			C			F			F	
Intersection Summary												
HCM Average Control Delay			44.7			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			115.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			90.1%			ICU Level of Service				E		
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.

























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	1937	30	19	1727	31	15	3	21	12	4	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	28	1997	31	20	1780	32	15	3	22	12	4	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1812			2028			3017	3920	1014	2891	3919	906
vC1, stage 1 conf vol							2068	2068		1836	1836	
vC2, stage 2 conf vol							949	1852		1056	2084	
vCu, unblocked vol	1812			2028			3017	3920	1014	2891	3919	906
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			93			69	95	91	81	93	94
cM capacity (veh/h)	335			280			49	59	240	66	56	283
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	28	1331	697	20	1187	625	40	34				
Volume Left	28	0	0	20	0	0	15	12				
Volume Right	0	0	31	0	0	32	22	18				
cSH	335	1700	1700	280	1700	1700	110	105				
Volume to Capacity	0.08	0.78	0.41	0.07	0.70	0.37	0.37	0.32				
Queue Length 95th (ft)	7	0	0	6	0	0	37	31				
Control Delay (s)	16.7	0.0	0.0	18.8	0.0	0.0	63.3	54.8				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.2			0.2			63.3	54.8				
Approach LOS							F	F				
Intersection Summary												
Average Delay			1.3									
Intersection Capacity Utilization			71.2%			ICU Level of Service			C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	462	1528	119	141	1574	199	110	192	173	345	129	336
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	3467	3574	1599	1805	3610	1615	3467	3187	
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)	3467	3574	1599	3467	3574	1599	1805	3610	1615	3467	3187	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	491	1626	127	150	1674	212	117	204	184	367	137	357
RTOR Reduction (vph)	0	0	28	0	0	90	0	0	7	0	217	0
Lane Group Flow (vph)	491	1626	99	150	1674	122	117	204	177	367	277	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	15.5	64.7	76.3	6.9	56.1	69.6	11.6	14.2	21.1	13.5	16.1	
Effective Green, g (s)	15.5	64.7	76.3	6.9	56.1	69.6	11.6	14.2	21.1	13.5	16.1	
Actuated g/C Ratio	0.13	0.53	0.63	0.06	0.46	0.57	0.10	0.12	0.17	0.11	0.13	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	443	1906	1078	197	1653	917	173	423	354	386	423	
v/s Ratio Prot	c0.14	0.45	0.01	0.04	c0.47	0.01	0.06	0.06	0.03	c0.11	c0.09	
v/s Ratio Perm			0.05			0.06			0.08			
v/c Ratio	1.11	0.85	0.09	0.76	1.01	0.13	0.68	0.48	0.50	0.95	0.66	
Uniform Delay, d1	52.9	24.2	8.9	56.4	32.6	11.9	53.0	50.1	45.3	53.6	50.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	75.6	3.9	0.0	15.9	25.3	0.1	10.0	0.9	1.1	33.2	3.6	
Delay (s)	128.5	28.1	8.9	72.2	57.9	12.0	63.0	51.0	46.5	86.7	53.6	
Level of Service	F	C	A	E	E	B	E	D	D	F	D	
Approach Delay (s)		49.0			54.2			52.1			67.7	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay			54.0	HCM Level of Service			D					
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			121.3	Sum of lost time (s)			16.5					
Intersection Capacity Utilization			95.5%	ICU Level of Service			F					
Analysis Period (min)			15									
Description: Dual SB/WB Lefts, EB RT Turn Lane, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	284	9	14	284	113	5	126	5	137	161	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.96		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1819		1770	974		1787	1726	
Flt Permitted	0.25	1.00		0.49	1.00		0.40	1.00		0.58	1.00	
Satd. Flow (perm)	474	1873		926	1819		743	974		1085	1726	
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)	87	316	10	16	316	126	6	140	6	152	179	218
RTOR Reduction (vph)	0	2	0	0	23	0	0	3	0	0	72	0
Lane Group Flow (vph)	87	324	0	16	419	0	6	143	0	152	325	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.2	18.2		17.4	16.8		15.8	15.2		20.4	17.5	
Effective Green, g (s)	20.2	18.2		17.4	16.8		15.8	15.2		20.4	17.5	
Actuated g/C Ratio	0.38	0.34		0.33	0.32		0.30	0.29		0.39	0.33	
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)	231	644		315	578		234	280		457	571	
v/s Ratio Prot	c0.01	0.17		0.00	c0.23		0.00	0.15		c0.02	c0.19	
v/s Ratio Perm	0.13			0.02			0.01			0.11		
v/c Ratio	0.38	0.50		0.05	0.73		0.03	0.51		0.33	0.57	
Uniform Delay, d1	11.5	13.8		12.1	16.0		13.2	15.7		11.0	14.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.6		0.1	4.5		0.0	1.6		0.4	1.3	
Delay (s)	12.5	14.4		12.1	20.5		13.2	17.3		11.5	15.9	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		14.0			20.2			17.2			14.7	
Approach LOS		B			C			B			B	
Intersection Summary												
HCM Average Control Delay			16.4			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			52.9			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			63.3%			ICU Level of Service			B			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	366	1234	1114	539	804	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	398	1341	1211	586	874	189
RTOR Reduction (vph)	0	0	0	354	0	138
Lane Group Flow (vph)	398	1341	1211	232	874	51
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	28.4	80.0	47.6	47.6	31.0	31.0
Effective Green, g (s)	28.4	80.0	47.6	47.6	31.0	31.0
Actuated g/C Ratio	0.24	0.67	0.40	0.40	0.26	0.26
Clearance Time (s)	5.0	5.0	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)	419	2359	1404	628	887	409
v/s Ratio Prot	c0.22	0.38	c0.34		c0.25	
v/s Ratio Perm				0.15		0.03
v/c Ratio	0.95	0.57	0.86	0.37	0.99	0.12
Uniform Delay, d1	45.1	10.7	33.2	25.6	44.3	34.1
Progression Factor	1.00	1.00	1.00	1.00	0.98	0.94
Incremental Delay, d2	31.0	1.0	7.2	1.7	26.9	0.6
Delay (s)	76.1	11.7	40.4	27.3	70.3	32.8
Level of Service	E	B	D	C	E	C
Approach Delay (s)		26.5	36.1		63.7	
Approach LOS		C	D		E	

Intersection Summary





















HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

**APPENDIX E7
ALTERNATIVE 1
YEAR 2019-PHASE 3**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	292	1821	292	90	1606	535	225	114	75	404	100	217
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	314	1958	314	97	1727	575	242	123	81	434	108	233
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2302			2272			3930	5082	979	3669	4820	863
vC1, stage 1 conf vol							2586	2586		1920	1920	
vC2, stage 2 conf vol							1344	2496		1749	2900	
vCu, unblocked vol	2302			2272			3930	5082	979	3669	4820	863
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			57			0	0	68	0	0	22
cM capacity (veh/h)	218			224			0	0	251	0	0	300
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	314	979	979	314	97	863	863	575	445	775		
Volume Left	314	0	0	0	97	0	0	0	242	434		
Volume Right	0	0	0	314	0	0	0	575	81	233		
cSH	218	1700	1700	1700	224	1700	1700	1700	0	0		
Volume to Capacity	1.44	0.58	0.58	0.18	0.43	0.51	0.51	0.34	Err	Err		
Queue Length 95th (ft)	459	0	0	0	51	0	0	0	Err	Err		
Control Delay (s)	263.0	0.0	0.0	0.0	32.7	0.0	0.0	0.0	Err	Err		
Lane LOS	F				D				F	F		
Approach Delay (s)	31.9				1.3				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			121.4%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	2264	30	19	2143	33	15	3	21	13	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	39	2334	31	20	2209	34	15	3	22	13	4	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2243			2365			3601	4710	1182	3534	4709	1122
vC1, stage 1 conf vol							2428	2428		2265	2265	
vC2, stage 2 conf vol							1173	2282		1269	2443	
vCu, unblocked vol	2243			2365			3601	4710	1182	3534	4709	1122
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			90			40	87	88	61	85	87
cM capacity (veh/h)	227			206			26	24	185	35	28	203
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	39	1556	809	20	1473	770	40	44				
Volume Left	39	0	0	20	0	0	15	13				
Volume Right	0	0	31	0	0	34	22	27				
cSH	227	1700	1700	206	1700	1700	48	66				
Volume to Capacity	0.17	0.92	0.48	0.10	0.87	0.45	0.84	0.67				
Queue Length 95th (ft)	15	0	0	8	0	0	86	73				
Control Delay (s)	24.1	0.0	0.0	24.3	0.0	0.0	217.2	132.9				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.4			0.2			217.2	132.9				
Approach LOS							F	F				
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			73.5%			ICU Level of Service			D			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	2201	44	93	1699	52	90	44	94	89	39	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3564		1787	3558			1820	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.55	1.00		0.53	1.00
Satd. Flow (perm)	1787	3564		1787	3558			1040	1599		998	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	82	2367	47	100	1827	56	97	47	101	96	42	61
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	42	0	0	26
Lane Group Flow (vph)	82	2413	0	100	1882	0	0	144	59	0	138	35
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	8.0	80.2		8.1	80.3			19.8	19.8		19.8	19.8
Effective Green, g (s)	8.0	80.2		8.1	80.3			19.8	19.8		19.8	19.8
Actuated g/C Ratio	0.07	0.66		0.07	0.66			0.16	0.16		0.16	0.16
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	117	2341		119	2340			169	259		162	259
v/s Ratio Prot	0.05	c0.68		0.06	c0.53							
v/s Ratio Perm								c0.14	0.04		0.14	0.02
v/c Ratio	0.70	1.03		0.84	0.80			0.85	0.23		0.85	0.14
Uniform Delay, d1	55.9	20.9		56.4	15.2			49.7	44.5		49.7	43.8
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	17.3	27.0		38.5	2.0			31.6	0.5		32.6	0.2
Delay (s)	73.1	48.0		94.9	17.2			81.3	45.0		82.3	44.1
Level of Service	E	D		F	B			F	D		F	D
Approach Delay (s)		48.8			21.1			66.3			70.6	
Approach LOS		D			C			E			E	
Intersection Summary												
HCM Average Control Delay			39.4			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			122.1			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			93.0%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	2057	23	38	2134	219	52	24	97	177	19	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3568		1787	3574	1599		1697			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.69			0.53	1.00
Satd. Flow (perm)	1787	3568		1787	3574	1599		1195			1009	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	134	2212	25	41	2295	235	56	26	104	190	20	108
RTOR Reduction (vph)	0	0	0	0	0	56	0	37	0	0	0	58
Lane Group Flow (vph)	134	2237	0	41	2295	179	0	149	0	0	210	50
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	77.1		3.9	71.5	71.5		28.7			28.7	28.7
Effective Green, g (s)	9.5	77.1		3.9	71.5	71.5		28.7			28.7	28.7
Actuated g/C Ratio	0.08	0.61		0.03	0.57	0.57		0.23			0.23	0.23
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	135	2188		55	2033	910		273			230	369
v/s Ratio Prot	c0.07	c0.63		0.02	c0.64						c0.21	0.03
v/s Ratio Perm						0.11		0.12				0.03
v/c Ratio	0.99	1.02		0.75	1.13	0.20		0.55			0.91	0.14
Uniform Delay, d1	58.1	24.3		60.4	27.1	13.2		42.8			47.3	38.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	74.9	25.1		41.8	64.9	0.1		2.2			36.4	0.2
Delay (s)	133.0	49.4		102.2	92.0	13.3		45.0			83.7	38.8
Level of Service	F	D		F	F	B		D			F	D
Approach Delay (s)		54.1			85.0			45.0			68.5	
Approach LOS		D			F			D			E	
Intersection Summary												
HCM Average Control Delay			69.2	HCM Level of Service			E					
HCM Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			125.7	Sum of lost time (s)			21.5					
Intersection Capacity Utilization			104.3%	ICU Level of Service			G					
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	505	1793	153	147	1990	217	121	204	175	360	138	359
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3187	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3187	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	537	1907	163	156	2117	231	129	217	186	383	147	382
RTOR Reduction (vph)	0	0	33	0	0	83	0	0	3	0	199	0
Lane Group Flow (vph)	537	1907	130	156	2117	148	129	217	183	383	330	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	12.5	59.1	72.6	8.5	55.1	71.6	13.5	15.9	24.4	16.5	18.9	
Effective Green, g (s)	12.5	59.1	72.6	8.5	55.1	71.6	13.5	15.9	24.4	16.5	18.9	
Actuated g/C Ratio	0.10	0.48	0.60	0.07	0.45	0.59	0.11	0.13	0.20	0.14	0.15	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	355	1731	1024	125	1614	938	200	470	396	242	494	
v/s Ratio Prot	c0.15	0.53	0.01	0.09	c0.59	0.02	0.07	0.06	0.03	c0.21	c0.10	
v/s Ratio Perm			0.07			0.07			0.08			
v/c Ratio	1.51	1.10	0.13	1.25	1.31	0.16	0.65	0.46	0.46	1.58	0.86dr	
Uniform Delay, d1	54.8	31.4	10.8	56.8	33.5	11.5	52.0	49.1	43.0	52.8	48.6	
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	244.8	55.1	0.1	161.6	144.8	0.1	7.0	0.7	0.9	281.0	3.4	
Delay (s)	299.6	86.6	10.9	218.4	178.2	11.6	58.9	49.8	43.9	333.8	52.0	
Level of Service	F	F	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		125.7			165.4			49.9			170.4	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM Average Control Delay	140.9			HCM Level of Service			F					
HCM Volume to Capacity ratio	1.30											
Actuated Cycle Length (s)	122.0			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	113.3%			ICU Level of Service			H					
Analysis Period (min)	15											
Description: Optimized												
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	165	9	38	5	20	175	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	177	10	41	5	22	188	28	16	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	244	292	16	205	198	116	16			210		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244	292	16	205	198	116	16			210		
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 %	100	99	100	76	99	96	100			98		
cM capacity (veh/h)	663	607	1069	735	684	942	1615			1373		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	228	215	44								
Volume Left	0	177	5	28								
Volume Right	3	41	188	0								
cSH	709	763	1615	1373								
Volume to Capacity	0.01	0.30	0.00	0.02								
Queue Length 95th (ft)	1	31	0	2								
Control Delay (s)	10.1	11.7	0.2	4.9								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.1	11.7	0.2	4.9								
Approach LOS	B	B										
Intersection Summary												
Average Delay			6.1									
Intersection Capacity Utilization			41.8%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/8/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	56	0	356	35	64	403	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	61	0	387	38	70	438	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	1044	1002	438	983	983	406	438			425		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1044	1002	438	983	983	406	438			425		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	78	100	90	100			94		
cM capacity (veh/h)	178	228	619	211	227	630	1106			1145		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	108	425	508								
Volume Left	0	47	0	70								
Volume Right	0	61	38	0								
cSH	1700	338	1106	1145								
Volume to Capacity	0.00	0.32	0.00	0.06								
Queue Length 95th (ft)	0	33	0	5								
Control Delay (s)	0.0	20.5	0.0	1.7								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	20.5	0.0	1.7								
Approach LOS	A	C										
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			61.4%	ICU Level of Service						B		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/8/2011












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	353	0	2	30	31	414
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	384	0	2	33	34	450
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	35				786	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35				786	18
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	76				88	58
cM capacity (veh/h)	1570				273	1060
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	384	35	484			
Volume Left	384	0	34			
Volume Right	0	33	450			
cSH	1570	1700	882			
Volume to Capacity	0.24	0.02	0.55			
Queue Length 95th (ft)	24	0	85			
Control Delay (s)	8.0	0.0	13.9			
Lane LOS	A		B			
Approach Delay (s)	8.0	0.0	13.9			
Approach LOS			B			
Intersection Summary						
Average Delay		10.9				
Intersection Capacity Utilization		60.2%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















2/8/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	414	3	3	353
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	499	4	4	425
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			6		1005	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		1005	4
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		98	60
cM capacity (veh/h)			1628		185	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	502	429			
Volume Left	0	499	4			
Volume Right	4	0	425			
cSH	1700	1628	1034			
Volume to Capacity	0.00	0.31	0.41			
Queue Length 95th (ft)	0	33	52			
Control Delay (s)	0.0	8.1	10.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	8.1	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay			9.4			
Intersection Capacity Utilization			58.4%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	83	284	9	14	284	130	5	140	5	155	176	200
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	92	316	10	16	316	144	6	156	6	172	196	222
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	460			326			1172	996	321	1002	929	388
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460			326			1172	996	321	1002	929	388
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 %	92			99			84	30	99	0	20	66
cM capacity (veh/h)	1106			1245			35	221	720	89	243	663
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	92	326	16	460	167	590						
Volume Left	92	0	16	0	6	172						
Volume Right	0	10	0	144	6	222						
cSH	1106	1700	1245	1700	192	192						
Volume to Capacity	0.08	0.19	0.01	0.27	0.87	3.08						
Queue Length 95th (ft)	7	0	1	0	162	Err						
Control Delay (s)	8.5	0.0	7.9	0.0	84.9	Err						
Lane LOS	A		A		F	F						
Approach Delay (s)	1.9		0.3		84.9	Err						
Approach LOS					F	F						
Intersection Summary												
Average Delay			3584.5									
Intersection Capacity Utilization			86.0%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/8/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	663	49	527	718	361	1038
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	921	68	732	997	501	1442
RTOR Reduction (vph)	0	49	0	0	0	0
Lane Group Flow (vph)	921	19	732	997	501	1442
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	23.1	23.1	18.3	47.4	25.5	82.9
Effective Green, g (s)	23.1	23.1	18.3	47.4	25.5	82.9
Actuated g/C Ratio	0.28	0.28	0.22	0.57	0.31	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	967	433	765	1076	555	1615
v/s Ratio Prot	0.27		0.21	0.53	0.28	
v/s Ratio Perm		0.01				c0.89
v/c Ratio	0.95	0.04	0.96	0.93	0.90	0.89
Uniform Delay, d1	29.4	21.8	31.9	16.2	27.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.4	0.0	22.3	13.2	17.9	8.0
Delay (s)	47.8	21.9	54.2	29.3	45.4	8.0
Level of Service	D	C	D	C	D	A
Approach Delay (s)	46.0			39.9	17.6	
Approach LOS	D			D	B	
Intersection Summary						
HCM Average Control Delay			31.9		HCM Level of Service	C
HCM Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			82.9		Sum of lost time (s)	0.0
Intersection Capacity Utilization			66.7%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/8/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	297	0	534	356	0	433
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	323	0	580	387	0	471
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1245	774			967	
vC1, stage 1 conf vol	774					
vC2, stage 2 conf vol	471					
vCu, unblocked vol	1245	774			967	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	19	100			100	
cM capacity (veh/h)	397	399			712	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	323	967	0	471		
Volume Left	323	0	0	0		
Volume Right	0	387	0	0		
cSH	395	1700	1700	1700		
Volume to Capacity	0.82	0.57	0.00	0.28		
Queue Length 95th (ft)	185	0	0	0		
Control Delay (s)	44.0	0.0	0.0	0.0		
Lane LOS	E					
Approach Delay (s)	44.0	0.0	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay		8.1				
Intersection Capacity Utilization		73.0%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/8/2011









Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1884	1364	175	0	175
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2048	1483	190	0	190
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1673				2507	741
vC1, stage 1 conf vol					1483	
vC2, stage 2 conf vol					1024	
vCu, unblocked vol	1673				2507	741
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	47
cM capacity (veh/h)	380				148	359
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1024	1024	741	741	190	190
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	190	190
cSH	1700	1700	1700	1700	1700	359
Volume to Capacity	0.60	0.60	0.44	0.44	0.11	0.53
Queue Length 95th (ft)	0	0	0	0	0	74
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	25.8
Lane LOS						D
Approach Delay (s)	0.0		0.0			25.8
Approach LOS						D
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			55.4%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Volume (veh/h)	417	1467	1330	642	943	210		
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	453	1595	1446	698	1025	228		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	TWLTL		None					
Median storage veh	2							
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume	2143				3149	723		
vC1, stage 1 conf vol					1446			
vC2, stage 2 conf vol					1704			
vCu, unblocked vol	2143				3149	723		
tC, single (s)	4.1				6.8	6.9		
tC, 2 stage (s)					5.8			
tF (s)	2.2				3.5	3.3		
p0 queue free %	0				0	38		
cM capacity (veh/h)	248				0	369		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	453	797	797	723	723	698	1025	228
Volume Left	453	0	0	0	0	0	1025	0
Volume Right	0	0	0	0	0	698	0	228
cSH	248	1700	1700	1700	1700	1700	0	369
Volume to Capacity	1.82	0.47	0.47	0.43	0.43	0.41	Err	0.62
Queue Length 95th (ft)	777	0	0	0	0	0	Err	99
Control Delay (s)	420.1	0.0	0.0	0.0	0.0	0.0	Err	29.4
Lane LOS	F						F	D
Approach Delay (s)	93.0			0.0			Err	
Approach LOS							F	
Intersection Summary								
Average Delay			Err					
Intersection Capacity Utilization		122.1%		ICU Level of Service			H	
Analysis Period (min)		15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/8/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2405	1922	125	0	49
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2614	2089	136	0	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2225				3396	1045
vC1, stage 1 conf vol					2089	
vC2, stage 2 conf vol					1307	
vCu, unblocked vol	2225				3396	1045
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	76
cM capacity (veh/h)	231				73	226
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1307	1307	1045	1045	136	53
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	136	53
cSH	1700	1700	1700	1700	1700	226
Volume to Capacity	0.77	0.77	0.61	0.61	0.08	0.24
Queue Length 95th (ft)	0	0	0	0	0	22
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	25.8
Lane LOS						D
Approach Delay (s)	0.0		0.0			25.8
Approach LOS						D
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			69.8%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road



















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	208	0	47	0	0	0	37	682	0	0	543	186
Sign Control		Stop			Stop			Free			Free	
Grade		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)	226	0	51	0	0	0	40	741	0	0	590	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1412	1412	590	1463	1614	741	792			741		
vC1, stage 1 conf vol	590	590		822	822							
vC2, stage 2 conf vol	822	822		641	792							
vCu, unblocked vol	1412	1412	590	1463	1614	741	792			741		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	24	100	90	100	100	100	95			100		
cM capacity (veh/h)	297	313	507	266	270	416	828			866		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	226	51	0	40	741	590	202					
Volume Left	226	0	0	40	0	0	0					
Volume Right	0	51	0	0	0	0	202					
cSH	297	507	1700	828	1700	1700	1700					
Volume to Capacity	0.76	0.10	0.00	0.05	0.44	0.35	0.12					
Queue Length 95th (ft)	145	8	0	4	0	0	0					
Control Delay (s)	47.4	12.9	0.0	9.6	0.0	0.0	0.0					
Lane LOS	E	B	A	A								
Approach Delay (s)	41.0		0.0	0.5		0.0						
Approach LOS	E		A									
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			54.1%	ICU Level of Service				A				
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road




















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	63	0	0	0	69	707	0	0	559	49
Sign Control	Stop			Stop			Free			Free		
Grade	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)	50	0	68	0	0	0	75	768	0	0	608	53
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL						TWLTL					
Median storage veh	2						2					
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1553	1553	634	1621	1579	768	661				768	
vC1, stage 1 conf vol	634	634		918	918							
vC2, stage 2 conf vol	918	918		703	661							
vCu, unblocked vol	1553	1553	634	1621	1579	768	661				768	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	81	100	86	100	100	100	92				100	
cM capacity (veh/h)	257	276	479	214	259	401	927				846	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	50	68	0	75	768	661						
Volume Left	50	0	0	75	0	0						
Volume Right	0	68	0	0	0	53						
cSH	257	479	1700	927	1700	1700						
Volume to Capacity	0.19	0.14	0.00	0.08	0.45	0.39						
Queue Length 95th (ft)	18	12	0	7	0	0						
Control Delay (s)	22.3	13.8	0.0	9.2	0.0	0.0						
Lane LOS	C	B	A	A								
Approach Delay (s)	17.4		0.0	0.8		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay	1.7											
Intersection Capacity Utilization	50.1%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road
























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	73	0	188	0	0	0	201	704	0	0	569	72
Sign Control	Stop			Stop			Free			Free		
Grade	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)	79	0	204	0	0	0	218	765	0	0	618	78
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1860	1860	658	2025	1899	765	697				765	
vC1, stage 1 conf vol	658	658		1202	1202							
vC2, stage 2 conf vol	1202	1202		823	697							
vCu, unblocked vol	1860	1860	658	2025	1899	765	697				765	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	50	100	56	100	100	100	76				100	
cM capacity (veh/h)	158	179	464	19	152	403	899				848	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	79	204	0	218	765	0	697					
Volume Left	79	0	0	218	0	0	0					
Volume Right	0	204	0	0	0	0	78					
cSH	158	464	1700	899	1700	1700	1700					
Volume to Capacity	0.50	0.44	0.00	0.24	0.45	0.00	0.41					
Queue Length 95th (ft)	60	55	0	24	0	0	0					
Control Delay (s)	48.6	18.7	0.0	10.3	0.0	0.0	0.0					
Lane LOS	E	C	A	B								
Approach Delay (s)	27.1		0.0	2.3		0.0						
Approach LOS	D		A									
Intersection Summary												
Average Delay	5.1											
Intersection Capacity Utilization	67.1%			ICU Level of Service			C					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	292	1821	292	90	1606	535	225	114	75	404	100	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3574	1599	1787	3574	1599	3467	3361		3467	1881	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3574	1599	1787	3574	1599	3467	3361		3467	1881	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	314	1958	314	97	1727	575	242	123	81	434	108	233
RTOR Reduction (vph)	0	0	59	0	0	236	0	72	0	0	0	85
Lane Group Flow (vph)	314	1958	255	97	1727	339	242	132	0	434	108	148
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	10.5	78.5	78.5	6.5	74.5	74.5	11.8	15.0		14.0	17.2	17.2
Effective Green, g (s)	10.5	78.5	78.5	6.5	74.5	74.5	11.8	15.0		14.0	17.2	17.2
Actuated g/C Ratio	0.08	0.58	0.58	0.05	0.55	0.55	0.09	0.11		0.10	0.13	0.13
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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	3.0	3.0
Lane Grp Cap (vph)	270	2078	930	86	1972	882	303	373		360	240	204
v/s Ratio Prot	c0.09	c0.55		0.05	0.48		0.07	0.04		c0.13	0.06	
v/s Ratio Perm			0.16			0.21						c0.09
v/c Ratio	1.16	0.94	0.27	1.13	0.88	0.38	0.80	0.35		1.21	0.45	0.73
Uniform Delay, d1	62.2	26.2	14.1	64.2	26.2	17.2	60.4	55.5		60.5	54.5	56.6
Progression Factor	1.07	0.80	0.62	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	101.1	8.6	0.6	135.8	5.8	1.3	13.6	0.6		115.9	1.3	12.2
Delay (s)	167.8	29.5	9.2	200.0	32.1	18.5	74.1	56.1		176.4	55.9	68.8
Level of Service	F	C	A	F	C	B	E	E		F	E	E
Approach Delay (s)		43.9			35.6			65.9			127.3	
Approach LOS		D			D			E			F	
Intersection Summary												
HCM Average Control Delay			52.7				HCM Level of Service			D		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			135.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			89.9%				ICU Level of Service			E		
Analysis Period (min)			15									
Description: Dual EB, NB, SB lefts, 2nd NB through lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.






















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	2264	30	19	2143	33	15	3	21	13	4	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	39	2334	31	20	2209	34	15	3	22	13	4	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2243			2365			3574	4710	1182	3512	4709	1122
vC1, stage 1 conf vol							2428	2428		2265	2265	
vC2, stage 2 conf vol							1146	2282		1247	2443	
vCu, unblocked vol	2243			2365			3574	4710	1182	3512	4709	1122
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	83			90			41	87	88	61	85	87
cM capacity (veh/h)	227			206			26	24	185	35	28	203
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	39	1556	809	20	1473	770	40	44				
Volume Left	39	0	0	20	0	0	15	13				
Volume Right	0	0	31	0	0	34	22	27				
cSH	227	1700	1700	206	1700	1700	53	84				
Volume to Capacity	0.17	0.92	0.48	0.10	0.87	0.45	0.76	0.53				
Queue Length 95th (ft)	15	0	0	8	0	0	79	58				
Control Delay (s)	24.1	0.0	0.0	24.3	0.0	0.0	179.6	94.8				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.4			0.2			179.6	94.8				
Approach LOS							F	F				
Intersection Summary												
Average Delay			2.7									
Intersection Capacity Utilization			80.2%			ICU Level of Service			D			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	2057	23	38	2134	219	52	24	97	177	19	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.88		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3568		1787	3574	1599	1770	1639		1805	1660	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.61	1.00		0.60	1.00	
Satd. Flow (perm)	1787	3568		1787	3574	1599	1130	1639		1144	1660	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	132	2212	25	41	2295	235	56	26	104	190	20	108
RTOR Reduction (vph)	0	0	0	0	0	53	0	61	0	0	59	0
Lane Group Flow (vph)	132	2237	0	41	2295	182	56	69	0	190	69	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		
Actuated Green, G (s)	8.5	77.1		3.9	72.5	72.5	24.0	24.0		24.0	24.0	
Effective Green, g (s)	8.5	77.1		3.9	72.5	72.5	24.0	24.0		24.0	24.0	
Actuated g/C Ratio	0.07	0.64		0.03	0.60	0.60	0.20	0.20		0.20	0.20	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	126	2273		58	2141	958	224	325		227	329	
v/s Ratio Prot	c0.07	c0.63		0.02	c0.64			0.04			0.04	
v/s Ratio Perm						0.11	0.05			c0.17		
v/c Ratio	1.05	0.98		0.71	1.07	0.19	0.25	0.21		0.84	0.21	
Uniform Delay, d1	56.2	21.4		58.0	24.2	11.0	40.9	40.6		46.6	40.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	93.5	15.2		32.4	42.0	0.1	0.6	0.3		22.6	0.3	
Delay (s)	149.7	36.5		90.4	66.3	11.1	41.5	40.9		69.3	40.9	
Level of Service	F	D		F	E	B	D	D		E	D	
Approach Delay (s)		42.8			61.6			41.1			57.8	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM Average Control Delay			52.5			HCM Level of Service				D		
HCM Volume to Capacity ratio			1.08									
Actuated Cycle Length (s)			121.0			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			100.3%			ICU Level of Service			G			
Analysis Period (min)			15									
Description: Southbound left turn lane, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	505	1793	153	147	1990	217	121	204	175	360	138	359
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	3467	5136	1599	3502	3610	1615	3467	3187	
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)	3467	3574	1599	3467	5136	1599	3502	3610	1615	3467	3187	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	537	1907	163	156	2117	231	129	217	186	383	147	382
RTOR Reduction (vph)	0	0	30	0	0	101	0	0	2	0	227	0
Lane Group Flow (vph)	537	1907	133	156	2117	130	129	217	184	383	302	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	17.5	65.1	74.2	6.5	54.1	66.6	9.1	13.9	20.4	12.5	17.3	
Effective Green, g (s)	17.5	65.1	74.2	6.5	54.1	66.6	9.1	13.9	20.4	12.5	17.3	
Actuated g/C Ratio	0.15	0.54	0.62	0.05	0.45	0.55	0.08	0.12	0.17	0.10	0.14	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	506	1939	1062	188	2315	887	266	418	349	361	459	
v/s Ratio Prot	0.15	c0.53	0.01	0.04	c0.41	0.02	0.04	0.06	0.03	c0.11	c0.09	
v/s Ratio Perm			0.07			0.07			0.09			
v/c Ratio	1.06	0.98	0.13	0.83	0.91	0.15	0.48	0.52	0.53	1.06	0.66	
Uniform Delay, d1	51.2	26.9	9.5	56.2	30.8	12.9	53.2	49.9	45.4	53.8	48.6	
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	57.2	16.6	0.1	25.0	6.0	0.1	1.4	1.1	1.4	64.4	3.4	
Delay (s)	108.5	43.5	9.5	81.2	36.8	13.0	54.6	51.0	46.8	118.1	52.0	
Level of Service	F	D	A	F	D	B	D	D	D	F	D	
Approach Delay (s)		54.8			37.4			50.4			79.8	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay	51.3			HCM Level of Service			D					
HCM Volume to Capacity ratio	0.99											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	91.7%			ICU Level of Service			F					
Analysis Period (min)	15											
Description: Dual LTS all approaches, EB/NB RT turn lanes, third wb through lane, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	284	9	14	284	130	5	140	5	155	176	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.95		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1811		1770	975		1787	1731	
Flt Permitted	0.22	1.00		0.51	1.00		0.35	1.00		0.57	1.00	
Satd. Flow (perm)	423	1873		973	1811		649	975		1081	1731	
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)	92	316	10	16	316	144	6	156	6	172	196	222
RTOR Reduction (vph)	0	2	0	0	26	0	0	2	0	0	67	0
Lane Group Flow (vph)	92	324	0	16	434	0	6	160	0	172	351	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.2	20.3		18.8	18.1		16.6	15.9		21.0	18.1	
Effective Green, g (s)	23.2	20.3		18.8	18.1		16.6	15.9		21.0	18.1	
Actuated g/C Ratio	0.42	0.36		0.34	0.32		0.30	0.28		0.38	0.32	
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)	247	681		338	587		207	278		444	561	
v/s Ratio Prot	c0.02	0.17		0.00	c0.24		0.00	0.16		c0.02	c0.20	
v/s Ratio Perm	0.14			0.02			0.01			0.13		
v/c Ratio	0.37	0.48		0.05	0.74		0.03	0.58		0.39	0.63	
Uniform Delay, d1	11.3	13.7		12.4	16.8		14.1	17.1		12.4	16.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.1	4.9		0.1	2.9		0.6	2.2	
Delay (s)	12.2	14.2		12.5	21.6		14.1	19.9		13.0	18.2	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		13.8			21.3			19.7			16.7	
Approach LOS		B			C			B			B	
Intersection Summary												
HCM Average Control Delay			17.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			55.8			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			65.6%			ICU Level of Service			C			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	←←	↑↑	←←	↑	←←	↑
Volume (vph)	417	1467	1330	642	943	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	453	1595	1446	698	1025	228
RTOR Reduction (vph)	0	0	0	372	0	127
Lane Group Flow (vph)	453	1595	1446	326	1025	101
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	18.0	85.0	63.0	63.0	41.0	41.0
Effective Green, g (s)	18.0	85.0	63.0	63.0	41.0	41.0
Actuated g/C Ratio	0.13	0.63	0.47	0.47	0.30	0.30
Clearance Time (s)	5.0	5.0	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)	458	2228	1652	739	1043	481
v/s Ratio Prot	c0.13	0.45	c0.41		c0.30	
v/s Ratio Perm				0.21		0.06
v/c Ratio	0.99	0.72	0.88	0.44	0.98	0.21
Uniform Delay, d1	58.4	16.9	32.5	24.2	46.6	35.0
Progression Factor	1.00	1.00	0.92	2.50	0.98	0.90
Incremental Delay, d2	38.8	2.0	5.8	1.6	24.0	1.0
Delay (s)	97.2	18.9	35.5	62.1	69.6	32.6
Level of Service	F	B	D	E	E	C
Approach Delay (s)		36.2	44.1		62.8	
Approach LOS		D	D		E	













Intersection Summary

HCM Average Control Delay	45.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
Description: Signalized, Dual EB Lefts, Optimized			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

3/2/2011





















						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	297	0	534	356	0	433
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	323	0	580	387	0	471
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLTL			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1051	580			967	
vC1, stage 1 conf vol	580					
vC2, stage 2 conf vol	471					
vCu, unblocked vol	1051	580			967	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	31	100			100	
cM capacity (veh/h)	465	514			712	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	323	580	387	0	471	
Volume Left	323	0	0	0	0	
Volume Right	0	0	387	0	0	
cSH	463	1700	1700	1700	1700	
Volume to Capacity	0.70	0.34	0.23	0.00	0.28	
Queue Length 95th (ft)	132	0	0	0	0	
Control Delay (s)	28.8	0.0	0.0	0.0	0.0	
Lane LOS	D					
Approach Delay (s)	28.8	0.0		0.0		
Approach LOS	D					
Intersection Summary						
Average Delay		5.3				
Intersection Capacity Utilization		51.2%		ICU Level of Service		A
Analysis Period (min)		15				

**APPENDIX E8
ALTERNATIVE 2
YEAR 2012-BUILDOUT**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	1453	225	82	1243	213	162	80	66	160	68	72
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	100	1562	242	88	1337	229	174	86	71	172	73	77
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1566			1804			2721	3504	781	2608	3517	668
vC1, stage 1 conf vol							1762	1762		1513	1513	
vC2, stage 2 conf vol							959	1742		1095	2004	
vCu, unblocked vol	1566			1804			2721	3504	781	2608	3517	668
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	76			74			0	0	79	0	0	81
cM capacity (veh/h)	423			342			0	4	340	0	3	403
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	100	781	781	242	88	668	668	229	331	323		
Volume Left	100	0	0	0	88	0	0	0	174	172		
Volume Right	0	0	0	242	0	0	0	229	71	77		
cSH	423	1700	1700	1700	342	1700	1700	1700	0	0		
Volume to Capacity	0.24	0.46	0.46	0.14	0.26	0.39	0.39	0.13	Err	Err		
Queue Length 95th (ft)	23	0	0	0	25	0	0	0	Err	Err		
Control Delay (s)	16.1	0.0	0.0	0.0	19.2	0.0	0.0	0.0	Err	Err		
Lane LOS	C				C				F	F		
Approach Delay (s)	0.8				1.0				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			75.8%		ICU Level of Service				D			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	1688	30	19	1447	29	15	3	21	11	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	1740	31	20	1492	30	15	3	22	11	4	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1522			1771			2608	3366	886	2489	3366	761
vC1, stage 1 conf vol							1805	1805		1546	1546	
vC2, stage 2 conf vol							803	1561		943	1821	
vCu, unblocked vol	1522			1771			2608	3366	886	2489	3366	761
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			94			79	96	93	89	95	96
cM capacity (veh/h)	434			352			74	88	292	99	83	352
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	25	1160	611	20	995	527	40	31				
Volume Left	25	0	0	20	0	0	15	11				
Volume Right	0	0	31	0	0	30	22	15				
cSH	434	1700	1700	352	1700	1700	126	149				
Volume to Capacity	0.06	0.68	0.36	0.06	0.59	0.31	0.32	0.21				
Queue Length 95th (ft)	5	0	0	4	0	0	31	19				
Control Delay (s)	13.8	0.0	0.0	15.8	0.0	0.0	46.3	35.5				
Lane LOS	B			C			E	E				
Approach Delay (s)	0.2			0.2			46.3	35.5				
Approach LOS							E	E				
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			57.6%			ICU Level of Service		B				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	1661	35	87	1291	23	80	31	89	56	34	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3563		1787	3565			1816	1599		1825	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.65	1.00		0.63	1.00
Satd. Flow (perm)	1787	3563		1787	3565			1222	1599		1188	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	1786	38	94	1388	25	86	33	96	60	37	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	49	0	0	24
Lane Group Flow (vph)	59	1823	0	94	1412	0	0	119	47	0	97	14
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	6.1	77.4		9.2	80.5			16.6	16.6		16.6	16.6
Effective Green, g (s)	6.1	77.4		9.2	80.5			16.6	16.6		16.6	16.6
Actuated g/C Ratio	0.05	0.66		0.08	0.69			0.14	0.14		0.14	0.14
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	93	2353		140	2449			173	226		168	226
v/s Ratio Prot	0.03	c0.51		0.05	c0.40							
v/s Ratio Perm								c0.10	0.03		0.08	0.01
v/c Ratio	0.63	0.77		0.67	0.58			0.69	0.21		0.58	0.06
Uniform Delay, d1	54.5	13.8		52.5	9.5			47.8	44.5		47.0	43.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	13.3	1.7		12.0	0.3			10.8	0.5		4.7	0.1
Delay (s)	67.8	15.6		64.5	9.8			58.7	44.9		51.8	43.7
Level of Service	E	B		E	A			E	D		D	D
Approach Delay (s)		17.2			13.2			52.5			49.5	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			18.8			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			117.2			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			76.2%			ICU Level of Service			D			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	1552	18	37	1471	138	47	9	95	113	8	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1787	3568		1787	3574	1599		1679			1815	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.84			0.54	1.00
Satd. Flow (perm)	1787	3568		1787	3574	1599		1439			1027	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	67	1669	19	40	1582	148	51	10	102	122	9	68
RTOR Reduction (vph)	0	0	0	0	0	47	0	51	0	0	0	55
Lane Group Flow (vph)	67	1688	0	40	1582	101	0	112	0	0	131	13
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	6.7	66.4		3.7	63.4	63.4		19.5			19.5	19.5
Effective Green, g (s)	6.7	66.4		3.7	63.4	63.4		19.5			19.5	19.5
Actuated g/C Ratio	0.06	0.63		0.04	0.60	0.60		0.18			0.18	0.18
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	113	2244		63	2146	960		266			190	298
v/s Ratio Prot	c0.04	c0.47		0.02	0.44						c0.13	0.01
v/s Ratio Perm						0.06		0.08				0.01
v/c Ratio	0.59	0.75		0.63	0.74	0.11		0.42			0.69	0.04
Uniform Delay, d1	48.1	13.8		50.3	15.1	9.0		38.0			40.2	35.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	8.1	1.5		19.1	1.4	0.1		1.1			10.0	0.1
Delay (s)	56.2	15.3		69.3	16.5	9.0		39.1			50.2	35.4
Level of Service	E	B		E	B	A		D			D	D
Approach Delay (s)		16.8			17.1			39.1			45.2	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			19.3			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			105.6			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			75.9%			ICU Level of Service			D			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	439	1354	97	137	1328	194	96	191	173	344	128	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	467	1440	103	146	1413	206	102	203	184	366	136	334
RTOR Reduction (vph)	0	0	27	0	0	85	0	0	14	0	235	0
Lane Group Flow (vph)	467	1440	76	146	1413	121	102	203	170	366	235	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	63.6	9.5	47.0	69.5	11.6	11.9	21.4	22.5	22.8	
Effective Green, g (s)	14.5	52.0	63.6	9.5	47.0	69.5	11.6	11.9	21.4	22.5	22.8	
Actuated g/C Ratio	0.12	0.44	0.54	0.08	0.40	0.59	0.10	0.10	0.18	0.19	0.19	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	426	1576	937	144	1425	943	178	364	368	341	617	
v/s Ratio Prot	c0.13	0.40	0.01	0.08	c0.40	0.02	0.06	0.06	c0.04	c0.20	0.07	
v/s Ratio Perm			0.04			0.05			0.07			
v/c Ratio	1.10	0.91	0.08	1.01	0.99	0.13	0.57	0.56	0.46	1.07	0.38	
Uniform Delay, d1	51.7	30.8	13.1	54.2	35.3	10.8	50.8	50.5	43.1	47.7	41.4	
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	72.2	8.5	0.0	78.7	21.7	0.1	4.4	1.9	0.9	69.6	0.4	
Delay (s)	123.9	39.3	13.1	132.9	57.0	10.8	55.2	52.3	44.0	117.3	41.8	
Level of Service	F	D	B	F	E	B	E	D	D	F	D	
Approach Delay (s)		57.6			57.9			49.8			74.9	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM Average Control Delay	59.8			HCM Level of Service			E					
HCM Volume to Capacity ratio	0.98											
Actuated Cycle Length (s)	117.9			Sum of lost time (s)			22.0					
Intersection Capacity Utilization	91.9%			ICU Level of Service			F					
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	116	9	38	5	20	126	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	125	10	41	5	22	135	28	16	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	218	240	16	178	172	89	16			157		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218	240	16	178	172	89	16			157		
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 %	100	99	100	84	99	96	100			98		
cM capacity (veh/h)	692	650	1069	766	708	974	1615			1435		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	175	162	44								
Volume Left	0	125	5	28								
Volume Right	3	41	135	0								
cSH	748	802	1615	1435								
Volume to Capacity	0.01	0.22	0.00	0.02								
Queue Length 95th (ft)	1	21	0	1								
Control Delay (s)	9.9	10.7	0.3	4.8								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.9	10.7	0.3	4.8								
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			37.7%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	42	0	265	35	49	313	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	46	0	288	38	53	340	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	799	773	340	754	754	307	340			326		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	799	773	340	754	754	307	340			326		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	85	100	94	100			96		
cM capacity (veh/h)	275	316	702	307	316	717	1202			1245		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	92	326	393								
Volume Left	0	47	0	53								
Volume Right	0	46	38	0								
cSH	1700	428	1202	1245								
Volume to Capacity	0.00	0.22	0.00	0.04								
Queue Length 95th (ft)	0	20	0	3								
Control Delay (s)	0.0	15.7	0.0	1.5								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	15.7	0.0	1.5								
Approach LOS	A	C										
Intersection Summary												
Average Delay			2.5									
Intersection Capacity Utilization			50.2%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/8/2011












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	271	0	2	20	22	335
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	0	2	22	24	364
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	24				602	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24				602	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	81				94	66
cM capacity (veh/h)	1584				377	1067
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	295	24	388			
Volume Left	295	0	24			
Volume Right	0	22	364			
cSH	1584	1700	959			
Volume to Capacity	0.19	0.01	0.40			
Queue Length 95th (ft)	17	0	50			
Control Delay (s)	7.8	0.0	11.3			
Lane LOS	A		B			
Approach Delay (s)	7.8	0.0	11.3			
Approach LOS			B			
Intersection Summary						
Average Delay		9.4				
Intersection Capacity Utilization		50.3%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















2/8/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	335	3	3	271
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	404	4	4	327
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			6		815	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		815	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			75		99	70
cM capacity (veh/h)			1628		260	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	407	330			
Volume Left	0	404	4			
Volume Right	4	0	327			
cSH	1700	1628	1041			
Volume to Capacity	0.00	0.25	0.32			
Queue Length 95th (ft)	0	25	34			
Control Delay (s)	0.0	7.9	10.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	7.9	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			8.8			
Intersection Capacity Utilization			49.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	284	9	14	284	93	5	108	5	118	145	190
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	78	316	10	16	316	103	6	120	6	131	161	211
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	419			326			1114	926	321	935	879	367
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	419			326			1114	926	321	935	879	367
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 %	93			99			91	51	99	8	39	69
cM capacity (veh/h)	1146			1245			62	247	720	143	264	680
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	78	326	16	419	131	503						
Volume Left	78	0	16	0	6	131						
Volume Right	0	10	0	103	6	211						
cSH	1146	1700	1245	1700	225	274						
Volume to Capacity	0.07	0.19	0.01	0.25	0.58	1.84						
Queue Length 95th (ft)	5	0	1	0	82	854						
Control Delay (s)	8.4	0.0	7.9	0.0	41.1	421.4						
Lane LOS	A		A		E	F						
Approach Delay (s)	1.6		0.3		41.1	421.4						
Approach LOS					E	F						
Intersection Summary												
Average Delay			148.3									
Intersection Capacity Utilization			66.9%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/8/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	482	49	330	570	361	765
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	669	68	458	792	501	1062
RTOR Reduction (vph)	0	51	0	0	0	0
Lane Group Flow (vph)	669	17	458	792	501	1062
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot			Free
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	17.5	17.5	12.1	35.6	23.9	69.5
Effective Green, g (s)	17.5	17.5	12.1	35.6	23.9	69.5
Actuated g/C Ratio	0.25	0.25	0.17	0.51	0.34	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	874	391	604	964	621	1615
v/s Ratio Prot	0.19		0.13	c0.42	c0.28	
v/s Ratio Perm		0.01				0.66
v/c Ratio	0.77	0.04	0.76	0.82	0.81	0.66
Uniform Delay, d1	24.1	19.7	27.3	14.3	20.7	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.0	5.4	5.7	7.6	2.1
Delay (s)	28.1	19.7	32.7	20.0	28.3	2.1
Level of Service	C	B	C	B	C	A
Approach Delay (s)	27.4			24.7	10.5	
Approach LOS	C			C	B	
Intersection Summary						
HCM Average Control Delay			19.0		HCM Level of Service	B
HCM Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			69.5		Sum of lost time (s)	10.0
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/8/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	132	0	230	149	0	191
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	0	250	162	0	208
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	539	331			412	
vC1, stage 1 conf vol	331					
vC2, stage 2 conf vol	208					
vCu, unblocked vol	539	331			412	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	100			100	
cM capacity (veh/h)	662	711			1147	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	143	412	0	208		
Volume Left	143	0	0	0		
Volume Right	0	162	0	0		
cSH	655	1700	1700	1700		
Volume to Capacity	0.22	0.24	0.00	0.12		
Queue Length 95th (ft)	21	0	0	0		
Control Delay (s)	12.0	0.0	0.0	0.0		
Lane LOS	B					
Approach Delay (s)	12.0	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		35.2%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/8/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1421	961	165	0	162
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1545	1045	179	0	176
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1224				1817	522
vC1, stage 1 conf vol					1045	
vC2, stage 2 conf vol					772	
vCu, unblocked vol	1224				1817	522
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	65
cM capacity (veh/h)	565				246	499
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	772	772	522	522	179	176
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	179	176
cSH	1700	1700	1700	1700	1700	499
Volume to Capacity	0.45	0.45	0.31	0.31	0.11	0.35
Queue Length 95th (ft)	0	0	0	0	0	39
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	16.1
Lane LOS						C
Approach Delay (s)	0.0		0.0			16.1
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			43.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		 	 						
Volume (veh/h)	318	1103	982	436	674	144			
Sign Control	Free		Free	Stop					
Grade	0%		0%	0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	346	1199	1067	474	733	157			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL		None						
Median storage veh	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	1541				2358	534			
vC1, stage 1 conf vol					1067				
vC2, stage 2 conf vol					1291				
vCu, unblocked vol	1541				2358	534			
tC, single (s)	4.1				6.8	6.9			
tC, 2 stage (s)					5.8				
tF (s)	2.2				3.5	3.3			
p0 queue free %	19				0	68			
cM capacity (veh/h)	427				41	491			
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	
Volume Total	346	599	599	534	534	474	733	157	
Volume Left	346	0	0	0	0	0	733	0	
Volume Right	0	0	0	0	0	474	0	157	
cSH	427	1700	1700	1700	1700	1700	41	491	
Volume to Capacity	0.81	0.35	0.35	0.31	0.31	0.28	18.00	0.32	
Queue Length 95th (ft)	185	0	0	0	0	0	Err	34	
Control Delay (s)	40.7	0.0	0.0	0.0	0.0	0.0	Err	15.7	
Lane LOS	E							F	C
Approach Delay (s)	9.1				0.0				8241.6
Approach LOS									F
Intersection Summary									
Average Delay			1847.0						
Intersection Capacity Utilization			92.1%	ICU Level of Service		F			
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/8/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1772	1383	94	0	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1926	1503	102	0	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1605				2466	752
vC1, stage 1 conf vol					1503	
vC2, stage 2 conf vol					963	
vCu, unblocked vol	1605				2466	752
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	89
cM capacity (veh/h)	403				147	353
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	963	963	752	752	102	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	102	38
cSH	1700	1700	1700	1700	1700	353
Volume to Capacity	0.57	0.57	0.44	0.44	0.06	0.11
Queue Length 95th (ft)	0	0	0	0	0	9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	16.4
Lane LOS						C
Approach Delay (s)	0.0		0.0			16.4
Approach LOS						C
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road




















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	129	0	42	0	0	0	28	250	0	0	208	115
Sign Control	Stop				Stop				Free			
Grade	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)	140	0	46	0	0	0	30	272	0	0	226	125
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	559	559	226	604	684	272	351				272	
vC1, stage 1 conf vol	226	226		333	333							
vC2, stage 2 conf vol	333	333		272	351							
vCu, unblocked vol	559	559	226	604	684	272	351				272	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	77	100	94	100	100	100	97				100	
cM capacity (veh/h)	600	569	813	555	517	767	1208				1292	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	140	46	0	30	272	226	125					
Volume Left	140	0	0	30	0	0	0					
Volume Right	0	46	0	0	0	0	125					
cSH	600	813	1700	1208	1700	1700	1700					
Volume to Capacity	0.23	0.06	0.00	0.03	0.16	0.13	0.07					
Queue Length 95th (ft)	23	4	0	2	0	0	0					
Control Delay (s)	12.8	9.7	0.0	8.1	0.0	0.0	0.0					
Lane LOS	B	A	A	A								
Approach Delay (s)	12.1		0.0	0.8		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			3.0									
Intersection Capacity Utilization			31.4%		ICU Level of Service				A			
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road





















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	42	0	0	0	48	252	0	0	220	33
Sign Control	Stop				Stop		Free				Free	
Grade	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)	35	0	46	0	0	0	52	274	0	0	239	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	635	635	257	681	653	274	275				274	
vC1, stage 1 conf vol	257	257		378	378							
vC2, stage 2 conf vol	378	378		303	275							
vCu, unblocked vol	635	635	257	681	653	274	275				274	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	94	100	94	100	100	100	96				100	
cM capacity (veh/h)	556	533	782	509	516	765	1288				1289	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	35	46	0	52	274	275						
Volume Left	35	0	0	52	0	0						
Volume Right	0	46	0	0	0	36						
cSH	556	782	1700	1288	1700	1700						
Volume to Capacity	0.06	0.06	0.00	0.04	0.16	0.16						
Queue Length 95th (ft)	5	5	0	3	0	0						
Control Delay (s)	11.9	9.9	0.0	7.9	0.0	0.0						
Lane LOS	B	A	A	A								
Approach Delay (s)	10.8		0.0	1.3	0.0							
Approach LOS	B		A									
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			30.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road























2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	58	0	125	0	0	0	135	242	0	0	212	55
Sign Control	Stop			Stop			Free			Free		
Grade	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)	63	0	136	0	0	0	147	263	0	0	230	60
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	817	817	260	923	847	263	290				263	
vC1, stage 1 conf vol	260	260		557	557							
vC2, stage 2 conf vol	557	557		366	290							
vCu, unblocked vol	817	817	260	923	847	263	290				263	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	85	100	83	100	100	100	88				100	
cM capacity (veh/h)	427	423	778	334	400	776	1272				1301	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	63	136	0	147	263	0	290					
Volume Left	63	0	0	147	0	0	0					
Volume Right	0	136	0	0	0	0	60					
cSH	427	778	1700	1272	1700	1700	1700					
Volume to Capacity	0.15	0.17	0.00	0.12	0.15	0.00	0.17					
Queue Length 95th (ft)	13	16	0	10	0	0	0					
Control Delay (s)	14.9	10.6	0.0	8.2	0.0	0.0	0.0					
Lane LOS	B	B	A	A								
Approach Delay (s)	12.0		0.0	2.9		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			4.0									
Intersection Capacity Utilization			39.7%			ICU Level of Service					A	
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road






















2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1453	225	82	1243	213	162	80	66	160	68	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.93		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1754		1787	1736	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.46	1.00		0.37	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	872	1754		704	1736	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	100	1562	242	88	1337	229	174	86	71	172	73	77
RTOR Reduction (vph)	0	0	57	0	0	95	0	24	0	0	30	0
Lane Group Flow (vph)	100	1562	185	88	1337	134	174	133	0	172	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	12.3	85.5	85.5	8.5	81.7	81.7	24.0	17.0		26.0	18.0	
Effective Green, g (s)	12.3	85.5	85.5	8.5	81.7	81.7	24.0	17.0		26.0	18.0	
Actuated g/C Ratio	0.09	0.61	0.61	0.06	0.58	0.58	0.17	0.12		0.19	0.13	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	157	2183	977	108	2086	933	195	213		193	223	
v/s Ratio Prot	c0.06	c0.44		0.05	0.37		0.04	0.08		c0.05	0.07	
v/s Ratio Perm			0.12			0.08	0.11			c0.11		
v/c Ratio	0.64	0.72	0.19	0.81	0.64	0.14	0.89	0.63		0.89	0.54	
Uniform Delay, d1	61.7	18.8	12.0	65.0	19.4	13.2	56.0	58.5		54.4	57.1	
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	8.2	2.0	0.4	35.7	1.5	0.3	36.1	5.6		36.2	2.5	
Delay (s)	69.9	20.9	12.4	100.7	20.9	13.6	92.1	64.1		90.6	59.6	
Level of Service	E	C	B	F	C	B	F	E		F	E	
Approach Delay (s)		22.4			24.1			78.8			76.2	
Approach LOS		C			C			E			E	
Intersection Summary												
HCM Average Control Delay			31.6			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			79.3%			ICU Level of Service				D		
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.





















2/21/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	439	1354	97	137	1328	194	96	191	173	344	128	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		0.97	0.95	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.93		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	3538		1787	3574	1599	1805	3353		3467	3193	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3467	3538		1787	3574	1599	1805	3353		3467	3193	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	467	1440	103	146	1413	206	102	203	184	366	136	334
RTOR Reduction (vph)	0	3	0	0	0	93	0	138	0	0	269	0
Lane Group Flow (vph)	467	1540	0	146	1413	113	102	249	0	366	201	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot			Prot		pm+ov	Prot			Prot		
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases						6						
Actuated Green, G (s)	18.0	57.8		11.9	51.7	66.0	11.7	13.9		14.3	16.5	
Effective Green, g (s)	18.0	57.8		11.9	51.7	66.0	11.7	13.9		14.3	16.5	
Actuated g/C Ratio	0.15	0.48		0.10	0.43	0.55	0.10	0.12		0.12	0.14	
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	2.5		3.0	2.1	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	520	1706		177	1541	880	176	389		413	439	
v/s Ratio Prot	0.13	c0.44		0.08	c0.40	0.02	0.06	c0.07		c0.11	c0.06	
v/s Ratio Perm						0.06						
v/c Ratio	0.90	0.90		0.82	0.92	0.13	0.58	0.64		0.89	0.46	
Uniform Delay, d1	50.0	28.5		53.0	32.1	13.0	51.7	50.6		52.0	47.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.0	7.1		25.7	8.8	0.1	4.6	3.6		19.8	0.8	
Delay (s)	68.1	35.5		78.7	40.9	13.1	56.3	54.2		71.8	48.3	
Level of Service	E	D		E	D	B	E	D		E	D	
Approach Delay (s)		43.1			40.8			54.6			58.6	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay			45.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			119.9			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			88.2%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Dual SB Left Turn Lanes, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/8/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	284	9	14	284	93	5	108	5	118	145	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.96		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1830		1770	973		1787	1721	
Flt Permitted	0.28	1.00		0.49	1.00		0.44	1.00		0.58	1.00	
Satd. Flow (perm)	519	1873		931	1830		823	973		1088	1721	
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)	78	316	10	16	316	103	6	120	6	131	161	211
RTOR Reduction (vph)	0	2	0	0	19	0	0	3	0	0	78	0
Lane Group Flow (vph)	78	324	0	16	400	0	6	123	0	131	294	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.3	17.3		16.5	15.9		14.8	14.2		19.6	16.6	
Effective Green, g (s)	19.3	17.3		16.5	15.9		14.8	14.2		19.6	16.6	
Actuated g/C Ratio	0.38	0.34		0.32	0.31		0.29	0.28		0.38	0.32	
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)	246	634		311	569		249	270		458	559	
v/s Ratio Prot	c0.01	0.17		0.00	c0.22		0.00	0.13		c0.02	c0.17	
v/s Ratio Perm	0.11			0.02			0.01			0.09		
v/c Ratio	0.32	0.51		0.05	0.70		0.02	0.46		0.29	0.53	
Uniform Delay, d1	11.0	13.5		11.9	15.5		13.0	15.3		10.5	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.7		0.1	3.9		0.0	1.2		0.3	0.9	
Delay (s)	11.8	14.2		11.9	19.5		13.0	16.5		10.9	14.9	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		13.7			19.2			16.3			13.9	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			15.6			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			51.1			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			53.8%			ICU Level of Service			A			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/8/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	318	1103	982	436	674	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	346	1199	1067	474	733	157
RTOR Reduction (vph)	0	0	0	282	0	116
Lane Group Flow (vph)	346	1199	1067	192	733	41
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	27.3	80.0	48.7	48.7	31.0	31.0
Effective Green, g (s)	27.3	80.0	48.7	48.7	31.0	31.0
Actuated g/C Ratio	0.23	0.67	0.41	0.41	0.26	0.26
Clearance Time (s)	5.0	5.0	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)	403	2359	1436	642	887	409
v/s Ratio Prot	c0.20	0.34	c0.30		c0.21	
v/s Ratio Perm				0.12		0.03
v/c Ratio	0.86	0.51	0.74	0.30	0.83	0.10
Uniform Delay, d1	44.5	10.1	30.3	24.1	42.0	33.9
Progression Factor	1.00	1.00	1.00	1.00	0.98	0.95
Incremental Delay, d2	16.4	0.8	3.5	1.2	8.7	0.5
Delay (s)	60.9	10.9	33.8	25.3	49.8	32.6
Level of Service	E	B	C	C	D	C
Approach Delay (s)		22.1	31.2		46.8	
Approach LOS		C	C		D	

Intersection Summary






















HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

**APPENDIX E9
ALTERNATIVE 3
YEAR 2012-BUILDOUT**

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	93	1383	204	82	1146	154	133	40	66	113	37	72
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	100	1487	219	88	1232	166	143	43	71	122	40	77
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1398			1706			2577	3261	744	2445	3315	616
vC1, stage 1 conf vol							1687	1687		1409	1409	
vC2, stage 2 conf vol							890	1574		1036	1906	
vCu, unblocked vol	1398			1706			2577	3261	744	2445	3315	616
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	80			76			0	0	80	0	0	82
cM capacity (veh/h)	490			373			35	28	360	13	5	436
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	100	744	744	219	88	616	616	166	257	239		
Volume Left	100	0	0	0	88	0	0	0	143	122		
Volume Right	0	0	0	219	0	0	0	166	71	77		
cSH	490	1700	1700	1700	373	1700	1700	1700	45	14		
Volume to Capacity	0.20	0.44	0.44	0.13	0.24	0.36	0.36	0.10	5.75	17.15		
Queue Length 95th (ft)	19	0	0	0	23	0	0	0	Err	Err		
Control Delay (s)	14.2	0.0	0.0	0.0	17.6	0.0	0.0	0.0	Err	Err		
Lane LOS	B				C				F	F		
Approach Delay (s)	0.8				1.0				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay			1309.2									
Intersection Capacity Utilization			70.2%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	1574	30	19	1295	29	15	3	21	11	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	25	1623	31	20	1335	30	15	3	22	11	4	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			None								
Median storage veh	2											
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1365			1654			2412	3092	827	2273	3092	682
vC1, stage 1 conf vol							1688	1688		1389	1389	
vC2, stage 2 conf vol							724	1404		884	1703	
vCu, unblocked vol	1365			1654			2412	3092	827	2273	3092	682
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			95			82	97	93	91	96	96
cM capacity (veh/h)	499			391			88	105	319	122	100	397
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	25	1082	572	20	890	475	40	31				
Volume Left	25	0	0	20	0	0	15	11				
Volume Right	0	0	31	0	0	30	22	15				
cSH	499	1700	1700	391	1700	1700	148	178				
Volume to Capacity	0.05	0.64	0.34	0.05	0.52	0.28	0.27	0.17				
Queue Length 95th (ft)	4	0	0	4	0	0	26	15				
Control Delay (s)	12.6	0.0	0.0	14.7	0.0	0.0	38.3	29.4				
Lane LOS	B			B			E	D				
Approach Delay (s)	0.2			0.2			38.3	29.4				
Approach LOS							E	D				
Intersection Summary												
Average Delay				1.0								
Intersection Capacity Utilization				54.5%	ICU Level of Service				A			
Analysis Period (min)				15								

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	1557	29	87	1153	23	73	31	89	56	34	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3565		1787	3564			1817	1599		1825	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.66	1.00		0.66	1.00
Satd. Flow (perm)	1787	3565		1787	3564			1241	1599		1237	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	56	1674	31	94	1240	25	78	33	96	60	37	34
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	0	22
Lane Group Flow (vph)	56	1704	0	94	1264	0	0	111	43	0	97	12
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	6.0	73.6		9.4	77.0			15.7	15.7		15.7	15.7
Effective Green, g (s)	6.0	73.6		9.4	77.0			15.7	15.7		15.7	15.7
Actuated g/C Ratio	0.05	0.65		0.08	0.68			0.14	0.14		0.14	0.14
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	95	2328		149	2435			173	223		172	223
v/s Ratio Prot	0.03	c0.48		0.05	c0.35							
v/s Ratio Perm								c0.09	0.03		0.08	0.01
v/c Ratio	0.59	0.73		0.63	0.52			0.64	0.20		0.56	0.06
Uniform Delay, d1	52.1	13.0		50.0	8.8			45.8	42.9		45.3	42.1
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	9.0	1.3		8.4	0.1			7.9	0.4		4.2	0.1
Delay (s)	61.2	14.3		58.4	8.9			53.7	43.3		49.5	42.2
Level of Service	E	B		E	A			D	D		D	D
Approach Delay (s)		15.8			12.3			48.9			47.6	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			17.6			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			112.7			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			72.8%			ICU Level of Service			C			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	1456	15	37	1342	138	44	9	95	113	8	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3569		1787	3574	1599		1677			1815	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.87			0.55	1.00
Satd. Flow (perm)	1787	3569		1787	3574	1599		1477			1054	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	63	1566	16	40	1443	148	47	10	102	122	9	65
RTOR Reduction (vph)	0	0	0	0	0	54	0	54	0	0	0	53
Lane Group Flow (vph)	63	1582	0	40	1443	94	0	105	0	0	131	12
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	6.6	61.2		3.7	58.3	58.3		19.2			19.2	19.2
Effective Green, g (s)	6.6	61.2		3.7	58.3	58.3		19.2			19.2	19.2
Actuated g/C Ratio	0.07	0.61		0.04	0.58	0.58		0.19			0.19	0.19
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	118	2182		66	2082	931		283			202	310
v/s Ratio Prot	c0.04	c0.44		0.02	0.40							
v/s Ratio Perm						0.06		0.07			c0.12	0.01
v/c Ratio	0.53	0.72		0.61	0.69	0.10		0.37			0.65	0.04
Uniform Delay, d1	45.3	13.6		47.5	14.6	9.3		35.2			37.3	32.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	4.6	1.2		14.7	1.0	0.0		0.8			7.0	0.1
Delay (s)	49.8	14.8		62.2	15.7	9.3		36.0			44.3	33.0
Level of Service	D	B		E	B	A		D			D	C
Approach Delay (s)		16.1			16.2			36.0			40.6	
Approach LOS		B			B			D			D	
Intersection Summary												
HCM Average Control Delay			18.4			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			100.1			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			73.2%			ICU Level of Service			D			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	431	1276	89	137	1224	194	85	191	173	344	128	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
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	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	0.89
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3197	3197
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3197	3197
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	459	1357	95	146	1302	206	90	203	184	366	136	322
RTOR Reduction (vph)	0	0	27	0	0	84	0	0	16	0	243	0
Lane Group Flow (vph)	459	1357	68	146	1302	122	90	203	168	366	215	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	63.0	9.5	47.0	69.5	11.0	11.8	21.3	22.5	23.3	
Effective Green, g (s)	14.5	52.0	63.0	9.5	47.0	69.5	11.0	11.8	21.3	22.5	23.3	
Actuated g/C Ratio	0.12	0.44	0.53	0.08	0.40	0.59	0.09	0.10	0.18	0.19	0.20	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	427	1578	930	144	1426	943	169	362	367	341	632	
v/s Ratio Prot	c0.13	0.38	0.01	0.08	c0.36	0.02	0.05	0.06	c0.04	c0.20	0.07	
v/s Ratio Perm			0.04			0.05			0.07			
v/c Ratio	1.07	0.86	0.07	1.01	0.91	0.13	0.53	0.56	0.46	1.07	0.34	
Uniform Delay, d1	51.6	29.6	13.3	54.1	33.5	10.7	50.9	50.5	43.1	47.6	40.6	
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	65.1	4.9	0.0	78.7	9.1	0.1	3.2	2.0	0.9	69.6	0.3	
Delay (s)	116.7	34.5	13.3	132.9	42.5	10.8	54.2	52.5	44.0	117.3	41.0	
Level of Service	F	C	B	F	D	B	D	D	D	F	D	
Approach Delay (s)		53.2			46.5			49.5			74.9	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay			54.2				HCM Level of Service			D		
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			117.8				Sum of lost time (s)			22.0		
Intersection Capacity Utilization			88.8%				ICU Level of Service			E		
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	6	3	81	9	38	5	20	100	26	15	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	6	3	87	10	41	5	22	108	28	16	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	204	212	16	165	158	75	16			129		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	204	212	16	165	158	75	16			129		
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 %	100	99	100	89	99	96	100			98		
cM capacity (veh/h)	708	674	1069	783	721	992	1615			1469		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	10	138	134	44								
Volume Left	0	87	5	28								
Volume Right	3	41	108	0								
cSH	768	830	1615	1469								
Volume to Capacity	0.01	0.17	0.00	0.02								
Queue Length 95th (ft)	1	15	0	1								
Control Delay (s)	9.7	10.2	0.3	4.8								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.7	10.2	0.3	4.8								
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.4									
Intersection Capacity Utilization			29.5%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/9/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	43	0	31	0	206	35	42	269	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	47	0	34	0	224	38	46	292	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	660	646	292	627	627	243	292			262		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	660	646	292	627	627	243	292			262		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	88	100	96	100			97		
cM capacity (veh/h)	350	377	747	376	378	779	1252			1314		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	80	262	338								
Volume Left	0	47	0	46								
Volume Right	0	34	38	0								
cSH	1700	480	1252	1314								
Volume to Capacity	0.00	0.17	0.00	0.03								
Queue Length 95th (ft)	0	15	0	3								
Control Delay (s)	0.0	14.0	0.0	1.3								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	14.0	0.0	1.3								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			43.7%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/9/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	219	0	2	13	16	296
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	0	2	14	17	322
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	16				485	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16				485	9
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				96	70
cM capacity (veh/h)	1595				460	1072
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	238	16	339			
Volume Left	238	0	17			
Volume Right	0	14	322			
cSH	1595	1700	1004			
Volume to Capacity	0.15	0.01	0.34			
Queue Length 95th (ft)	13	0	38			
Control Delay (s)	7.7	0.0	10.4			
Lane LOS	A		B			
Approach Delay (s)	7.7	0.0	10.4			
Approach LOS			B			
Intersection Summary						
Average Delay			9.0			
Intersection Capacity Utilization			44.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig



















2/9/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	3	296	3	3	219
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	4	357	4	4	264
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			6		721	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			6		721	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			78		99	75
cM capacity (veh/h)			1628		307	1076
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	6	360	267			
Volume Left	0	357	4			
Volume Right	4	0	264			
cSH	1700	1628	1041			
Volume to Capacity	0.00	0.22	0.26			
Queue Length 95th (ft)	0	21	26			
Control Delay (s)	0.0	7.8	9.6			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.8	9.6			
Approach LOS			A			
Intersection Summary						
Average Delay		8.5				
Intersection Capacity Utilization		43.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	284	9	14	284	69	5	87	5	100	129	184
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	316	10	16	316	77	6	97	6	111	143	204
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	392			326			1083	884	321	894	851	354
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392			326			1083	884	321	894	851	354
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 %	94			99			93	63	99	37	48	70
cM capacity (veh/h)	1172			1245			77	264	720	177	277	692
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	70	326	16	392	108	459						
Volume Left	70	0	16	0	6	111						
Volume Right	0	10	0	77	6	204						
cSH	1172	1700	1245	1700	242	319						
Volume to Capacity	0.06	0.19	0.01	0.23	0.45	1.44						
Queue Length 95th (ft)	5	0	1	0	53	614						
Control Delay (s)	8.3	0.0	7.9	0.0	31.3	246.3						
Lane LOS	A		A		D	F						
Approach Delay (s)	1.5		0.3		31.3	246.3						
Approach LOS					D	F						
Intersection Summary												
Average Delay			85.5									
Intersection Capacity Utilization			62.9%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/9/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗	↘↙	↑	↖	↗
Volume (vph)	451	49	314	547	361	744
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	626	68	436	760	501	1033
RTOR Reduction (vph)	0	51	0	0	0	0
Lane Group Flow (vph)	626	17	436	760	501	1033
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot	Free		
Protected Phases	6		5	2	4	
Permitted Phases	6			Free		
Actuated Green, G (s)	16.7	16.7	11.5	34.2	23.7	67.9
Effective Green, g (s)	16.7	16.7	11.5	34.2	23.7	67.9
Actuated g/C Ratio	0.25	0.25	0.17	0.50	0.35	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	854	382	587	947	630	1615
v/s Ratio Prot	0.18		0.13	c0.40	c0.28	
v/s Ratio Perm		0.01				0.64
v/c Ratio	0.73	0.04	0.74	0.80	0.80	0.64
Uniform Delay, d1	23.5	19.5	26.8	14.0	19.9	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.0	5.1	5.0	6.9	2.0
Delay (s)	26.8	19.6	31.9	19.0	26.8	2.0
Level of Service	C	B	C	B	C	A
Approach Delay (s)	26.1			23.7	10.1	
Approach LOS	C			C	B	
Intersection Summary						
HCM Average Control Delay			18.1	HCM Level of Service		B
HCM Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			67.9	Sum of lost time (s)		10.0
Intersection Capacity Utilization			57.1%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/9/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	97	0	204	123	0	156
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	0	222	134	0	170
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	458	289			355	
vC1, stage 1 conf vol	289					
vC2, stage 2 conf vol	170					
vCu, unblocked vol	458	289			355	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	100			100	
cM capacity (veh/h)	701	751			1203	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	105	355	0	170		
Volume Left	105	0	0	0		
Volume Right	0	134	0	0		
cSH	692	1700	1700	1700		
Volume to Capacity	0.15	0.21	0.00	0.10		
Queue Length 95th (ft)	13	0	0	0		
Control Delay (s)	11.1	0.0	0.0	0.0		
Lane LOS	B					
Approach Delay (s)	11.1	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		30.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/9/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1369	919	168	0	165
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1488	999	183	0	179
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1182				1743	499
vC1, stage 1 conf vol					999	
vC2, stage 2 conf vol					744	
vCu, unblocked vol	1182				1743	499
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	65
cM capacity (veh/h)	587				259	517
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	744	744	499	499	183	179
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	183	179
cSH	1700	1700	1700	1700	1700	517
Volume to Capacity	0.44	0.44	0.29	0.29	0.11	0.35
Queue Length 95th (ft)	0	0	0	0	0	38
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	15.6
Lane LOS						C
Approach Delay (s)	0.0		0.0			15.6
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			42.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/9/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		 	 						
Volume (veh/h)	266	1103	969	348	583	118			
Sign Control	Free		Free	Stop					
Grade	0%		0%	0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	289	1199	1053	378	634	128			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL		None						
Median storage veh	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	1432				2231	527			
vC1, stage 1 conf vol					1053				
vC2, stage 2 conf vol					1178				
vCu, unblocked vol	1432				2231	527			
tC, single (s)	4.1				6.8	6.9			
tC, 2 stage (s)					5.8				
tF (s)	2.2				3.5	3.3			
p0 queue free %	39				0	74			
cM capacity (veh/h)	471				91	496			
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	
Volume Total	289	599	599	527	527	378	634	128	
Volume Left	289	0	0	0	0	0	634	0	
Volume Right	0	0	0	0	0	378	0	128	
cSH	471	1700	1700	1700	1700	1700	91	496	
Volume to Capacity	0.61	0.35	0.35	0.31	0.31	0.22	6.99	0.26	
Queue Length 95th (ft)	101	0	0	0	0	0	Err	26	
Control Delay (s)	24.1	0.0	0.0	0.0	0.0	0.0	Err	14.8	
Lane LOS	C							F	B
Approach Delay (s)	4.7				0.0				8318.3
Approach LOS									F
Intersection Summary									
Average Delay			1723.5						
Intersection Capacity Utilization			83.8%	ICU Level of Service		E			
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/9/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	1681	1298	53	0	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1827	1411	58	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1468				2324	705
vC1, stage 1 conf vol					1411	
vC2, stage 2 conf vol					914	
vCu, unblocked vol	1468				2324	705
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	95
cM capacity (veh/h)	455				164	379
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	914	914	705	705	58	20
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	58	20
cSH	1700	1700	1700	1700	1700	379
Volume to Capacity	0.54	0.54	0.41	0.41	0.03	0.05
Queue Length 95th (ft)	0	0	0	0	0	4
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	15.0
Lane LOS						C
Approach Delay (s)	0.0		0.0			15.0
Approach LOS						C
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			49.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road



















2/9/2011

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (veh/h)	110	0	42	0	0	0	28	217	0	0	167	87	
Sign Control	Stop			Stop			Free			Free			
Grade	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)	120	0	46	0	0	0	30	236	0	0	182	95	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type							TWLTL		TWLTL				
Median storage (veh)							2		2				
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	478	478	182	524	573	236	276						236
vC1, stage 1 conf vol	182	182		297	297								
vC2, stage 2 conf vol	297	297		227	276								
vCu, unblocked vol	478	478	182	524	573	236	276						236
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1						4.1
tC, 2 stage (s)	6.1	5.5		6.1	5.5								
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2						2.2
p0 queue free %	81	100	95	100	100	100	98						100
cM capacity (veh/h)	640	602	861	596	561	803	1287						1331
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	120	46	0	30	236	182	95						
Volume Left	120	0	0	30	0	0	0						
Volume Right	0	46	0	0	0	0	95						
cSH	640	861	1700	1287	1700	1700	1700						
Volume to Capacity	0.19	0.05	0.00	0.02	0.14	0.11	0.06						
Queue Length 95th (ft)	17	4	0	2	0	0	0						
Control Delay (s)	11.9	9.4	0.0	7.9	0.0	0.0	0.0						
Lane LOS	B	A	A	A									
Approach Delay (s)	11.2		0.0	0.9		0.0							
Approach LOS	B		A										
Intersection Summary													
Average Delay			3.0										
Intersection Capacity Utilization			28.2%	ICU Level of Service				A					
Analysis Period (min)			15										
Description: SB Right Turn Lane (100')													

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road





















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	0	19	0	0	0	19	236	0	0	200	12
Sign Control	Stop				Stop			Free			Free	
Grade	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)	17	0	21	0	0	0	21	257	0	0	217	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	522	522	224	542	528	257	230				257	
vC1, stage 1 conf vol	224	224		298	298							
vC2, stage 2 conf vol	298	298		245	230							
vCu, unblocked vol	522	522	224	542	528	257	230				257	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	97	100	97	100	100	100	98				100	
cM capacity (veh/h)	626	591	816	603	584	782	1337				1308	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	17	21	0	21	257	230						
Volume Left	17	0	0	21	0	0						
Volume Right	0	21	0	0	0	13						
cSH	626	816	1700	1337	1700	1700						
Volume to Capacity	0.03	0.03	0.00	0.02	0.15	0.14						
Queue Length 95th (ft)	2	2	0	1	0	0						
Control Delay (s)	10.9	9.5	0.0	7.7	0.0	0.0						
Lane LOS	B	A	A	A								
Approach Delay (s)	10.2		0.0	0.6		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			25.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road























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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	42	0	69	0	0	0	65	214	0	0	189	34
Sign Control	Stop			Stop			Free			Free		
Grade	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)	46	0	75	0	0	0	71	233	0	0	205	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	598	598	224	654	616	233	242				233	
vC1, stage 1 conf vol	224	224		374	374							
vC2, stage 2 conf vol	374	374		280	242							
vCu, unblocked vol	598	598	224	654	616	233	242				233	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	92	100	91	100	100	100	95				100	
cM capacity (veh/h)	562	537	816	498	519	807	1324				1335	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	46	75	0	71	233	0	242					
Volume Left	46	0	0	71	0	0	0					
Volume Right	0	75	0	0	0	0	37					
cSH	562	816	1700	1324	1700	1700	1700					
Volume to Capacity	0.08	0.09	0.00	0.05	0.14	0.00	0.14					
Queue Length 95th (ft)	7	8	0	4	0	0	0					
Control Delay (s)	12.0	9.9	0.0	7.9	0.0	0.0	0.0					
Lane LOS	B	A	A	A								
Approach Delay (s)	10.7		0.0	1.8		0.0						
Approach LOS	B		A									
Intersection Summary												
Average Delay	2.8											
Intersection Capacity Utilization	29.9%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road





















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1383	204	82	1146	154	133	40	66	113	37	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.91		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1705		1787	1695	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.52	1.00		0.44	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	983	1705		830	1695	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	100	1487	219	88	1232	166	143	43	71	122	40	77
RTOR Reduction (vph)	0	0	49	0	0	63	0	48	0	0	56	0
Lane Group Flow (vph)	100	1487	170	88	1232	103	143	66	0	122	61	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	12.3	90.4	90.4	8.5	86.6	86.6	19.1	12.1		21.1	13.1	
Effective Green, g (s)	12.3	90.4	90.4	8.5	86.6	86.6	19.1	12.1		21.1	13.1	
Actuated g/C Ratio	0.09	0.65	0.65	0.06	0.62	0.62	0.14	0.09		0.15	0.09	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	157	2308	1032	108	2211	989	174	147		180	159	
v/s Ratio Prot	c0.06	c0.42		0.05	0.34		c0.04	0.04		0.04	0.04	
v/s Ratio Perm			0.11			0.06	c0.07			0.06		
v/c Ratio	0.64	0.64	0.16	0.81	0.56	0.10	0.82	0.45		0.68	0.38	
Uniform Delay, d1	61.7	15.0	9.8	65.0	15.5	10.9	57.9	60.8		54.6	59.6	
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	8.2	1.4	0.3	35.7	1.0	0.2	25.7	2.2		9.7	1.5	
Delay (s)	69.9	16.4	10.2	100.7	16.6	11.1	83.6	62.9		64.3	61.2	
Level of Service	E	B	B	F	B	B	F	E		E	E	
Approach Delay (s)		18.6			20.9			74.4			62.8	
Approach LOS		B			C			E			E	
Intersection Summary												
HCM Average Control Delay			26.1			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			70.1%			ICU Level of Service			C			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/9/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	284	9	14	284	69	5	87	5	100	129	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.97		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1844		1770	972		1787	1715	
Flt Permitted	0.33	1.00		0.51	1.00		0.43	1.00		0.63	1.00	
Satd. Flow (perm)	621	1873		961	1844		799	972		1178	1715	
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)	70	316	10	16	316	77	6	97	6	111	143	204
RTOR Reduction (vph)	0	2	0	0	14	0	0	4	0	0	89	0
Lane Group Flow (vph)	70	324	0	16	379	0	6	99	0	111	258	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.8	16.9		16.2	15.6		13.3	12.7		15.9	14.0	
Effective Green, g (s)	18.8	16.9		16.2	15.6		13.3	12.7		15.9	14.0	
Actuated g/C Ratio	0.39	0.35		0.34	0.32		0.28	0.26		0.33	0.29	
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)	289	658		334	598		233	257		413	499	
v/s Ratio Prot	c0.01	0.17		0.00	c0.21		0.00	0.10		c0.01	c0.15	
v/s Ratio Perm	0.09			0.02			0.01			0.08		
v/c Ratio	0.24	0.49		0.05	0.63		0.03	0.39		0.27	0.52	
Uniform Delay, d1	9.7	12.2		10.7	13.8		12.7	14.5		11.6	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.6		0.1	2.2		0.0	1.0		0.4	0.9	
Delay (s)	10.2	12.8		10.8	16.0		12.8	15.5		12.0	15.1	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		12.4			15.8			15.3			14.4	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM Average Control Delay			14.3			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			48.1			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			50.7%			ICU Level of Service			A			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/9/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	266	1103	969	348	583	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	289	1199	1053	378	634	128
RTOR Reduction (vph)	0	0	0	216	0	95
Lane Group Flow (vph)	289	1199	1053	162	634	33
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	24.5	80.0	51.5	51.5	31.0	31.0
Effective Green, g (s)	24.5	80.0	51.5	51.5	31.0	31.0
Actuated g/C Ratio	0.20	0.67	0.43	0.43	0.26	0.26
Clearance Time (s)	5.0	5.0	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)	361	2359	1519	679	887	409
v/s Ratio Prot	c0.16	0.34	c0.30		c0.18	
v/s Ratio Perm				0.10		0.02
v/c Ratio	0.80	0.51	0.69	0.24	0.71	0.08
Uniform Delay, d1	45.4	10.1	27.8	21.8	40.5	33.7
Progression Factor	1.00	1.00	1.00	1.00	0.98	0.94
Incremental Delay, d2	12.0	0.8	2.6	0.8	4.9	0.4
Delay (s)	57.4	10.9	30.5	22.6	44.5	32.2
Level of Service	E	B	C	C	D	C
Approach Delay (s)		19.9	28.4		42.5	
Approach LOS		B	C		D	

Intersection Summary






















HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

YEAR 2032
SYNCHRO WORKSHEETS

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	347	1565	106	109	1342	438	44	2	91	313	2	255
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	373	1683	114	117	1443	471	47	2	98	337	2	274
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1914			1797			3660	4577	841	3364	4220	722
vC1, stage 1 conf vol							2429	2429		1677	1677	
vC2, stage 2 conf vol							1231	2148		1687	2543	
vCu, unblocked vol	1914			1797			3660	4577	841	3364	4220	722
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			66			0	0	68	0	0	26
cM capacity (veh/h)	310			344			0	0	310	0	0	372
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	373	841	841	114	117	722	722	471	147	613		
Volume Left	373	0	0	0	117	0	0	0	47	337		
Volume Right	0	0	0	114	0	0	0	471	98	274		
cSH	310	1700	1700	1700	344	1700	1700	1700	0	0		
Volume to Capacity	1.20	0.49	0.49	0.07	0.34	0.42	0.42	0.28	Err	Err		
Queue Length 95th (ft)	411	0	0	0	37	0	0	0	Err	Err		
Control Delay (s)	154.4	0.0	0.0	0.0	20.8	0.0	0.0	0.0	Err	Err		
Lane LOS	F				C				F	F		
Approach Delay (s)	26.5				1.2				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			106.1%		ICU Level of Service				G			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	1911	36	23	1801	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	1970	37	24	1857	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1898			2007			3095	4029	1004	3034	4027	949
vC1, stage 1 conf vol							2084	2084		1925	1925	
vC2, stage 2 conf vol							1011	1945		1109	2102	
vCu, unblocked vol	1898			2007			3095	4029	1004	3034	4027	949
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	85			92			57	90	89	70	89	88
cM capacity (veh/h)	310			285			43	43	244	56	47	265
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	47	1313	694	24	1238	660	49	55				
Volume Left	47	0	0	24	0	0	19	16				
Volume Right	0	0	37	0	0	41	27	33				
cSH	310	1700	1700	285	1700	1700	78	103				
Volume to Capacity	0.15	0.77	0.41	0.08	0.73	0.39	0.63	0.53				
Queue Length 95th (ft)	13	0	0	7	0	0	72	61				
Control Delay (s)	18.7	0.0	0.0	18.8	0.0	0.0	109.6	74.1				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.4			0.2			109.6	74.1				
Approach LOS							F	F				
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			64.7%			ICU Level of Service			C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	1911	16	113	1335	63	73	54	114	108	47	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3570		1787	3550			1829	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.55	1.00		0.57	1.00
Satd. Flow (perm)	1787	3570		1787	3550			1034	1599		1081	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	78	2055	17	122	1435	68	78	58	123	116	51	55
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	52	0	0	19
Lane Group Flow (vph)	78	2072	0	122	1501	0	0	136	71	0	167	36
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	7.9	80.2		8.1	80.4			22.9	22.9		22.9	22.9
Effective Green, g (s)	7.9	80.2		8.1	80.4			22.9	22.9		22.9	22.9
Actuated g/C Ratio	0.06	0.64		0.06	0.64			0.18	0.18		0.18	0.18
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	113	2287		116	2280			189	292		198	292
v/s Ratio Prot	0.04	c0.58		c0.07	0.42							
v/s Ratio Perm								0.13	0.04		c0.15	0.02
v/c Ratio	0.69	0.91		1.05	0.66			0.72	0.24		0.84	0.12
Uniform Delay, d1	57.5	19.3		58.6	13.9			48.1	43.7		49.4	42.8
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	16.6	5.7		98.1	0.6			12.3	0.4		26.5	0.2
Delay (s)	74.1	25.0		156.7	14.5			60.5	44.2		75.9	43.0
Level of Service	E	C		F	B			E	D		E	D
Approach Delay (s)		26.8			25.2			52.7			67.7	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM Average Control Delay			29.9			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			125.2			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			86.4%			ICU Level of Service			E			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	1795	9	46	1919	266	45	29	118	215	23	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3571		1787	3574	1599		1688			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.74			0.52	1.00
Satd. Flow (perm)	1787	3571		1787	3574	1599		1260			982	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	143	1930	10	49	2063	286	48	31	127	231	25	111
RTOR Reduction (vph)	0	0	0	0	0	81	0	44	0	0	0	56
Lane Group Flow (vph)	143	1940	0	49	2063	205	0	162	0	0	256	55
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	76.9		3.9	71.3	71.3		36.1			36.1	36.1
Effective Green, g (s)	9.5	76.9		3.9	71.3	71.3		36.1			36.1	36.1
Actuated g/C Ratio	0.07	0.58		0.03	0.54	0.54		0.27			0.27	0.27
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	128	2066		52	1917	858		342			267	439
v/s Ratio Prot	c0.08	0.54		0.03	c0.58						c0.26	0.03
v/s Ratio Perm						0.13		0.13				0.03
v/c Ratio	1.12	0.94		0.94	1.08	0.24		0.47			0.96	0.13
Uniform Delay, d1	61.7	25.8		64.4	30.8	16.4		40.4			47.7	36.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	114.5	9.0		102.9	44.5	0.1		1.0			43.3	0.1
Delay (s)	176.2	34.8		167.3	75.3	16.5		41.5			91.0	36.6
Level of Service	F	C		F	E	B		D			F	D
Approach Delay (s)		44.5			70.2			41.5			74.5	
Approach LOS		D			E			D			E	
Intersection Summary												
HCM Average Control Delay			58.7			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.04									
Actuated Cycle Length (s)			132.9			Sum of lost time (s)			16.0			
Intersection Capacity Utilization			102.3%			ICU Level of Service			G			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	557	1607	129	179	1871	264	92	248	213	438	168	382
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3202	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3202	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	593	1710	137	190	1990	281	98	264	227	466	179	406
RTOR Reduction (vph)	0	0	31	0	0	78	0	0	6	0	232	0
Lane Group Flow (vph)	593	1710	106	190	1990	203	98	264	221	466	353	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	63.4	9.5	47.0	69.5	11.4	13.9	23.4	22.5	25.0	
Effective Green, g (s)	14.5	52.0	63.4	9.5	47.0	69.5	11.4	13.9	23.4	22.5	25.0	
Actuated g/C Ratio	0.12	0.43	0.53	0.08	0.39	0.58	0.10	0.12	0.20	0.19	0.21	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	419	1550	919	142	1401	927	172	419	389	335	668	
v/s Ratio Prot	c0.17	0.48	0.01	0.11	c0.56	0.04	0.05	0.07	c0.05	c0.26	0.11	
v/s Ratio Perm			0.06			0.09			0.09			
v/c Ratio	1.42	1.10	0.12	1.34	1.42	0.22	0.57	0.63	0.57	1.39	0.53	
Uniform Delay, d1	52.7	34.0	14.2	55.2	36.5	12.1	51.9	50.5	43.7	48.7	42.2	
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	200.5	56.6	0.1	191.9	193.4	0.1	4.3	3.1	1.9	193.4	0.8	
Delay (s)	253.2	90.6	14.2	247.1	229.9	12.3	56.2	53.6	45.6	242.1	43.0	
Level of Service	F	F	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		125.8			206.4			51.0			131.2	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM Average Control Delay	150.3			HCM Level of Service					F			
HCM Volume to Capacity ratio	1.31											
Actuated Cycle Length (s)	119.9			Sum of lost time (s)					22.0			
Intersection Capacity Utilization	117.1%			ICU Level of Service					H			
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	4	17	11	46	6	24	22	32	18	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	8	4	18	12	49	6	26	24	34	19	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	194	151	19	147	139	38	19			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	194	151	19	147	139	38	19			49		
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 %	100	99	100	98	98	95	100			98		
cM capacity (veh/h)	710	726	1065	800	736	1040	1610			1570		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	12	80	56	54								
Volume Left	0	18	6	34								
Volume Right	4	49	24	0								
cSH	821	920	1610	1570								
Volume to Capacity	0.01	0.09	0.00	0.02								
Queue Length 95th (ft)	1	7	0	2								
Control Delay (s)	9.5	9.3	0.9	4.8								
Lane LOS	A	A	A	A								
Approach Delay (s)	9.5	9.3	0.9	4.8								
Approach LOS	A	A										
Intersection Summary												
Average Delay			5.7									
Intersection Capacity Utilization			27.1%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/10/2011




												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	52	0	13	0	122	43	21	164	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	57	0	14	0	133	47	23	178	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	394	403	178	380	380	156	178			179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	394	403	178	380	380	156	178			179		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	90	100	98	100			98		
cM capacity (veh/h)	550	527	865	558	533	872	1380			1408		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	71	179	201								
Volume Left	0	57	0	23								
Volume Right	0	14	47	0								
cSH	1700	602	1380	1408								
Volume to Capacity	0.00	0.12	0.00	0.02								
Queue Length 95th (ft)	0	10	0	1								
Control Delay (s)	0.0	11.8	0.0	1.0								
Lane LOS	A	B		A								
Approach Delay (s)	0.0	11.8	0.0	1.0								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			32.5%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/10/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	155	0	2	0	0	217
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	168	0	2	0	0	236
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	2				339	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2				339	2
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				100	78
cM capacity (veh/h)	1614				588	1082
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	168	2	236			
Volume Left	168	0	0			
Volume Right	0	0	236			
cSH	1614	1700	1082			
Volume to Capacity	0.10	0.00	0.22			
Queue Length 95th (ft)	9	0	21			
Control Delay (s)	7.5	0.0	9.3			
Lane LOS	A		A			
Approach Delay (s)	7.5	0.0	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			35.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















2/10/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	4	217	4	4	155
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	5	261	5	5	187
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			7		533	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			7		533	5
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		99	83
cM capacity (veh/h)			1627		425	1075
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	7	266	192			
Volume Left	0	261	5			
Volume Right	5	0	187			
cSH	1700	1627	1036			
Volume to Capacity	0.00	0.16	0.18			
Queue Length 95th (ft)	0	14	17			
Control Delay (s)	0.0	7.5	9.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.5	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			8.1			
Intersection Capacity Utilization			35.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	346	11	17	346	30	6	61	6	55	100	206
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	71	384	12	19	384	33	7	68	7	61	111	229
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	418			397			1239	988	391	1006	978	401
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	418			397			1239	988	391	1006	978	401
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 %	94			98			89	70	99	62	52	65
cM capacity (veh/h)	1147			1173			58	228	658	159	232	651
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	71	397	19	418	81	401						
Volume Left	71	0	19	0	7	61						
Volume Right	0	12	0	33	7	229						
cSH	1147	1700	1173	1700	192	330						
Volume to Capacity	0.06	0.23	0.02	0.25	0.42	1.21						
Queue Length 95th (ft)	5	0	1	0	48	437						
Control Delay (s)	8.3	0.0	8.1	0.0	36.7	155.4						
Lane LOS	A		A		E	F						
Approach Delay (s)	1.3		0.4		36.7	155.4						
Approach LOS					E	F						
Intersection Summary												
Average Delay			47.6									
Intersection Capacity Utilization			61.2%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/10/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	642	60	527	701	439	1152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	892	83	732	974	610	1600
RTOR Reduction (vph)	0	61	0	0	0	0
Lane Group Flow (vph)	892	22	732	974	610	1600
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	22.7	22.7	18.5	47.2	27.0	84.2
Effective Green, g (s)	22.7	22.7	18.5	47.2	27.0	84.2
Actuated g/C Ratio	0.27	0.27	0.22	0.56	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	936	419	762	1054	579	1615
v/s Ratio Prot	0.26		0.21	0.52	0.34	
v/s Ratio Perm		0.01				c0.99
v/c Ratio	0.95	0.05	0.96	0.92	1.05	0.99
Uniform Delay, d1	30.2	22.8	32.5	16.9	28.6	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.9	0.1	23.3	13.1	52.3	20.3
Delay (s)	49.2	22.8	55.8	30.0	80.9	20.3
Level of Service	D	C	E	C	F	C
Approach Delay (s)	46.9			41.0	37.0	
Approach LOS	D			D	D	
Intersection Summary						
HCM Average Control Delay			40.4		HCM Level of Service	D
HCM Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			84.2		Sum of lost time (s)	0.0
Intersection Capacity Utilization			70.4%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road






















2/10/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	178	0	459	242	0	343
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	193	0	499	263	0	373
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1003	630			762	
vC1, stage 1 conf vol	630					
vC2, stage 2 conf vol	373					
vCu, unblocked vol	1003	630			762	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	59	100			100	
cM capacity (veh/h)	470	481			850	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	193	762	0	373		
Volume Left	193	0	0	0		
Volume Right	0	263	0	0		
cSH	466	1700	1700	1700		
Volume to Capacity	0.42	0.45	0.00	0.22		
Queue Length 95th (ft)	50	0	0	0		
Control Delay (s)	18.1	0.0	0.0	0.0		
Lane LOS	C					
Approach Delay (s)	18.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		2.6				
Intersection Capacity Utilization		55.4%		ICU Level of Service		B
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	353	2100	311	109	1845	613	233	115	91	460	101	262
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	380	2258	334	117	1984	659	251	124	98	495	109	282
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2643			2592			4580	5895	1129	4266	5570	992
vC1, stage 1 conf vol							3017	3017		2218	2218	
vC2, stage 2 conf vol							1562	2877		2048	3352	
vCu, unblocked vol	2643			2592			4580	5895	1129	4266	5570	992
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			30			0	0	51	0	0	0
cM capacity (veh/h)	160			168			0	0	200	0	0	246
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	380	1129	1129	334	117	992	992	659	472	885		
Volume Left	380	0	0	0	117	0	0	0	251	495		
Volume Right	0	0	0	334	0	0	0	659	98	282		
cSH	160	1700	1700	1700	168	1700	1700	1700	0	0		
Volume to Capacity	2.37	0.66	0.66	0.20	0.70	0.58	0.58	0.39	Err	Err		
Queue Length 95th (ft)	798	0	0	0	105	0	0	0	Err	Err		
Control Delay (s)	682.2	0.0	0.0	0.0	65.4	0.0	0.0	0.0	Err	Err		
Lane LOS	F				F				F	F		
Approach Delay (s)	87.1				2.8				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			139.5%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2604	36	23	2463	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2685	37	24	2539	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2580			2722			4151	5426	1361	4073	5424	1290
vC1, stage 1 conf vol							2798	2798		2607	2607	
vC2, stage 2 conf vol							1353	2628		1466	2816	
vCu, unblocked vol	2580			2722			4151	5426	1361	4073	5424	1290
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			84			0	0	81	9	0	79
cM capacity (veh/h)	167			149			13	0	141	18	5	157
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	47	1790	932	24	1693	888	49	55				
Volume Left	47	0	0	24	0	0	19	16				
Volume Right	0	0	37	0	0	41	27	33				
cSH	167	1700	1700	149	1700	1700	2	24				
Volume to Capacity	0.28	1.05	0.55	0.16	1.00	0.52	24.32	2.23				
Queue Length 95th (ft)	28	0	0	14	0	0	Err	170				
Control Delay (s)	35.0	0.0	0.0	33.7	0.0	0.0	Err	903.7				
Lane LOS	D			D			F	F				
Approach Delay (s)	0.6			0.3			Err	903.7				
Approach LOS							F	F				
Intersection Summary												
Average Delay			99.8									
Intersection Capacity Utilization			83.8%	ICU Level of Service					E			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	2541	47	113	1937	63	103	54	114	108	47	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3564		1787	3557			1821	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.52	1.00		0.51	1.00
Satd. Flow (perm)	1787	3564		1787	3557			977	1599		951	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	96	2732	51	122	2083	68	111	58	123	116	51	71
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	41	0	0	24
Lane Group Flow (vph)	96	2782	0	122	2150	0	0	169	82	0	167	47
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	8.0	80.2		8.0	80.2			24.6	24.6		24.6	24.6
Effective Green, g (s)	8.0	80.2		8.0	80.2			24.6	24.6		24.6	24.6
Actuated g/C Ratio	0.06	0.63		0.06	0.63			0.19	0.19		0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	113	2254		113	2250			190	310		185	310
v/s Ratio Prot	0.05	c0.78		0.07	c0.60							
v/s Ratio Perm								0.17	0.05		c0.18	0.03
v/c Ratio	0.85	1.23		1.08	0.96			0.89	0.26		0.90	0.15
Uniform Delay, d1	58.8	23.3		59.4	21.6			49.8	43.4		49.9	42.4
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	41.5	109.5		107.7	10.4			35.8	0.5		39.7	0.2
Delay (s)	100.3	132.8		167.1	32.0			85.6	43.9		89.7	42.7
Level of Service	F	F		F	C			F	D		F	D
Approach Delay (s)		131.7			39.3			68.0			75.6	
Approach LOS		F			D			E			E	
Intersection Summary												
HCM Average Control Delay			89.1			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			126.8			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			104.9%			ICU Level of Service			G			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	148	2377	24	46	2476	266	60	29	118	215	23	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3569		1787	3574	1599		1695			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.65			0.51	1.00
Satd. Flow (perm)	1787	3569		1787	3574	1599		1120			977	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	159	2556	26	49	2662	286	65	31	127	231	25	127
RTOR Reduction (vph)	0	0	0	0	0	63	0	36	0	0	0	53
Lane Group Flow (vph)	159	2582	0	49	2662	223	0	187	0	0	256	74
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	76.9		3.9	71.3	71.3		36.3			36.3	36.3
Effective Green, g (s)	9.5	76.9		3.9	71.3	71.3		36.3			36.3	36.3
Actuated g/C Ratio	0.07	0.58		0.03	0.54	0.54		0.27			0.27	0.27
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	128	2062		52	1915	857		305			266	440
v/s Ratio Prot	c0.09	c0.72		0.03	c0.74						c0.26	0.05
v/s Ratio Perm						0.14		0.17				0.17
v/c Ratio	1.24	1.25		0.94	1.39	0.26		0.61			0.96	0.17
Uniform Delay, d1	61.8	28.1		64.5	30.9	16.7		42.3			47.7	36.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	158.6	117.6		102.9	178.8	0.2		3.6			44.6	0.2
Delay (s)	220.4	145.7		167.4	209.7	16.8		45.9			92.3	37.1
Level of Service	F	F		F	F	B		D			F	D
Approach Delay (s)		150.0			190.6			45.9			74.0	
Approach LOS		F			F			D			E	
Intersection Summary												
HCM Average Control Delay			160.9			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.31									
Actuated Cycle Length (s)			133.1			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			119.4%			ICU Level of Service			H			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	604	2079	176	179	2323	264	138	248	213	438	168	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
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	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	0.89
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3190	3190
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3190	3190
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	643	2212	187	190	2471	281	147	264	227	466	179	454
RTOR Reduction (vph)	0	0	31	0	0	79	0	0	5	0	210	0
Lane Group Flow (vph)	643	2212	156	190	2471	202	147	264	222	466	423	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot		
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.6	52.1	65.8	9.5	47.0	69.5	13.7	14.7	24.2	22.5	23.5	
Effective Green, g (s)	14.6	52.1	65.8	9.5	47.0	69.5	13.7	14.7	24.2	22.5	23.5	
Actuated g/C Ratio	0.12	0.43	0.54	0.08	0.39	0.58	0.11	0.12	0.20	0.19	0.19	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	419	1541	944	141	1391	920	205	439	397	333	621	
v/s Ratio Prot	0.19	c0.62	0.02	0.11	c0.69	0.04	0.08	0.07	0.04	c0.26	c0.13	
v/s Ratio Perm			0.08			0.09			0.09			
v/c Ratio	1.53	1.44	0.16	1.35	1.78	0.22	0.72	0.60	0.56	1.40	0.87dr	
Uniform Delay, d1	53.1	34.4	13.8	55.6	36.9	12.5	51.7	50.3	43.5	49.2	45.2	
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	252.3	199.7	0.1	195.9	352.3	0.1	11.3	2.3	1.7	197.0	3.1	
Delay (s)	305.4	234.1	13.8	251.5	389.2	12.6	63.0	52.6	45.2	246.2	48.2	
Level of Service	F	F	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		235.6			344.4			52.4			132.2	
Approach LOS		F			F			D			F	

Intersection Summary

HCM Average Control Delay	247.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	120.8	Sum of lost time (s)	11.0
Intersection Capacity Utilization	130.9%	ICU Level of Service	H
Analysis Period (min)	15		

Description: Optimized

















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

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	4	168	11	46	6	24	179	32	18	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	8	4	181	12	49	6	26	192	34	19	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	278	319	19	231	223	122	19			218		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278	319	19	231	223	122	19			218		
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 %	100	99	100	74	98	95	100			97		
cM capacity (veh/h)	619	583	1065	702	659	934	1610			1363		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	12	242	225	54								
Volume Left	0	181	6	34								
Volume Right	4	49	192	0								
cSH	698	737	1610	1363								
Volume to Capacity	0.02	0.33	0.00	0.03								
Queue Length 95th (ft)	1	36	0	2								
Control Delay (s)	10.2	12.3	0.2	5.0								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.2	12.3	0.2	5.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			45.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	52	0	59	0	378	43	68	432	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	57	0	64	0	411	47	74	470	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	1116	1075	470	1052	1052	434	470			458		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1116	1075	470	1052	1052	434	470			458		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	70	100	89	100			93		
cM capacity (veh/h)	157	205	594	188	206	607	1077			1114		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	121	458	543								
Volume Left	0	57	0	74								
Volume Right	0	64	47	0								
cSH	1700	297	1077	1114								
Volume to Capacity	0.00	0.41	0.00	0.07								
Queue Length 95th (ft)	0	47	0	5								
Control Delay (s)	0.0	25.1	0.0	1.8								
Lane LOS	A	D		A								
Approach Delay (s)	0.0	25.1	0.0	1.8								
Approach LOS	A	D										
Intersection Summary												
Average Delay			3.6									
Intersection Capacity Utilization			65.5%		ICU Level of Service					C		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/10/2011












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	
Volume (veh/h)	380	0	2	30	31	453
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	413	0	2	33	34	492
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	35				845	18
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	35				845	18
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	74				86	54
cM capacity (veh/h)	1570				246	1060
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	413	35	526			
Volume Left	413	0	34			
Volume Right	0	33	492			
cSH	1570	1700	874			
Volume to Capacity	0.26	0.02	0.60			
Queue Length 95th (ft)	27	0	103			
Control Delay (s)	8.1	0.0	15.1			
Lane LOS	A		C			
Approach Delay (s)	8.1	0.0	15.1			
Approach LOS			C			
Intersection Summary						
Average Delay		11.6				
Intersection Capacity Utilization		64.1%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















2/10/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	4	453	4	4	380
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	5	546	5	5	458
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			7		1101	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			7		1101	5
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			66		97	57
cM capacity (veh/h)			1627		155	1075
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	7	551	463			
Volume Left	0	546	5			
Volume Right	5	0	458			
cSH	1700	1627	1013			
Volume to Capacity	0.00	0.34	0.46			
Queue Length 95th (ft)	0	37	61			
Control Delay (s)	0.0	8.3	11.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	8.3	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay			9.7			
Intersection Capacity Utilization			62.4%	ICU Level of Service		B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	95	346	11	17	346	136	6	151	6	165	194	237
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	106	384	12	19	384	151	7	168	7	183	216	263
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	536			397			1395	1175	391	1184	1106	460
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536			397			1395	1175	391	1184	1106	460
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 %	90			98			0	1	99	0	0	56
cM capacity (veh/h)	1037			1173			0	169	658	9	187	603
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	106	397	19	536	181	662						
Volume Left	106	0	19	0	7	183						
Volume Right	0	12	0	151	7	263						
cSH	1037	1700	1173	1700	0	30						
Volume to Capacity	0.10	0.23	0.02	0.32	Err	21.76						
Queue Length 95th (ft)	8	0	1	0	Err	Err						
Control Delay (s)	8.9	0.0	8.1	0.0	Err	Err						
Lane LOS	A		A		F	F						
Approach Delay (s)	1.9		0.3		Err	Err						
Approach LOS					F	F						
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			95.3%		ICU Level of Service				F			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/10/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	778	60	621	843	439	1243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1081	83	862	1171	610	1726
RTOR Reduction (vph)	0	55	0	0	0	0
Lane Group Flow (vph)	1081	28	862	1171	610	1726
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot			Free
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	23.0	23.0	19.0	48.0	27.0	85.0
Effective Green, g (s)	23.0	23.0	19.0	48.0	27.0	85.0
Actuated g/C Ratio	0.27	0.27	0.22	0.56	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	939	420	775	1062	573	1615
v/s Ratio Prot	0.31		0.25	0.62	0.34	
v/s Ratio Perm		0.02				c1.07
v/c Ratio	1.15	0.07	1.11	1.10	1.06	1.07
Uniform Delay, d1	31.0	23.0	33.0	18.5	29.0	42.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	80.4	0.1	67.7	60.2	56.0	43.3
Delay (s)	111.4	23.1	100.7	78.7	85.0	85.8
Level of Service	F	C	F	E	F	F
Approach Delay (s)	105.1			88.0	85.6	
Approach LOS	F			F	F	
Intersection Summary						
HCM Average Control Delay			90.6		HCM Level of Service	F
HCM Volume to Capacity ratio			1.07			
Actuated Cycle Length (s)			85.0		Sum of lost time (s)	0.0
Intersection Capacity Utilization			77.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/10/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	328	0	616	400	0	494
Sign Control	Stop		Free		Free	Free
Grade	0%		0%		0%	0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	0	670	435	0	537
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1424	887			1104	
vC1, stage 1 conf vol	887					
vC2, stage 2 conf vol	537					
vCu, unblocked vol	1424	887			1104	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	100			100	
cM capacity (veh/h)	350	343			632	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	357	1104	0	537		
Volume Left	357	0	0	0		
Volume Right	0	435	0	0		
cSH	348	1700	1700	1700		
Volume to Capacity	1.02	0.65	0.00	0.32		
Queue Length 95th (ft)	302	0	0	0		
Control Delay (s)	89.9	0.0	0.0	0.0		
Lane LOS	F					
Approach Delay (s)	89.9	0.0	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		16.0				
Intersection Capacity Utilization		81.7%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/10/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2243	1618	201	0	203
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2438	1759	218	0	221
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None TWLTL				
Median storage (veh)		2				
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1977				2978	879
vC1, stage 1 conf vol					1759	
vC2, stage 2 conf vol					1219	
vCu, unblocked vol	1977				2978	879
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	24
cM capacity (veh/h)	289				106	291
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1219	1219	879	879	218	221
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	218	221
cSH	1700	1700	1700	1700	1700	291
Volume to Capacity	0.72	0.72	0.52	0.52	0.13	0.76
Queue Length 95th (ft)	0	0	0	0	0	143
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	47.9
Lane LOS						E
Approach Delay (s)	0.0		0.0			47.9
Approach LOS						E
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			65.3%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/10/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		 	 						
Volume (veh/h)	440	1803	1609	654	967	210			
Sign Control	Free		Free	Stop					
Grade	0%		0%	0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	478	1960	1749	711	1051	228			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL		None						
Median storage (veh)	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	2460				3685	874			
vC1, stage 1 conf vol					1749				
vC2, stage 2 conf vol					1936				
vCu, unblocked vol	2460				3685	874			
tC, single (s)	4.1				6.8	6.9			
tC, 2 stage (s)					5.8				
tF (s)	2.2				3.5	3.3			
p0 queue free %	0				0	22			
cM capacity (veh/h)	186				0	293			
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	
Volume Total	478	980	980	874	874	711	1051	228	
Volume Left	478	0	0	0	0	0	1051	0	
Volume Right	0	0	0	0	0	711	0	228	
cSH	186	1700	1700	1700	1700	1700	0	293	
Volume to Capacity	2.57	0.58	0.58	0.51	0.51	0.42	Err	0.78	
Queue Length 95th (ft)	1022	0	0	0	0	0	Err	152	
Control Delay (s)	760.6	0.0	0.0	0.0	0.0	0.0	Err	50.0	
Lane LOS	F							F	F
Approach Delay (s)	149.2				0.0				Err
Approach LOS							F		
Intersection Summary									
Average Delay			Err						
Intersection Capacity Utilization			132.4%	ICU Level of Service			H		
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/10/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2764	2215	125	0	49
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3004	2408	136	0	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None TWLTL				
Median storage (veh)		2				
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2543				3910	1204
vC1, stage 1 conf vol					2408	
vC2, stage 2 conf vol					1502	
vCu, unblocked vol	2543				3910	1204
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	70
cM capacity (veh/h)	172				49	176
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1502	1502	1204	1204	136	53
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	136	53
cSH	1700	1700	1700	1700	1700	176
Volume to Capacity	0.88	0.88	0.71	0.71	0.08	0.30
Queue Length 95th (ft)	0	0	0	0	0	30
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	34.0
Lane LOS						D
Approach Delay (s)	0.0		0.0			34.0
Approach LOS						D
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			79.7%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road




















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	208	0	47	0	0	0	37	806	0	0	636	186
Sign Control	Stop				Stop				Free			
Grade	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)	226	0	51	0	0	0	40	876	0	0	691	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage veh							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1648	1648	691	1699	1850	876	893			876		
vC1, stage 1 conf vol	691	691		957	957							
vC2, stage 2 conf vol	957	957		742	893							
vCu, unblocked vol	1648	1648	691	1699	1850	876	893			876		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	8	100	89	100	100	100	95			100		
cM capacity (veh/h)	247	267	444	219	231	348	759			771		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	226	51	0	40	876	691	202					
Volume Left	226	0	0	40	0	0	0					
Volume Right	0	51	0	0	0	0	202					
cSH	247	444	1700	759	1700	1700	1700					
Volume to Capacity	0.92	0.11	0.00	0.05	0.52	0.41	0.12					
Queue Length 95th (ft)	200	10	0	4	0	0	0					
Control Delay (s)	80.4	14.2	0.0	10.0	0.0	0.0	0.0					
Lane LOS	F	B	A	B								
Approach Delay (s)	68.2		0.0	0.4		0.0						
Approach LOS	F		A									
Intersection Summary												
Average Delay			9.3									
Intersection Capacity Utilization			60.6%		ICU Level of Service				B			
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road




















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	0	63	0	0	0	69	840	0	0	656	49
Sign Control	Stop				Stop				Free			
Grade	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)	50	0	68	0	0	0	75	913	0	0	713	53
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1803	1803	740	1871	1829	913	766				913	
vC1, stage 1 conf vol	740	740		1063	1063							
vC2, stage 2 conf vol	1063	1063		808	766							
vCu, unblocked vol	1803	1803	740	1871	1829	913	766				913	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	76	100	84	100	100	100	91				100	
cM capacity (veh/h)	211	233	417	171	217	331	847				746	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	50	68	0	75	913	766						
Volume Left	50	0	0	75	0	0						
Volume Right	0	68	0	0	0	53						
cSH	211	417	1700	847	1700	1700						
Volume to Capacity	0.24	0.16	0.00	0.09	0.54	0.45						
Queue Length 95th (ft)	22	15	0	7	0	0						
Control Delay (s)	27.3	15.3	0.0	9.7	0.0	0.0						
Lane LOS	D	C	A	A								
Approach Delay (s)	20.4		0.0	0.7		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay			1.7									
Intersection Capacity Utilization			55.2%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road
























2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	73	0	188	0	0	0	201	836	0	0	670	72
Sign Control	Stop				Stop				Free			
Grade	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)	79	0	204	0	0	0	218	909	0	0	728	78
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2113	2113	767	2278	2152	909	807				909	
vC1, stage 1 conf vol	767	767		1346	1346							
vC2, stage 2 conf vol	1346	1346		933	807							
vCu, unblocked vol	2113	2113	767	2278	2152	909	807				909	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	38	100	49	100	100	100	73				100	
cM capacity (veh/h)	127	148	402	11	121	333	818				749	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	79	204	0	218	909	0	807					
Volume Left	79	0	0	218	0	0	0					
Volume Right	0	204	0	0	0	0	78					
cSH	127	402	1700	818	1700	1700	1700					
Volume to Capacity	0.62	0.51	0.00	0.27	0.53	0.00	0.47					
Queue Length 95th (ft)	81	70	0	27	0	0	0					
Control Delay (s)	71.7	22.9	0.0	11.0	0.0	0.0	0.0					
Lane LOS	F	C	A	B								
Approach Delay (s)	36.5		0.0	2.1		0.0						
Approach LOS	E		A									
Intersection Summary												
Average Delay			5.8									
Intersection Capacity Utilization			72.4%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	353	2100	311	109	1845	613	233	115	91	460	101	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	0.95		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3574	1599	1787	3574	1599	3467	3338		3467	1881	1599
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3574	1599	1787	3574	1599	3467	3338		3467	1881	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	380	2258	334	117	1984	659	251	124	98	495	109	282
RTOR Reduction (vph)	0	0	58	0	0	249	0	84	0	0	0	86
Lane Group Flow (vph)	380	2258	276	117	1984	410	251	138	0	495	109	196
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	11.5	76.0	76.0	7.5	72.0	72.0	12.7	20.5		15.0	22.8	22.8
Effective Green, g (s)	11.5	76.0	76.0	7.5	72.0	72.0	12.7	20.5		15.0	22.8	22.8
Actuated g/C Ratio	0.08	0.54	0.54	0.05	0.51	0.51	0.09	0.15		0.11	0.16	0.16
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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	3.0	3.0
Lane Grp Cap (vph)	285	1940	868	96	1838	822	315	489		371	306	260
v/s Ratio Prot	c0.11	c0.63		0.07	0.56		0.07	0.04		c0.14	0.06	
v/s Ratio Perm			0.17			0.26						c0.12
v/c Ratio	1.33	1.16	0.32	1.22	1.08	0.50	0.80	0.28		1.33	0.36	0.75
Uniform Delay, d1	64.2	32.0	17.7	66.2	34.0	22.2	62.4	53.2		62.5	52.1	55.9
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	172.0	79.8	1.0	161.9	46.1	2.2	13.1	0.3		167.8	0.7	11.7
Delay (s)	236.3	111.8	18.6	228.2	80.1	24.4	75.4	53.5		230.3	52.8	67.6
Level of Service	F	F	B	F	F	C	E	D		F	D	E
Approach Delay (s)		117.3			73.1			65.2			156.6	
Approach LOS		F			E			E			F	
Intersection Summary												
HCM Average Control Delay			101.5			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			100.8%			ICU Level of Service				G		
Analysis Period (min)			15									
Description: Dual EB, NB, SB lefts, 2nd NB through lane, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.

























2/21/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2604	36	23	2463	40	0	0	48	0	0	53
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2685	37	24	2539	41	0	0	49	0	0	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	TWLTL			TWLTL								
Median storage veh)	2			2								
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2580			2722			4151	5407	1342	4073	5403	1270
vC1, stage 1 conf vol							2779	2779		2587	2587	
vC2, stage 2 conf vol							1372	2628		1487	2816	
vCu, unblocked vol	2580			2722			4151	5407	1342	4073	5403	1270
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			84			100	100	66	100	100	66
cM capacity (veh/h)	167			149			13	0	145	18	5	162
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	47	1342	1342	37	24	1270	1270	41	49	55		
Volume Left	47	0	0	0	24	0	0	0	0	0		
Volume Right	0	0	0	37	0	0	0	41	49	55		
cSH	167	1700	1700	1700	149	1700	1700	1700	145	162		
Volume to Capacity	0.28	0.79	0.79	0.02	0.16	0.75	0.75	0.02	0.34	0.34		
Queue Length 95th (ft)	28	0	0	0	14	0	0	0	35	35		
Control Delay (s)	35.0	0.0	0.0	0.0	33.7	0.0	0.0	0.0	42.3	38.1		
Lane LOS	D				D				E	E		
Approach Delay (s)	0.6				0.3				42.3	38.1		
Approach LOS									E	E		
Intersection Summary												
Average Delay	1.2											
Intersection Capacity Utilization	82.0%			ICU Level of Service			D					
Analysis Period (min)	15											
Description: Add NB&SB Right turn bays-2012, Add EB/WB right turn lanes, Eliminate NB/SB LT movements (2032)												

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St
























2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	2541	47	113	1937	63	103	54	114	108	47	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	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)	1787	3574	1599	1787	3574	1599	1787	1881	1599	1787	1881	1599
Flt Permitted	0.04	1.00	1.00	0.04	1.00	1.00	0.72	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	82	3574	1599	83	3574	1599	1362	1881	1599	1353	1881	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	96	2732	51	122	2083	68	111	58	123	116	51	71
RTOR Reduction (vph)	0	0	7	0	0	12	0	0	52	0	0	61
Lane Group Flow (vph)	96	2732	44	122	2083	56	111	58	71	116	51	10
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4		4	8		8
Actuated Green, G (s)	98.2	92.2	92.2	96.2	91.2	91.2	17.2	17.2	17.2	17.2	17.2	17.2
Effective Green, g (s)	98.2	92.2	92.2	96.2	91.2	91.2	17.2	17.2	17.2	17.2	17.2	17.2
Actuated g/C Ratio	0.76	0.72	0.72	0.75	0.71	0.71	0.13	0.13	0.13	0.13	0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.8	3.8	3.0	2.5	2.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	142	2566	1148	129	2539	1136	182	252	214	181	252	214
v/s Ratio Prot	0.03	c0.76		c0.04	0.58			0.03			0.03	
v/s Ratio Perm	0.49		0.03	0.68		0.04	0.08		0.04	c0.09		0.01
v/c Ratio	0.68	1.06	0.04	0.95	0.82	0.05	0.61	0.23	0.33	0.64	0.20	0.05
Uniform Delay, d1	28.7	18.1	5.2	44.0	12.9	5.6	52.4	49.7	50.4	52.7	49.5	48.5
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	12.0	38.0	0.0	62.1	2.2	0.0	5.7	0.5	0.9	7.5	0.4	0.1
Delay (s)	40.7	56.1	5.3	106.0	15.1	5.6	58.1	50.2	51.3	60.2	49.9	48.6
Level of Service	D	E	A	F	B	A	E	D	D	E	D	D
Approach Delay (s)		54.7			19.7			53.7			54.5	
Approach LOS		D			B			D			D	
Intersection Summary												
HCM Average Control Delay			40.6			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			128.4			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			100.8%			ICU Level of Service			G			
Analysis Period (min)			15									
Description: Optimized, Add NB&SB Left Turn Bays												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	148	2377	24	46	2476	266	60	29	118	215	23	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91		1.00	0.91	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	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	5128		1787	5136	1599	1770	1863	1583	1805	1900	1615
Flt Permitted	0.05	1.00		0.05	1.00	1.00	0.74	1.00	1.00	0.74	1.00	1.00
Satd. Flow (perm)	88	5128		94	5136	1599	1380	1863	1583	1400	1900	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	159	2556	26	49	2662	286	65	31	127	231	25	127
RTOR Reduction (vph)	0	1	0	0	0	82	0	0	69	0	0	75
Lane Group Flow (vph)	159	2581	0	49	2662	204	65	31	58	231	25	52
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	pm+pt			pm+pt		Perm	Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2		2	4		4	8		8
Actuated Green, G (s)	96.8	86.3		85.2	80.2	80.2	25.9	25.9	25.9	25.9	25.9	25.9
Effective Green, g (s)	96.8	86.3		85.2	80.2	80.2	25.9	25.9	25.9	25.9	25.9	25.9
Actuated g/C Ratio	0.73	0.65		0.64	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	206	3322		124	3092	963	268	362	308	272	369	314
v/s Ratio Prot	c0.06	c0.50		0.01	c0.52			0.02			0.01	
v/s Ratio Perm	0.50			0.24		0.13	0.05		0.04	c0.16		0.03
v/c Ratio	0.77	0.78		0.40	0.86	0.21	0.24	0.09	0.19	0.85	0.07	0.17
Uniform Delay, d1	41.0	16.6		17.1	21.9	12.1	45.4	43.9	44.9	51.8	43.8	44.7
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	16.3	1.2		2.1	2.7	0.1	0.5	0.1	0.3	21.1	0.1	0.3
Delay (s)	57.3	17.8		19.2	24.6	12.2	45.8	44.1	45.1	72.9	43.9	44.9
Level of Service	E	B		B	C	B	D	D	D	E	D	D
Approach Delay (s)		20.1			23.3			45.2			61.7	
Approach LOS		C			C			D			E	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	133.2	Sum of lost time (s)	21.5
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

Description: Southbound left turn lane, Optimized

























Add EB & WB Auxilliary Lanes, connect turn bays from W. Center to S. Center

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	604	2079	176	179	2323	264	138	248	213	438	168	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	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)	3467	3574	1599	3467	5136	1599	3502	3610	1615	3467	1881	1599
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)	3467	3574	1599	3467	5136	1599	3502	3610	1615	3467	1881	1599
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	643	2212	187	190	2471	281	147	264	227	466	179	454
RTOR Reduction (vph)	0	0	30	0	0	79	0	0	1	0	0	9
Lane Group Flow (vph)	643	2212	157	190	2471	202	147	264	226	466	179	445
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	5
Permitted Phases			2			6			8			4
Actuated Green, G (s)	17.6	65.1	74.5	6.5	54.0	66.5	9.4	14.7	21.2	12.5	17.8	35.4
Effective Green, g (s)	17.6	65.1	74.5	6.5	54.0	66.5	9.4	14.7	21.2	12.5	17.8	35.4
Actuated g/C Ratio	0.15	0.54	0.62	0.05	0.45	0.55	0.08	0.12	0.18	0.10	0.15	0.29
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	505	1926	1059	187	2296	880	273	439	357	359	277	469
v/s Ratio Prot	0.19	c0.62	0.01	0.05	c0.48	0.02	0.04	0.07	0.03	c0.13	0.10	c0.14
v/s Ratio Perm			0.09			0.10			0.11			0.14
v/c Ratio	1.27	1.15	0.15	1.02	1.08	0.23	0.54	0.60	0.63	1.30	0.65	0.95
Uniform Delay, d1	51.6	27.9	9.8	57.1	33.4	14.0	53.6	50.3	46.2	54.1	48.5	41.8
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	137.8	73.4	0.1	70.0	43.1	0.1	2.0	2.3	3.7	153.2	5.1	28.6
Delay (s)	189.4	101.3	9.8	127.2	76.5	14.1	55.7	52.6	49.8	207.4	53.6	70.4
Level of Service	F	F	A	F	E	B	E	D	D	F	D	E
Approach Delay (s)		114.3			73.8			52.3			125.8	
Approach LOS		F			E			D			F	





















Intersection Summary

HCM Average Control Delay	95.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.8	Sum of lost time (s)	22.0
Intersection Capacity Utilization	100.3%	ICU Level of Service	G
Analysis Period (min)	15		
Description: Dual lefts all approaches, Reconfigure SB Through/Right			
Add WB auxilliary lane			
Add EB and NB right turn bays			
Optimized			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	346	11	17	346	136	6	151	6	165	194	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.96		1.00	0.99		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1820		1770	975		1787	1726	
Flt Permitted	0.17	1.00		0.42	1.00		0.25	1.00		0.55	1.00	
Satd. Flow (perm)	329	1873		804	1820		460	975		1040	1726	
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)	106	384	12	19	384	151	7	168	7	183	216	263
RTOR Reduction (vph)	0	2	0	0	21	0	0	2	0	0	65	0
Lane Group Flow (vph)	106	394	0	19	514	0	7	173	0	183	414	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	26.8	23.9		22.4	21.7		18.4	17.7		22.8	19.9	
Effective Green, g (s)	26.8	23.9		22.4	21.7		18.4	17.7		22.8	19.9	
Actuated g/C Ratio	0.44	0.39		0.37	0.35		0.30	0.29		0.37	0.33	
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)	213	731		306	645		153	282		423	561	
v/s Ratio Prot	c0.02	0.21		0.00	c0.28		0.00	0.18		c0.02	c0.24	
v/s Ratio Perm	0.19			0.02			0.01			0.14		
v/c Ratio	0.50	0.54		0.06	0.80		0.05	0.61		0.43	0.74	
Uniform Delay, d1	12.3	14.4		12.6	17.8		15.7	18.8		14.3	18.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.8		0.1	6.8		0.1	3.9		0.7	5.0	
Delay (s)	14.2	15.2		12.7	24.6		15.8	22.7		15.0	23.4	
Level of Service	B	B		B	C		B	C		B	C	
Approach Delay (s)		15.0			24.2			22.4			21.0	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM Average Control Delay			20.5			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			61.2			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			73.1%			ICU Level of Service			D			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB













2/10/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑↑	↘↙	↑
Volume (vph)	778	60	621	843	439	1243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	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)	3471	1553	3467	3574	3502	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	3574	3502	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1081	83	862	1171	610	1726
RTOR Reduction (vph)	0	47	0	0	0	0
Lane Group Flow (vph)	1081	36	862	1171	610	1726
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	31.9	31.9	24.9	62.8	21.4	94.2
Effective Green, g (s)	31.9	31.9	24.9	62.8	21.4	94.2
Actuated g/C Ratio	0.34	0.34	0.26	0.67	0.23	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1175	526	916	2383	796	1615
v/s Ratio Prot	0.31		0.25	0.33	0.17	
v/s Ratio Perm		0.02				c1.07
v/c Ratio	0.92	0.07	0.94	0.49	0.77	1.07
Uniform Delay, d1	29.9	21.1	33.9	7.8	34.1	47.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.6	0.1	17.2	0.2	4.4	43.3
Delay (s)	41.5	21.1	51.1	7.9	38.5	90.4
Level of Service	D	C	D	A	D	F
Approach Delay (s)	40.1			26.3	76.9	
Approach LOS	D			C	E	
Intersection Summary						
HCM Average Control Delay			50.5		HCM Level of Service	D
HCM Volume to Capacity ratio			1.07			
Actuated Cycle Length (s)			94.2		Sum of lost time (s)	0.0
Intersection Capacity Utilization			65.1%		ICU Level of Service	C
Analysis Period (min)			15			
Description: Optimized						
Add NB Left turn bay and WB through lane						
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/10/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	328	0	616	400	0	494
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	357	0	670	435	0	537
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1207	670			1104	
vC1, stage 1 conf vol	670					
vC2, stage 2 conf vol	537					
vCu, unblocked vol	1207	670			1104	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	15	100			100	
cM capacity (veh/h)	418	457			632	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	357	670	435	0	537	
Volume Left	357	0	0	0	0	
Volume Right	0	0	435	0	0	
cSH	417	1700	1700	1700	1700	
Volume to Capacity	0.86	0.39	0.26	0.00	0.32	
Queue Length 95th (ft)	210	0	0	0	0	
Control Delay (s)	47.3	0.0	0.0	0.0	0.0	
Lane LOS	E					
Approach Delay (s)	47.3	0.0		0.0		
Approach LOS	E					
Intersection Summary						
Average Delay			8.4			
Intersection Capacity Utilization			57.3%		ICU Level of Service	B
Analysis Period (min)			15			
Description: NB Right Turn Bay-Check roundabout						

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/10/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	440	1803	1609	654	967	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3433	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	1960	1749	711	1051	228
RTOR Reduction (vph)	0	0	0	0	0	139
Lane Group Flow (vph)	478	1960	1749	711	1051	89
Turn Type	Prot			Free		Perm
Protected Phases	5	2	6		4	
Permitted Phases				Free		4
Actuated Green, G (s)	16.0	77.0	57.0	120.0	34.0	34.0
Effective Green, g (s)	16.0	77.0	57.0	120.0	34.0	34.0
Actuated g/C Ratio	0.13	0.64	0.48	1.00	0.28	0.28
Clearance Time (s)	5.0	5.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	458	2271	1681	1583	973	449
v/s Ratio Prot	c0.14	0.55	c0.49		c0.31	
v/s Ratio Perm				0.45		0.06
v/c Ratio	1.04	0.86	1.04	0.45	1.08	0.20
Uniform Delay, d1	52.0	17.3	31.5	0.0	43.0	32.6
Progression Factor	1.00	1.00	1.00	1.00	0.98	0.94
Incremental Delay, d2	53.9	4.6	33.3	0.9	53.0	1.0
Delay (s)	105.9	21.9	64.8	0.9	95.2	31.8
Level of Service	F	C	E	A	F	C
Approach Delay (s)		38.4	46.3		83.9	
Approach LOS		D	D		F	




















Intersection Summary

HCM Average Control Delay	51.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		
Description: Signalized, Dual EB Lefts, Optimized			
Channelize WB right, free movement			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road






















2/22/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	208	0	47	0	0	0	37	806	0	0	636	186
Sign Control		Stop			Stop			Free			Free	
Grade		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)	226	0	51	0	0	0	40	876	0	0	691	202
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLT			TWLT	
Median storage (veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1210	1648	691	1699	1850	438	893			876		
vC1, stage 1 conf vol	691	691		957	957							
vC2, stage 2 conf vol	518	957		742	893							
vCu, unblocked vol	1210	1648	691	1699	1850	438	893			876		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	31	100	87	100	100	100	95			100		
cM capacity (veh/h)	326	266	387	193	229	566	755			766		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2				
Volume Total	226	51	0	40	438	438	691	202				
Volume Left	226	0	0	40	0	0	0	0				
Volume Right	0	51	0	0	0	0	0	202				
cSH	326	387	1700	755	1700	1700	1700	1700				
Volume to Capacity	0.69	0.13	0.00	0.05	0.26	0.26	0.41	0.12				
Queue Length 95th (ft)	122	11	0	4	0	0	0	0				
Control Delay (s)	37.7	15.7	0.0	10.0	0.0	0.0	0.0	0.0				
Lane LOS	E	C	A	B								
Approach Delay (s)	33.7		0.0	0.4			0.0					
Approach LOS	D		A									
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			51.7%		ICU Level of Service			A				
Analysis Period (min)			15									
Description: SB Right Turn Lane (100')												
2 NB Through lane												

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	353	1924	244	109	1678	561	170	80	91	412	68	262
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	380	2069	262	117	1804	603	183	86	98	443	73	282
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2408			2331			4283	5470	1034	3973	5129	902
vC1, stage 1 conf vol							2828	2828		2039	2039	
vC2, stage 2 conf vol							1455	2642		1934	3090	
vCu, unblocked vol	2408			2331			4283	5470	1034	3973	5129	902
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			45			0	0	58	0	0	0
cM capacity (veh/h)	198			213			0	0	231	0	0	283
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	380	1034	1034	262	117	902	902	603	367	798		
Volume Left	380	0	0	0	117	0	0	0	183	443		
Volume Right	0	0	0	262	0	0	0	603	98	282		
cSH	198	1700	1700	1700	213	1700	1700	1700	0	0		
Volume to Capacity	1.91	0.61	0.61	0.15	0.55	0.53	0.53	0.35	Err	Err		
Queue Length 95th (ft)	694	0	0	0	74	0	0	0	Err	Err		
Control Delay (s)	469.4	0.0	0.0	0.0	40.9	0.0	0.0	0.0	Err	Err		
Lane LOS	F				E				F	F		
Approach Delay (s)	65.7				1.9				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			131.2%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2386	36	23	2250	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2460	37	24	2320	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2361			2497			3816	4981	1248	3741	4979	1180
vC1, stage 1 conf vol							2573	2573		2388	2388	
vC2, stage 2 conf vol							1243	2408		1354	2592	
vCu, unblocked vol	2361			2497			3816	4981	1248	3741	4979	1180
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			87			3	53	84	38	66	82
cM capacity (veh/h)	204			183			19	9	167	27	15	186
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	47	1640	857	24	1546	814	49	55				
Volume Left	47	0	0	24	0	0	19	16				
Volume Right	0	0	37	0	0	41	27	33				
cSH	204	1700	1700	183	1700	1700	31	48				
Volume to Capacity	0.23	0.96	0.50	0.13	0.91	0.48	1.60	1.14				
Queue Length 95th (ft)	22	0	0	11	0	0	140	124				
Control Delay (s)	27.9	0.0	0.0	27.6	0.0	0.0	574.9	308.0				
Lane LOS	D			D			F	F				
Approach Delay (s)	0.5			0.3			574.9	308.0				
Approach LOS							F	F				
Intersection Summary												
Average Delay			9.4									
Intersection Capacity Utilization			77.8%			ICU Level of Service				D		
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	2343	37	113	1743	63	93	54	114	108	47	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3566		1787	3555			1823	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.52	1.00		0.53	1.00
Satd. Flow (perm)	1787	3566		1787	3555			978	1599		992	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	90	2519	40	122	1874	68	100	58	123	116	51	66
RTOR Reduction (vph)	0	1	0	0	2	0	0	0	45	0	0	23
Lane Group Flow (vph)	90	2558	0	122	1940	0	0	158	78	0	167	43
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	8.0	80.2		8.0	80.2			24.0	24.0		24.0	24.0
Effective Green, g (s)	8.0	80.2		8.0	80.2			24.0	24.0		24.0	24.0
Actuated g/C Ratio	0.06	0.64		0.06	0.64			0.19	0.19		0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	113	2266		113	2259			186	304		189	304
v/s Ratio Prot	0.05	c0.72		0.07	c0.55							
v/s Ratio Perm								0.16	0.05		c0.17	0.03
v/c Ratio	0.80	1.13		1.08	0.86			0.85	0.26		0.88	0.14
Uniform Delay, d1	58.3	23.0		59.1	18.5			49.4	43.5		49.7	42.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	31.0	64.3		107.7	3.4			28.6	0.5		35.0	0.2
Delay (s)	89.3	87.3		166.8	21.9			77.9	44.0		84.8	42.8
Level of Service	F	F		F	C			E	D		F	D
Approach Delay (s)		87.4			30.5			63.1			72.9	
Approach LOS		F			C			E			E	
Intersection Summary												
HCM Average Control Delay			63.0			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			126.2			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			99.0%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	143	2193	19	46	2296	266	55	29	118	215	23	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3570		1787	3574	1599		1693			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.68			0.51	1.00
Satd. Flow (perm)	1787	3570		1787	3574	1599		1164			977	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	154	2358	20	49	2469	286	59	31	127	231	25	123
RTOR Reduction (vph)	0	0	0	0	0	68	0	39	0	0	0	54
Lane Group Flow (vph)	154	2378	0	49	2469	218	0	178	0	0	256	69
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	76.9		3.9	71.3	71.3		36.2			36.2	36.2
Effective Green, g (s)	9.5	76.9		3.9	71.3	71.3		36.2			36.2	36.2
Actuated g/C Ratio	0.07	0.58		0.03	0.54	0.54		0.27			0.27	0.27
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	128	2064		52	1916	857		317			266	440
v/s Ratio Prot	c0.09	c0.67		0.03	c0.69						c0.26	0.04
v/s Ratio Perm						0.14		0.15				0.16
v/c Ratio	1.20	1.15		0.94	1.29	0.25		0.56			0.96	0.16
Uniform Delay, d1	61.8	28.0		64.4	30.9	16.6		41.6			47.7	36.8
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	144.2	74.4		102.9	133.9	0.2		2.3			44.6	0.2
Delay (s)	206.0	102.5		167.4	164.8	16.7		43.9			92.3	37.0
Level of Service	F	F		F	F	B		D			F	D
Approach Delay (s)		108.8			149.7			43.9			74.4	
Approach LOS		F			F			D			E	
Intersection Summary												
HCM Average Control Delay			123.6			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.24									
Actuated Cycle Length (s)			133.0			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			113.8%			ICU Level of Service			H			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	590	1931	161	179	2178	264	123	248	213	438	168	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3193	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	628	2054	171	190	2317	281	131	264	227	466	179	439
RTOR Reduction (vph)	0	0	31	0	0	79	0	0	5	0	216	0
Lane Group Flow (vph)	628	2054	140	190	2317	202	131	264	222	466	402	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	65.0	9.5	47.0	69.5	13.0	14.4	23.9	22.5	23.9	
Effective Green, g (s)	14.5	52.0	65.0	9.5	47.0	69.5	13.0	14.4	23.9	22.5	23.9	
Actuated g/C Ratio	0.12	0.43	0.54	0.08	0.39	0.58	0.11	0.12	0.20	0.19	0.20	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	418	1544	936	141	1395	923	195	432	394	334	634	
v/s Ratio Prot	0.18	c0.57	0.02	0.11	c0.65	0.04	0.07	0.07	0.04	c0.26	c0.13	
v/s Ratio Perm			0.07			0.09			0.09			
v/c Ratio	1.50	1.33	0.15	1.35	1.66	0.22	0.67	0.61	0.56	1.40	0.63	
Uniform Delay, d1	53.0	34.2	13.9	55.5	36.7	12.3	51.6	50.3	43.5	49.0	44.2	
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	238.3	153.2	0.1	195.9	300.6	0.1	8.8	2.6	1.8	195.2	2.1	
Delay (s)	291.2	187.4	13.9	251.3	337.3	12.4	60.4	52.9	45.4	244.1	46.3	
Level of Service	F	F	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		199.9			298.7			51.7			131.4	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM Average Control Delay	214.7			HCM Level of Service					F			
HCM Volume to Capacity ratio	1.31											
Actuated Cycle Length (s)	120.4			Sum of lost time (s)					11.0			
Intersection Capacity Utilization	126.5%			ICU Level of Service					H			
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	4	119	11	46	6	24	130	32	18	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	8	4	128	12	49	6	26	140	34	19	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	252	267	19	205	197	96	19			166		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	252	267	19	205	197	96	19			166		
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 %	100	99	100	83	98	95	100			98		
cM capacity (veh/h)	646	624	1065	731	683	966	1610			1425		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	12	189	172	54								
Volume Left	0	128	6	34								
Volume Right	4	49	140	0								
cSH	735	777	1610	1425								
Volume to Capacity	0.02	0.24	0.00	0.02								
Queue Length 95th (ft)	1	24	0	2								
Control Delay (s)	10.0	11.1	0.3	4.9								
Lane LOS	A	B	A	A								
Approach Delay (s)	10.0	11.1	0.3	4.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.9									
Intersection Capacity Utilization			39.6%	ICU Level of Service					A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	52	0	44	0	295	43	53	348	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	57	0	48	0	321	47	58	378	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	885	861	378	838	838	344	378			367		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	885	861	378	838	838	344	378			367		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	79	100	93	100			95		
cM capacity (veh/h)	238	279	668	268	281	683	1164			1202		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	104	367	436								
Volume Left	0	57	0	58								
Volume Right	0	48	47	0								
cSH	1700	371	1164	1202								
Volume to Capacity	0.00	0.28	0.00	0.05								
Queue Length 95th (ft)	0	28	0	4								
Control Delay (s)	0.0	18.4	0.0	1.5								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	18.4	0.0	1.5								
Approach LOS	A	C										
Intersection Summary												
Average Delay			2.8									
Intersection Capacity Utilization			55.0%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/14/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Volume (veh/h)	308	0	2	20	22	378
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	335	0	2	22	24	411
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	24				683	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	24				683	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	79				93	62
cM capacity (veh/h)	1584				327	1067
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	335	24	435			
Volume Left	335	0	24			
Volume Right	0	22	411			
cSH	1584	1700	949			
Volume to Capacity	0.21	0.01	0.46			
Queue Length 95th (ft)	20	0	61			
Control Delay (s)	7.9	0.0	12.0			
Lane LOS	A		B			
Approach Delay (s)	7.9	0.0	12.0			
Approach LOS			B			
Intersection Summary						
Average Delay			9.9			
Intersection Capacity Utilization			55.0%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















2/14/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	4	378	4	4	308
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	5	455	5	5	371
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			7		920	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			7		920	5
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			72		98	65
cM capacity (veh/h)			1627		215	1075
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	7	460	376			
Volume Left	0	455	5			
Volume Right	5	0	371			
cSH	1700	1627	1023			
Volume to Capacity	0.00	0.28	0.37			
Queue Length 95th (ft)	0	29	43			
Control Delay (s)	0.0	8.0	10.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	8.0	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			9.1			
Intersection Capacity Utilization			53.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	85	346	11	17	346	102	6	122	6	130	164	227
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	94	384	12	19	384	113	7	136	7	144	182	252
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	498			397			1345	1115	391	1127	1064	441
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	498			397			1345	1115	391	1127	1064	441
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 %	91			98			56	27	99	0	9	59
cM capacity (veh/h)	1071			1173			15	187	658	69	201	618
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	94	397	19	498	149	579						
Volume Left	94	0	19	0	7	144						
Volume Right	0	12	0	113	7	252						
cSH	1071	1700	1173	1700	127	170						
Volume to Capacity	0.09	0.23	0.02	0.29	1.18	3.41						
Queue Length 95th (ft)	7	0	1	0	225	Err						
Control Delay (s)	8.7	0.0	8.1	0.0	202.2	Err						
Lane LOS	A		A		F	F						
Approach Delay (s)	1.7		0.3		202.2	Err						
Approach LOS					F	F						
Intersection Summary												
Average Delay			3353.0									
Intersection Capacity Utilization			85.7%		ICU Level of Service				E			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/14/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	734	60	591	798	439	1214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1019	83	821	1108	610	1686
RTOR Reduction (vph)	0	59	0	0	0	0
Lane Group Flow (vph)	1019	24	821	1108	610	1686
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	23.0	23.0	19.0	48.0	27.0	85.0
Effective Green, g (s)	23.0	23.0	19.0	48.0	27.0	85.0
Actuated g/C Ratio	0.27	0.27	0.22	0.56	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	939	420	775	1062	573	1615
v/s Ratio Prot	0.29		0.24	0.59	0.34	
v/s Ratio Perm		0.02				c1.04
v/c Ratio	1.09	0.06	1.06	1.04	1.06	1.04
Uniform Delay, d1	31.0	23.0	33.0	18.5	29.0	42.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	55.3	0.1	49.2	39.6	56.0	34.8
Delay (s)	86.3	23.0	82.2	58.1	85.0	77.3
Level of Service	F	C	F	E	F	E
Approach Delay (s)	81.5			68.4	79.3	
Approach LOS	F			E	E	
Intersection Summary						
HCM Average Control Delay			75.8		HCM Level of Service	E
HCM Volume to Capacity ratio			1.04			
Actuated Cycle Length (s)			85.0		Sum of lost time (s)	0.0
Intersection Capacity Utilization			74.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/14/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	280	0	566	350	0	445
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	0	615	380	0	484
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1289	805			996	
vC1, stage 1 conf vol	805					
vC2, stage 2 conf vol	484					
vCu, unblocked vol	1289	805			996	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	21	100			100	
cM capacity (veh/h)	384	382			695	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	304	996	0	484		
Volume Left	304	0	0	0		
Volume Right	0	380	0	0		
cSH	382	1700	1700	1700		
Volume to Capacity	0.80	0.59	0.00	0.28		
Queue Length 95th (ft)	172	0	0	0		
Control Delay (s)	42.6	0.0	0.0	0.0		
Lane LOS	E					
Approach Delay (s)	42.6	0.0	0.0			
Approach LOS	E					
Intersection Summary						
Average Delay		7.3				
Intersection Capacity Utilization		73.3%		ICU Level of Service		D
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/14/2011

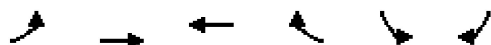








Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2170	1555	191	0	190
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2359	1690	208	0	207
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1898				2870	845
vC1, stage 1 conf vol					1690	
vC2, stage 2 conf vol					1179	
vCu, unblocked vol	1898				2870	845
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	33
cM capacity (veh/h)	310				114	306
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1179	1179	845	845	208	207
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	208	207
cSH	1700	1700	1700	1700	1700	306
Volume to Capacity	0.69	0.69	0.50	0.50	0.12	0.67
Queue Length 95th (ft)	0	0	0	0	0	114
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	38.0
Lane LOS						E
Approach Delay (s)	0.0		0.0			38.0
Approach LOS						E
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			63.3%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/14/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Volume (veh/h)	341	1829	1603	449	698	144		
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	371	1988	1742	488	759	157		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	TWLTL		None					
Median storage veh	2							
Upstream signal (ft)								
pX, platoon unblocked								
vC, conflicting volume	2230				3478	871		
vC1, stage 1 conf vol					1742			
vC2, stage 2 conf vol					1735			
vCu, unblocked vol	2230				3478	871		
tC, single (s)	4.1				6.8	6.9		
tC, 2 stage (s)					5.8			
tF (s)	2.2				3.5	3.3		
p0 queue free %	0				0	47		
cM capacity (veh/h)	230				0	294		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	371	994	994	871	871	488	759	157
Volume Left	371	0	0	0	0	0	759	0
Volume Right	0	0	0	0	0	488	0	157
cSH	230	1700	1700	1700	1700	1700	0	294
Volume to Capacity	1.61	0.58	0.58	0.51	0.51	0.29	Err	0.53
Queue Length 95th (ft)	588	0	0	0	0	0	Err	73
Control Delay (s)	333.6	0.0	0.0	0.0	0.0	0.0	Err	30.3
Lane LOS	F						F	D
Approach Delay (s)	52.4			0.0			Err	
Approach LOS							F	
Intersection Summary								
Average Delay			Err					
Intersection Capacity Utilization			111.9%		ICU Level of Service		H	
Analysis Period (min)			15					

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/14/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2521	2016	94	0	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2740	2191	102	0	38
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2293				3561	1096
vC1, stage 1 conf vol					2191	
vC2, stage 2 conf vol					1370	
vCu, unblocked vol	2293				3561	1096
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	82
cM capacity (veh/h)	217				64	208
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1370	1370	1096	1096	102	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	102	38
cSH	1700	1700	1700	1700	1700	208
Volume to Capacity	0.81	0.81	0.64	0.64	0.06	0.18
Queue Length 95th (ft)	0	0	0	0	0	16
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	26.1
Lane LOS						D
Approach Delay (s)	0.0		0.0			26.1
Approach LOS						D
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			73.0%		ICU Level of Service	D
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road




















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	129	0	42	0	0	0	28	788	0	0	610	115
Sign Control	Stop			Stop			Free			Free		
Grade	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)	140	0	46	0	0	0	30	857	0	0	663	125
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1580	1580	663	1626	1705	857	788				857	
vC1, stage 1 conf vol	663	663		917	917							
vC2, stage 2 conf vol	917	917		709	788							
vCu, unblocked vol	1580	1580	663	1626	1705	857	788				857	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	47	100	90	100	100	100	96				100	
cM capacity (veh/h)	263	283	461	239	259	357	831				784	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	140	46	0	30	857	663	125					
Volume Left	140	0	0	30	0	0	0					
Volume Right	0	46	0	0	0	0	125					
cSH	263	461	1700	831	1700	1700	1700					
Volume to Capacity	0.53	0.10	0.00	0.04	0.50	0.39	0.07					
Queue Length 95th (ft)	72	8	0	3	0	0	0					
Control Delay (s)	33.3	13.7	0.0	9.5	0.0	0.0	0.0					
Lane LOS	D	B	A	A								
Approach Delay (s)	28.4		0.0	0.3		0.0						
Approach LOS	D		A									
Intersection Summary												
Average Delay	3.0											
Intersection Capacity Utilization	55.3%			ICU Level of Service			B					
Analysis Period (min)	15											
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road





















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	0	42	0	0	0	48	826	0	0	643	33
Sign Control	Stop				Stop				Free			
Grade	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)	35	0	46	0	0	0	52	898	0	0	699	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1719	1719	717	1765	1737	898	735				898	
vC1, stage 1 conf vol	717	717		1002	1002							
vC2, stage 2 conf vol	1002	1002		762	735							
vCu, unblocked vol	1719	1719	717	1765	1737	898	735				898	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	85	100	89	100	100	100	94				100	
cM capacity (veh/h)	232	253	430	205	242	338	870				756	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	35	46	0	52	898	735						
Volume Left	35	0	0	52	0	0						
Volume Right	0	46	0	0	0	36						
cSH	232	430	1700	870	1700	1700						
Volume to Capacity	0.15	0.11	0.00	0.06	0.53	0.43						
Queue Length 95th (ft)	13	9	0	5	0	0						
Control Delay (s)	23.2	14.4	0.0	9.4	0.0	0.0						
Lane LOS	C	B	A	A								
Approach Delay (s)	18.2		0.0	0.5		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			53.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road























2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	58	0	125	0	0	0	135	816	0	0	653	55
Sign Control	Stop			Stop			Free			Free		
Grade	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)	63	0	136	0	0	0	147	887	0	0	710	60
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1920	1920	740	2026	1950	887	770				887	
vC1, stage 1 conf vol	740	740		1180	1180							
vC2, stage 2 conf vol	1180	1180		846	770							
vCu, unblocked vol	1920	1920	740	2026	1950	887	770				887	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	63	100	67	100	100	100	83				100	
cM capacity (veh/h)	172	194	417	84	172	343	845				763	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	63	136	0	147	887	0	770					
Volume Left	63	0	0	147	0	0	0					
Volume Right	0	136	0	0	0	0	60					
cSH	172	417	1700	845	1700	1700	1700					
Volume to Capacity	0.37	0.33	0.00	0.17	0.52	0.00	0.45					
Queue Length 95th (ft)	39	35	0	16	0	0	0					
Control Delay (s)	37.6	17.8	0.0	10.2	0.0	0.0	0.0					
Lane LOS	E	C	A	B								
Approach Delay (s)	24.0		0.0	1.4		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			64.0%	ICU Level of Service				C				
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road





















2/10/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	353	1924	244	109	1678	561	170	80	91	412	68	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.92		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1731		1787	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.17	1.00		0.41	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	311	1731		767	1657	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	380	2069	262	117	1804	603	183	86	98	443	73	282
RTOR Reduction (vph)	0	0	53	0	0	265	0	31	0	0	103	0
Lane Group Flow (vph)	380	2069	209	117	1804	338	183	153	0	443	253	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	21.5	75.3	75.3	7.5	61.3	61.3	35.2	24.2		37.2	25.2	
Effective Green, g (s)	21.5	75.3	75.3	7.5	61.3	61.3	35.2	24.2		37.2	25.2	
Actuated g/C Ratio	0.15	0.54	0.54	0.05	0.44	0.44	0.25	0.17		0.27	0.18	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	274	1922	860	96	1565	700	194	299		291	298	
v/s Ratio Prot	c0.21	0.58		0.07	c0.50		0.07	0.09		c0.13	0.15	
v/s Ratio Perm			0.13			0.21	0.16			c0.27		
v/c Ratio	1.39	1.08	0.24	1.22	1.15	0.48	0.94	0.51		1.52	0.85	
Uniform Delay, d1	59.2	32.4	17.2	66.2	39.4	28.1	46.7	52.6		49.8	55.5	
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	195.1	44.6	0.7	161.9	76.5	2.4	48.3	1.5		251.9	19.4	
Delay (s)	254.4	76.9	17.9	228.2	115.9	30.4	94.9	54.0		301.7	75.0	
Level of Service	F	E	B	F	F	C	F	D		F	E	
Approach Delay (s)		96.1			100.7			74.4			200.8	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM Average Control Delay			109.7			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.27									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			116.0%			ICU Level of Service				H		
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.























2/21/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2386	36	23	2250	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2460	37	24	2320	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									2			2
Median type		TWLT			TWLT							
Median storage veh		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2361			2497			3783	4981	1248	3714	4979	1180
vC1, stage 1 conf vol							2573	2573		2388	2388	
vC2, stage 2 conf vol							1210	2408		1327	2592	
vCu, unblocked vol	2361			2497			3783	4981	1248	3714	4979	1180
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	77			87			4	53	84	39	66	82
cM capacity (veh/h)	204			183			19	9	167	27	15	186
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	47	1640	857	24	1546	814	49	55				
Volume Left	47	0	0	24	0	0	19	16				
Volume Right	0	0	37	0	0	41	27	33				
cSH	204	1700	1700	183	1700	1700	34	57				
Volume to Capacity	0.23	0.96	0.50	0.13	0.91	0.48	1.46	0.96				
Queue Length 95th (ft)	22	0	0	11	0	0	135	110				
Control Delay (s)	27.9	0.0	0.0	27.6	0.0	0.0	500.9	226.0				
Lane LOS	D			D			F	F				
Approach Delay (s)	0.5			0.3			500.9	226.0				
Approach LOS							F	F				
Intersection Summary												
Average Delay			7.8									
Intersection Capacity Utilization			83.8%			ICU Level of Service		E				
Analysis Period (min)			15									
Description: NB/SB Right Turn Pocket 50' (2012)												

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St


























2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	2343	37	113	1743	63	93	54	114	108	47	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	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	0.90		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1689		1787	1722	
Flt Permitted	0.05	1.00	1.00	0.05	1.00	1.00	0.57	1.00		0.40	1.00	
Satd. Flow (perm)	91	3574	1599	91	3574	1599	1075	1689		758	1722	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	90	2519	40	122	1874	68	100	58	123	116	51	66
RTOR Reduction (vph)	0	0	6	0	0	14	0	55	0	0	37	0
Lane Group Flow (vph)	90	2519	34	122	1874	54	100	126	0	116	80	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	88.3	88.3	88.3	87.3	87.3	87.3	21.4	21.4		21.4	21.4	
Effective Green, g (s)	88.3	88.3	88.3	87.3	87.3	87.3	21.4	21.4		21.4	21.4	
Actuated g/C Ratio	0.69	0.69	0.69	0.68	0.68	0.68	0.17	0.17		0.17	0.17	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.8	3.8	3.0	2.5	2.5	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	142	2452	1097	128	2424	1085	179	281		126	286	
v/s Ratio Prot	0.03	c0.70		0.04	c0.52			0.07			0.05	
v/s Ratio Perm	0.40		0.02	0.61		0.03	0.09			c0.15		
v/c Ratio	0.63	1.03	0.03	0.95	0.77	0.05	0.56	0.45		0.92	0.28	
Uniform Delay, d1	22.6	20.2	6.5	58.2	14.0	6.9	49.3	48.3		52.8	46.9	
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	8.9	25.6	0.0	64.7	1.5	0.0	3.7	1.1		56.2	0.5	
Delay (s)	31.5	45.8	6.5	122.8	15.5	6.9	53.1	49.5		109.0	47.5	
Level of Service	C	D	A	F	B	A	D	D		F	D	
Approach Delay (s)		44.7			21.6			50.7			78.1	
Approach LOS		D			C			D			E	
Intersection Summary												
HCM Average Control Delay			37.4			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			128.7			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			101.9%			ICU Level of Service			G			
Analysis Period (min)			15									
Description: Optimized												
Add EB/WB Rt Turn Bays, Reconfigure N/S approaches												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Volume (vph)	143	2193	19	46	2296	266	55	29	118	215	23	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		4.0	5.0	
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	0.88		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1770	1638		1805	1663	
Flt Permitted	0.05	1.00	1.00	0.05	1.00	1.00	0.48	1.00		0.47	1.00	
Satd. Flow (perm)	93	3574	1599	95	3574	1599	892	1638		899	1663	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	154	2358	20	49	2469	286	59	31	127	231	25	123
RTOR Reduction (vph)	0	0	3	0	0	54	0	64	0	0	56	0
Lane Group Flow (vph)	154	2358	17	49	2469	232	59	94	0	231	92	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			pm+pt		
Protected Phases	1	6		5	2			4		3	8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	86.2	80.7	80.7	83.2	79.2	79.2	14.5	14.5		23.5	22.5	
Effective Green, g (s)	86.2	80.7	80.7	83.2	79.2	79.2	14.5	14.5		23.5	22.5	
Actuated g/C Ratio	0.70	0.66	0.66	0.68	0.64	0.64	0.12	0.12		0.19	0.18	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		4.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.1	3.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	2341	1047	119	2298	1028	105	193		201	304	
v/s Ratio Prot	c0.05	0.66		0.01	0.69			0.06		c0.04	0.06	
v/s Ratio Perm	c0.72		0.01	0.26		0.14	0.07			c0.18		
v/c Ratio	1.09	1.01	0.02	0.41	1.07	0.23	0.56	0.49		1.15	0.30	
Uniform Delay, d1	40.8	21.2	7.4	30.2	22.0	9.2	51.3	50.9		51.5	43.6	
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	102.6	20.4	0.0	2.3	42.4	0.1	6.7	2.0		109.5	0.6	
Delay (s)	143.4	41.6	7.4	32.6	64.4	9.3	58.1	52.8		160.9	44.1	
Level of Service	F	D	A	C	E	A	E	D		F	D	
Approach Delay (s)		47.5			58.2			54.3			115.3	
Approach LOS		D			E			D			F	

Intersection Summary

HCM Average Control Delay	57.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	123.2	Sum of lost time (s)	9.5
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		

Description: Optimized

























Add EB Rt and NB Lt turn bays, Reconfigure SB approach

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

2/22/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	590	1931	161	179	2178	264	123	248	213	438	168	413
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	0.89
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	3467	3193	3193
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	3467	3193	3193
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	628	2054	171	190	2317	281	131	264	227	466	179	439
RTOR Reduction (vph)	0	0	28	0	0	58	0	0	2	0	197	0
Lane Group Flow (vph)	628	2054	143	190	2317	223	131	264	225	466	421	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	18.5	78.2	92.3	11.5	71.2	85.7	14.1	22.3	33.8	14.5	22.7	
Effective Green, g (s)	18.5	78.2	92.3	11.5	71.2	85.7	14.1	22.3	33.8	14.5	22.7	
Actuated g/C Ratio	0.12	0.53	0.62	0.08	0.48	0.58	0.09	0.15	0.23	0.10	0.15	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	432	1882	1053	138	1714	923	171	542	427	339	488	
v/s Ratio Prot	c0.18	0.57	0.01	0.11	c0.65	0.02	0.07	0.07	0.04	c0.13	c0.13	
v/s Ratio Perm			0.08			0.12			0.10			
v/c Ratio	1.45	1.09	0.14	1.38	1.35	0.24	0.77	0.49	0.53	1.37	1.00dr	
Uniform Delay, d1	65.0	35.1	11.6	68.5	38.6	15.4	65.6	57.9	50.3	67.0	61.4	
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	216.7	50.4	0.1	208.4	162.3	0.1	18.3	0.7	1.2	186.2	14.6	
Delay (s)	281.7	85.6	11.7	276.9	200.9	15.6	83.9	58.5	51.5	253.2	76.0	
Level of Service	F	F	B	F	F	B	F	E	D	F	E	
Approach Delay (s)		124.3			187.4			61.3			152.2	
Approach LOS		F			F			E			F	

Intersection Summary

HCM Average Control Delay	147.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	148.5	Sum of lost time (s)	16.5
Intersection Capacity Utilization	120.2%	ICU Level of Service	H
Analysis Period (min)	15		

Description: Dual SB Left Turn Lanes





















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

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	346	11	17	346	102	6	122	6	130	164	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.97		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1835		1770	973		1787	1717	
Flt Permitted	0.20	1.00		0.43	1.00		0.31	1.00		0.58	1.00	
Satd. Flow (perm)	377	1873		812	1835		573	973		1094	1717	
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)	94	384	12	19	384	113	7	136	7	144	182	252
RTOR Reduction (vph)	0	2	0	0	17	0	0	4	0	0	84	0
Lane Group Flow (vph)	94	394	0	19	480	0	7	139	0	144	350	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	21.1		19.6	18.9		15.9	15.2		20.3	17.4	
Effective Green, g (s)	24.0	21.1		19.6	18.9		15.9	15.2		20.3	17.4	
Actuated g/C Ratio	0.43	0.38		0.35	0.34		0.28	0.27		0.36	0.31	
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)	235	707		297	620		178	265		433	534	
v/s Ratio Prot	c0.02	0.21		0.00	c0.26		0.00	0.14		c0.02	c0.20	
v/s Ratio Perm	0.15			0.02			0.01			0.10		
v/c Ratio	0.40	0.56		0.06	0.77		0.04	0.53		0.33	0.66	
Uniform Delay, d1	11.1	13.7		12.0	16.6		14.7	17.3		12.5	16.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.0		0.1	6.0		0.1	1.9		0.5	2.9	
Delay (s)	12.2	14.7		12.1	22.6		14.8	19.2		12.9	19.6	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		14.2			22.2			19.0			17.9	
Approach LOS		B			C			B			B	
Intersection Summary												
HCM Average Control Delay			18.2			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			55.9			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			68.3%			ICU Level of Service			C			
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

2/14/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑↑	↘↙	↑
Volume (vph)	734	60	591	798	439	1214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	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)	3471	1553	3467	3574	3502	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	3574	3502	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1019	83	821	1108	610	1686
RTOR Reduction (vph)	0	36	0	0	0	0
Lane Group Flow (vph)	1019	47	821	1108	610	1686
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	40.8	40.8	30.8	77.6	25.4	113.0
Effective Green, g (s)	40.8	40.8	30.8	77.6	25.4	113.0
Actuated g/C Ratio	0.36	0.36	0.27	0.69	0.22	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1253	561	945	2454	787	1615
v/s Ratio Prot	0.29		0.24	0.31	0.17	
v/s Ratio Perm		0.03				c1.04
v/c Ratio	0.81	0.08	0.87	0.45	0.78	1.04
Uniform Delay, d1	32.7	23.8	39.2	8.0	41.1	56.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	0.1	8.5	0.1	4.8	34.8
Delay (s)	36.8	23.8	47.7	8.2	45.9	91.3
Level of Service	D	C	D	A	D	F
Approach Delay (s)	35.8			25.0	79.3	
Approach LOS	D			C	E	
Intersection Summary						
HCM Average Control Delay			50.6		HCM Level of Service	D
HCM Volume to Capacity ratio			1.04			
Actuated Cycle Length (s)			113.0		Sum of lost time (s)	0.0
Intersection Capacity Utilization			63.0%		ICU Level of Service	B
Analysis Period (min)			15			
Description: Modify signal timing						
Add NB Lt turn bay and WB through lane						
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/14/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	341	1829	1603	449	698	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	371	1988	1742	488	759	157
RTOR Reduction (vph)	0	0	0	252	0	124
Lane Group Flow (vph)	371	1988	1742	236	759	33
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	24.0	86.0	58.0	58.0	25.0	25.0
Effective Green, g (s)	24.0	86.0	58.0	58.0	25.0	25.0
Actuated g/C Ratio	0.20	0.72	0.48	0.48	0.21	0.21
Clearance Time (s)	5.0	5.0	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)	354	2536	1711	765	715	330
v/s Ratio Prot	c0.21	0.56	c0.49		c0.22	
v/s Ratio Perm				0.15		0.02
v/c Ratio	1.05	0.78	1.02	0.31	1.06	0.10
Uniform Delay, d1	48.0	11.0	31.0	18.8	47.5	38.4
Progression Factor	1.00	1.00	1.00	1.00	0.99	0.98
Incremental Delay, d2	61.0	2.5	26.4	1.0	51.2	0.6
Delay (s)	109.0	13.5	57.4	19.9	98.2	38.3
Level of Service	F	B	E	B	F	D
Approach Delay (s)		28.5	49.2		88.0	
Approach LOS		C	D		F	






















Intersection Summary

HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road



















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	353	1854	223	109	1582	502	140	41	91	365	37	262
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	380	1994	240	117	1701	540	151	44	98	392	40	282
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2241			2233			4139	5228	997	3811	4928	851
vC1, stage 1 conf vol							2753	2753		1935	1935	
vC2, stage 2 conf vol							1387	2475		1876	2992	
vCu, unblocked vol	2241			2233			4139	5228	997	3811	4928	851
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0			50			0	0	60	0	0	8
cM capacity (veh/h)	231			232			0	0	244	0	0	306
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	SB 1		
Volume Total	380	997	997	240	117	851	851	540	292	714		
Volume Left	380	0	0	0	117	0	0	0	151	392		
Volume Right	0	0	0	240	0	0	0	540	98	282		
cSH	231	1700	1700	1700	232	1700	1700	1700	0	0		
Volume to Capacity	1.64	0.59	0.59	0.14	0.50	0.50	0.50	0.32	Err	Err		
Queue Length 95th (ft)	611	0	0	0	65	0	0	0	Err	Err		
Control Delay (s)	346.3	0.0	0.0	0.0	35.3	0.0	0.0	0.0	Err	Err		
Lane LOS	F				E				F	F		
Approach Delay (s)	50.3				1.8				Err	Err		
Approach LOS									F	F		
Intersection Summary												
Average Delay				Err								
Intersection Capacity Utilization			122.0%		ICU Level of Service				H			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.





















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2271	36	23	2097	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2341	37	24	2162	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			None							
Median storage veh		2										
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2203			2378			3619	4705	1189	3524	4703	1102
vC1, stage 1 conf vol							2455	2455		2230	2230	
vC2, stage 2 conf vol							1164	2251		1294	2473	
vCu, unblocked vol	2203			2378			3619	4705	1189	3524	4703	1102
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	80			88			22	78	85	52	77	84
cM capacity (veh/h)	235			204			24	19	183	34	22	210
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	47	1561	818	24	1441	762	49	55				
Volume Left	47	0	0	24	0	0	19	16				
Volume Right	0	0	37	0	0	41	27	33				
cSH	235	1700	1700	204	1700	1700	43	62				
Volume to Capacity	0.20	0.92	0.48	0.12	0.85	0.45	1.14	0.87				
Queue Length 95th (ft)	18	0	0	10	0	0	118	102				
Control Delay (s)	24.1	0.0	0.0	25.0	0.0	0.0	327.5	187.6				
Lane LOS	C			C			F	F				
Approach Delay (s)	0.5			0.3			327.5	187.6				
Approach LOS							F	F				
Intersection Summary												
Average Delay			5.9									
Intersection Capacity Utilization			74.6%			ICU Level of Service			D			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Hwy. 2 & Lawson St





















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	2239	32	113	1604	63	86	54	114	108	47	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1787	3567		1787	3554			1825	1599		1818	1599
Flt Permitted	0.95	1.00		0.95	1.00			0.52	1.00		0.54	1.00
Satd. Flow (perm)	1787	3567		1787	3554			981	1599		1024	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	87	2408	34	122	1725	68	92	58	123	116	51	62
RTOR Reduction (vph)	0	1	0	0	2	0	0	0	47	0	0	21
Lane Group Flow (vph)	87	2441	0	122	1791	0	0	150	76	0	167	41
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	8.0	80.2		8.0	80.2			23.6	23.6		23.6	23.6
Effective Green, g (s)	8.0	80.2		8.0	80.2			23.6	23.6		23.6	23.6
Actuated g/C Ratio	0.06	0.64		0.06	0.64			0.19	0.19		0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.8		3.0	2.5			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	114	2274		114	2266			184	300		192	300
v/s Ratio Prot	0.05	c0.68		c0.07	0.50							
v/s Ratio Perm								0.15	0.05		c0.16	0.03
v/c Ratio	0.76	1.07		1.07	0.79			0.82	0.25		0.87	0.14
Uniform Delay, d1	58.0	22.8		58.9	16.7			49.0	43.6		49.6	42.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	25.6	42.2		104.4	1.9			23.4	0.4		31.6	0.2
Delay (s)	83.6	65.0		163.3	18.6			72.4	44.0		81.2	42.8
Level of Service	F	E		F	B			E	D		F	D
Approach Delay (s)		65.6			27.8			59.6			70.8	
Approach LOS		E			C			E			E	
Intersection Summary												
HCM Average Control Delay			50.9			HCM Level of Service				D		
HCM Volume to Capacity ratio			1.03									
Actuated Cycle Length (s)			125.8			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			96.0%			ICU Level of Service			F			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

























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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	2097	17	46	2168	266	52	29	118	215	23	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.92			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1787	3570		1787	3574	1599		1691			1818	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.69			0.51	1.00
Satd. Flow (perm)	1787	3570		1787	3574	1599		1188			978	1615
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	152	2255	18	49	2331	286	56	31	127	231	25	118
RTOR Reduction (vph)	0	0	0	0	0	72	0	40	0	0	0	55
Lane Group Flow (vph)	152	2273	0	49	2331	214	0	174	0	0	256	63
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		8
Actuated Green, G (s)	9.5	76.9		3.9	71.3	71.3		36.2			36.2	36.2
Effective Green, g (s)	9.5	76.9		3.9	71.3	71.3		36.2			36.2	36.2
Actuated g/C Ratio	0.07	0.58		0.03	0.54	0.54		0.27			0.27	0.27
Clearance Time (s)	5.5	5.5		5.5	5.5	5.5		5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.1	3.1		3.0			3.0	3.0
Lane Grp Cap (vph)	128	2064		52	1916	857		323			266	440
v/s Ratio Prot	c0.09	c0.64		0.03	c0.65							
v/s Ratio Perm						0.13		0.15			c0.26	0.04
v/c Ratio	1.19	1.10		0.94	1.22	0.25		0.54			0.96	0.14
Uniform Delay, d1	61.8	28.0		64.4	30.9	16.5		41.3			47.7	36.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	138.6	53.5		102.9	102.5	0.2		1.7			44.6	0.2
Delay (s)	200.3	81.6		167.4	133.3	16.7		43.0			92.3	36.8
Level of Service	F	F		F	F	B		D			F	D
Approach Delay (s)		89.0			121.4			43.0			74.8	
Approach LOS		F			F			D			E	
Intersection Summary												
HCM Average Control Delay			101.6			HCM Level of Service			F			
HCM Volume to Capacity ratio			1.19									
Actuated Cycle Length (s)			133.0			Sum of lost time (s)			21.5			
Intersection Capacity Utilization			110.0%			ICU Level of Service			H			
Analysis Period (min)			15									
Description: Optimized												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

















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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	582	1853	154	179	2073	264	113	248	213	438	168	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
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	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3196	
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	1787	3196	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	619	1971	164	190	2205	281	120	264	227	466	179	428
RTOR Reduction (vph)	0	0	31	0	0	79	0	0	5	0	220	0
Lane Group Flow (vph)	619	1971	133	190	2205	202	120	264	222	466	387	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	pm+ov		Prot	pm+ov		Prot	pm+ov	
Protected Phases	5	2	3	1	6	7	3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	14.5	52.0	64.5	9.5	47.0	69.5	12.5	14.3	23.8	22.5	24.3	
Effective Green, g (s)	14.5	52.0	64.5	9.5	47.0	69.5	12.5	14.3	23.8	22.5	24.3	
Actuated g/C Ratio	0.12	0.43	0.54	0.08	0.39	0.58	0.10	0.12	0.20	0.19	0.20	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	418	1545	930	141	1396	924	188	429	393	334	646	
v/s Ratio Prot	0.18	c0.55	0.01	0.11	c0.62	0.04	0.07	0.07	0.04	c0.26	c0.12	
v/s Ratio Perm			0.07			0.09			0.09			
v/c Ratio	1.48	1.28	0.14	1.35	1.58	0.22	0.64	0.62	0.57	1.40	0.60	
Uniform Delay, d1	52.9	34.1	14.0	55.4	36.6	12.3	51.7	50.4	43.6	48.9	43.6	
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	228.9	129.3	0.1	195.9	264.2	0.1	6.9	2.6	1.9	195.2	1.5	
Delay (s)	281.8	163.4	14.1	251.3	300.9	12.4	58.7	53.0	45.4	244.1	45.1	
Level of Service	F	F	B	F	F	B	E	D	D	F	D	
Approach Delay (s)		181.1			267.1			51.3			131.5	
Approach LOS		F			F			D			F	
Intersection Summary												
HCM Average Control Delay	194.8			HCM Level of Service					F			
HCM Volume to Capacity ratio	1.26											
Actuated Cycle Length (s)	120.3			Sum of lost time (s)					11.0			
Intersection Capacity Utilization	123.4%			ICU Level of Service					H			
Analysis Period (min)	15											
Description: Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Deno Rd. & Craig Road

















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	7	4	84	11	46	6	24	104	32	18	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	8	4	90	12	49	6	26	112	34	19	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	238	239	19	191	183	82	19			138		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	238	239	19	191	183	82	19			138		
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 %	100	99	100	88	98	95	100			98		
cM capacity (veh/h)	661	648	1065	747	695	984	1610			1459		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	12	152	144	54								
Volume Left	0	90	6	34								
Volume Right	4	49	112	0								
cSH	755	806	1610	1459								
Volume to Capacity	0.02	0.19	0.00	0.02								
Queue Length 95th (ft)	1	17	0	2								
Control Delay (s)	9.8	10.5	0.4	4.9								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.8	10.5	0.4	4.9								
Approach LOS	A	B										
Intersection Summary												
Average Delay			5.6									
Intersection Capacity Utilization			36.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

7: McFarlane Rd. & Craig Road

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	52	0	34	0	236	43	45	303	0
Sign Control		Stop			Stop			Free			Free	
Grade		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	0	0	57	0	37	0	257	47	49	329	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	744	730	329	707	707	280	329			303		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	744	730	329	707	707	280	329			303		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	100	100	100	83	100	95	100			96		
cM capacity (veh/h)	305	336	712	331	338	743	1213			1269		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	0	93	303	378								
Volume Left	0	57	0	49								
Volume Right	0	37	47	0								
cSH	1700	424	1213	1269								
Volume to Capacity	0.00	0.22	0.00	0.04								
Queue Length 95th (ft)	0	21	0	3								
Control Delay (s)	0.0	15.9	0.0	1.4								
Lane LOS	A	C		A								
Approach Delay (s)	0.0	15.9	0.0	1.4								
Approach LOS	A	C										
Intersection Summary												
Average Delay			2.6									
Intersection Capacity Utilization			48.4%	ICU Level of Service						A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

8: Thorpe & Craig Road East

2/14/2011













Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	256	0	2	13	16	339
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	278	0	2	14	17	368
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	16				566	9
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16				566	9
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				96	66
cM capacity (veh/h)	1595				401	1072
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	278	16	386			
Volume Left	278	0	17			
Volume Right	0	14	368			
cSH	1595	1700	997			
Volume to Capacity	0.17	0.01	0.39			
Queue Length 95th (ft)	16	0	46			
Control Delay (s)	7.7	0.0	10.9			
Lane LOS	A		B			
Approach Delay (s)	7.7	0.0	10.9			
Approach LOS			B			
Intersection Summary						
Average Delay		9.3				
Intersection Capacity Utilization		49.4%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

9: Thorpe & Craig




















2/14/2011

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	4	339	4	4	256
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	2	5	408	5	5	308
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			7		827	5
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			7		827	5
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			75		98	71
cM capacity (veh/h)			1627		255	1075
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	7	413	313			
Volume Left	0	408	5			
Volume Right	5	0	308			
cSH	1700	1627	1025			
Volume to Capacity	0.00	0.25	0.31			
Queue Length 95th (ft)	0	25	33			
Control Delay (s)	0.0	7.9	10.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	7.9	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			8.7			
Intersection Capacity Utilization			48.4%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: SR-902 & Craig

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	78	346	11	17	346	78	6	101	6	112	149	222
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	87	384	12	19	384	87	7	112	7	124	166	247
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	471			397			1316	1073	391	1086	1036	428
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	471			397			1316	1073	391	1086	1036	428
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 %	92			98			75	44	99	0	21	61
cM capacity (veh/h)	1096			1173			27	200	658	100	211	629
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1						
Volume Total	87	397	19	471	126	537						
Volume Left	87	0	19	0	7	124						
Volume Right	0	12	0	87	7	247						
cSH	1096	1700	1173	1700	153	222						
Volume to Capacity	0.08	0.23	0.02	0.28	0.82	2.42						
Queue Length 95th (ft)	6	0	1	0	134	1099						
Control Delay (s)	8.6	0.0	8.1	0.0	89.3	687.9						
Lane LOS	A		A		F	F						
Approach Delay (s)	1.5		0.3		89.3	687.9						
Approach LOS					F	F						
Intersection Summary												
Average Delay			233.1									
Intersection Capacity Utilization			71.6%		ICU Level of Service				C			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB












2/14/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗
Volume (vph)	703	60	576	775	439	1193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	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)	3471	1553	3467	1881	1805	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	976	83	800	1076	610	1657
RTOR Reduction (vph)	0	61	0	0	0	0
Lane Group Flow (vph)	976	22	800	1076	610	1657
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	23.0	23.0	19.0	48.0	27.0	85.0
Effective Green, g (s)	23.0	23.0	19.0	48.0	27.0	85.0
Actuated g/C Ratio	0.27	0.27	0.22	0.56	0.32	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	939	420	775	1062	573	1615
v/s Ratio Prot	0.28		0.23	0.57	0.34	
v/s Ratio Perm		0.01				c1.03
v/c Ratio	1.04	0.05	1.03	1.01	1.06	1.03
Uniform Delay, d1	31.0	22.9	33.0	18.5	29.0	42.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.1	0.1	40.9	30.9	56.0	29.3
Delay (s)	71.1	23.0	73.9	49.4	85.0	71.8
Level of Service	E	C	E	D	F	E
Approach Delay (s)	67.3			59.9	75.3	
Approach LOS	E			E	E	
Intersection Summary						
HCM Average Control Delay			68.1		HCM Level of Service	E
HCM Volume to Capacity ratio			1.03			
Actuated Cycle Length (s)			85.0		Sum of lost time (s)	0.0
Intersection Capacity Utilization			73.5%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

12: 6th Ave & Craig Road

2/14/2011

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	245	0	540	324	0	410
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	266	0	587	352	0	446
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		4				
Median type			TWLT			None
Median storage veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1209	763			939	
vC1, stage 1 conf vol	763					
vC2, stage 2 conf vol	446					
vCu, unblocked vol	1209	763			939	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	34	100			100	
cM capacity (veh/h)	405	404			730	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	266	939	0	446		
Volume Left	266	0	0	0		
Volume Right	0	352	0	0		
cSH	403	1700	1700	1700		
Volume to Capacity	0.66	0.55	0.00	0.26		
Queue Length 95th (ft)	115	0	0	0		
Control Delay (s)	29.8	0.0	0.0	0.0		
Lane LOS	D					
Approach Delay (s)	29.8	0.0	0.0			
Approach LOS	D					
Intersection Summary						
Average Delay		4.8				
Intersection Capacity Utilization		68.4%		ICU Level of Service		C
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Hwy. 2 & West Access

2/14/2011











Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2118	1513	194	0	194
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2302	1645	211	0	211
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1855				2796	822
vC1, stage 1 conf vol					1645	
vC2, stage 2 conf vol					1151	
vCu, unblocked vol	1855				2796	822
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	33
cM capacity (veh/h)	322				121	317
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1151	1151	822	822	211	211
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	211	211
cSH	1700	1700	1700	1700	1700	317
Volume to Capacity	0.68	0.68	0.48	0.48	0.12	0.67
Queue Length 95th (ft)	0	0	0	0	0	112
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	36.3
Lane LOS						E
Approach Delay (s)	0.0		0.0			36.3
Approach LOS						E
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			61.9%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/14/2011



Movement	EBL	EBT	WBT	WBR	SBL	SBR			
Lane Configurations		 	 						
Volume (veh/h)	289	1829	1589	361	607	118			
Sign Control	Free		Free	Stop					
Grade	0%		0%	0%					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92			
Hourly flow rate (vph)	314	1988	1727	392	660	128			
Pedestrians									
Lane Width (ft)									
Walking Speed (ft/s)									
Percent Blockage									
Right turn flare (veh)									
Median type	TWLTL		None						
Median storage veh	2								
Upstream signal (ft)									
pX, platoon unblocked									
vC, conflicting volume	2120				3349	864			
vC1, stage 1 conf vol					1727				
vC2, stage 2 conf vol					1622				
vCu, unblocked vol	2120				3349	864			
tC, single (s)	4.1				6.8	6.9			
tC, 2 stage (s)					5.8				
tF (s)	2.2				3.5	3.3			
p0 queue free %	0				0	57			
cM capacity (veh/h)	254				0	298			
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2	
Volume Total	314	994	994	864	864	392	660	128	
Volume Left	314	0	0	0	0	0	660	0	
Volume Right	0	0	0	0	0	392	0	128	
cSH	254	1700	1700	1700	1700	1700	0	298	
Volume to Capacity	1.24	0.58	0.58	0.51	0.51	0.23	Err	0.43	
Queue Length 95th (ft)	381	0	0	0	0	0	Err	52	
Control Delay (s)	176.2	0.0	0.0	0.0	0.0	0.0	Err	25.9	
Lane LOS	F							F	D
Approach Delay (s)	24.0				0.0				Err
Approach LOS							F		
Intersection Summary									
Average Delay			Err						
Intersection Capacity Utilization			103.6%	ICU Level of Service			G		
Analysis Period (min)			15						

HCM Unsignalized Intersection Capacity Analysis

15: Hwy. 2 & East Access

2/14/2011






















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↑		↑
Volume (veh/h)	0	2430	1931	53	0	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2641	2099	58	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	TWLTL			
Median storage (veh)			2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2157				3420	1049
vC1, stage 1 conf vol					2099	
vC2, stage 2 conf vol					1321	
vCu, unblocked vol	2157				3420	1049
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	246				72	224
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	SB 1
Volume Total	1321	1321	1049	1049	58	20
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	58	20
cSH	1700	1700	1700	1700	1700	224
Volume to Capacity	0.78	0.78	0.62	0.62	0.03	0.09
Queue Length 95th (ft)	0	0	0	0	0	7
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	22.6
Lane LOS						C
Approach Delay (s)	0.0		0.0			22.6
Approach LOS						C
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			70.5%		ICU Level of Service	C
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

16: North Access & Craig Road



















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	110	0	42	0	0	0	28	755	0	0	569	87
Sign Control	Stop			Stop			Free			Free		
Grade	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)	120	0	46	0	0	0	30	821	0	0	618	95
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL		TWLTL			
Median storage (veh)							2		2			
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1500	1500	618	1546	1595	821	713			821		
vC1, stage 1 conf vol	618	618		882	882							
vC2, stage 2 conf vol	882	882		664	713							
vCu, unblocked vol	1500	1500	618	1546	1595	821	713			821		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	57	100	91	100	100	100	97			100		
cM capacity (veh/h)	279	297	489	255	278	375	887			808		
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2					
Volume Total	120	46	0	30	821	618	95					
Volume Left	120	0	0	30	0	0	0					
Volume Right	0	46	0	0	0	0	95					
cSH	279	489	1700	887	1700	1700	1700					
Volume to Capacity	0.43	0.09	0.00	0.03	0.48	0.36	0.06					
Queue Length 95th (ft)	51	8	0	3	0	0	0					
Control Delay (s)	27.2	13.1	0.0	9.2	0.0	0.0	0.0					
Lane LOS	D	B	A	A								
Approach Delay (s)	23.3		0.0	0.3		0.0						
Approach LOS	C		A									
Intersection Summary												
Average Delay	2.4											
Intersection Capacity Utilization	52.5%			ICU Level of Service			A					
Analysis Period (min)	15											
Description: SB Right Turn Lane (100')												

HCM Unsignalized Intersection Capacity Analysis

17: Middle Access & Craig Road




















2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	0	19	0	0	0	19	810	0	0	622	12
Sign Control	Stop				Stop		Free				Free	
Grade	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)	17	0	21	0	0	0	21	880	0	0	676	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage veh)							2			2		
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1604	1604	683	1625	1611	880	689				880	
vC1, stage 1 conf vol	683	683		922	922							
vC2, stage 2 conf vol	922	922		703	689							
vCu, unblocked vol	1604	1604	683	1625	1611	880	689				880	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	93	100	95	100	100	100	98				100	
cM capacity (veh/h)	262	282	449	250	277	346	905				768	
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1						
Volume Total	17	21	0	21	880	689						
Volume Left	17	0	0	21	0	0						
Volume Right	0	21	0	0	0	13						
cSH	262	449	1700	905	1700	1700						
Volume to Capacity	0.07	0.05	0.00	0.02	0.52	0.41						
Queue Length 95th (ft)	5	4	0	2	0	0						
Control Delay (s)	19.7	13.4	0.0	9.1	0.0	0.0						
Lane LOS	C	B	A	A								
Approach Delay (s)	16.3		0.0	0.2	0.0							
Approach LOS	C		A									
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			52.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

18: South Access & Craig Road

























2/14/2011

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (veh/h)	42	0	69	0	0	0	65	787	0	0	631	34	
Sign Control	Stop			Stop			Free			Free			
Grade	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)	46	0	75	0	0	0	71	855	0	0	686	37	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type							TWLTL		TWLTL				
Median storage veh)							2		2				
Upstream signal (ft)													
pX, platoon unblocked													
vC, conflicting volume	1701	1701	704	1758	1720	855	723						855
vC1, stage 1 conf vol	704	704		997	997								
vC2, stage 2 conf vol	997	997		761	723								
vCu, unblocked vol	1701	1701	704	1758	1720	855	723						855
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1						4.1
tC, 2 stage (s)	6.1	5.5		6.1	5.5								
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2						2.2
p0 queue free %	80	100	83	100	100	100	92						100
cM capacity (veh/h)	231	251	437	189	237	358	879						785
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	46	75	0	71	855	0	723						
Volume Left	46	0	0	71	0	0	0						
Volume Right	0	75	0	0	0	0	37						
cSH	231	437	1700	879	1700	1700	1700						
Volume to Capacity	0.20	0.17	0.00	0.08	0.50	0.00	0.43						
Queue Length 95th (ft)	18	15	0	7	0	0	0						
Control Delay (s)	24.4	14.9	0.0	9.5	0.0	0.0	0.0						
Lane LOS	C	B	A	A									
Approach Delay (s)	18.5		0.0	0.7		0.0							
Approach LOS	C		A										
Intersection Summary													
Average Delay			1.6										
Intersection Capacity Utilization			59.0%		ICU Level of Service				B				
Analysis Period (min)			15										

HCM Signalized Intersection Capacity Analysis

1: Hwy. 2 & Craig Road























2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	353	1854	223	109	1582	502	140	41	91	365	37	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.90		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1787	1686		1787	1634	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.26	1.00		0.40	1.00	
Satd. Flow (perm)	1787	3574	1599	1787	3574	1599	482	1686		751	1634	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	380	1994	240	117	1701	540	151	44	98	392	40	282
RTOR Reduction (vph)	0	0	43	0	0	223	0	64	0	0	202	0
Lane Group Flow (vph)	380	1994	197	117	1701	317	151	78	0	392	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm	pm+pt			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	23.5	87.9	87.9	7.5	71.9	71.9	22.6	15.6		24.6	16.6	
Effective Green, g (s)	23.5	87.9	87.9	7.5	71.9	71.9	22.6	15.6		24.6	16.6	
Actuated g/C Ratio	0.17	0.63	0.63	0.05	0.51	0.51	0.16	0.11		0.18	0.12	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	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)	300	2244	1004	96	1836	821	143	188		191	194	
v/s Ratio Prot	c0.21	0.56		0.07	c0.48		0.05	0.05		c0.12	0.07	
v/s Ratio Perm			0.12			0.20	0.12			c0.24		
v/c Ratio	1.27	0.89	0.20	1.22	0.93	0.39	1.06	0.42		2.05	0.62	
Uniform Delay, d1	58.2	21.9	11.1	66.2	31.6	20.7	57.3	57.9		56.7	58.7	
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	143.8	5.7	0.4	161.9	9.6	1.4	90.9	1.5		491.3	5.8	
Delay (s)	202.0	27.7	11.5	228.2	41.2	22.0	148.3	59.4		547.9	64.5	
Level of Service	F	C	B	F	D	C	F	E		F	E	
Approach Delay (s)		51.5			46.1			105.2			329.9	
Approach LOS		D			D			F			F	
Intersection Summary												
HCM Average Control Delay			85.3			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.18									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)				16.0		
Intersection Capacity Utilization			108.8%			ICU Level of Service				G		
Analysis Period (min)			15									
Description: Signalized, Optimized												
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

2: Hwy. 2 & Lundstrom St.























2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2271	36	23	2097	40	18	4	26	16	5	32
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	47	2341	37	24	2162	41	19	4	27	16	5	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLT			TWLT							
Median storage (veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2203			2378			3600	4687	1171	3504	4682	1081
vC1, stage 1 conf vol							2436	2436		2209	2209	
vC2, stage 2 conf vol							1164	2251		1294	2473	
vCu, unblocked vol	2203			2378			3600	4687	1171	3504	4682	1081
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	80			88			24	79	86	53	77	85
cM capacity (veh/h)	235			204			25	19	189	35	22	217
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2
Volume Total	47	1171	1171	37	24	1081	1081	41	19	31	16	38
Volume Left	47	0	0	0	24	0	0	0	19	0	16	0
Volume Right	0	0	0	37	0	0	0	41	0	27	0	33
cSH	235	1700	1700	1700	204	1700	1700	1700	25	87	35	99
Volume to Capacity	0.20	0.69	0.69	0.02	0.12	0.64	0.64	0.02	0.76	0.36	0.47	0.38
Queue Length 95th (ft)	18	0	0	0	10	0	0	0	57	35	40	39
Control Delay (s)	24.1	0.0	0.0	0.0	25.0	0.0	0.0	0.0	327.4	67.9	178.8	62.4
Lane LOS	C				C				F	F	F	F
Approach Delay (s)	0.5				0.3				165.2		97.5	
Approach LOS									F		F	
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			77.1%			ICU Level of Service				D		
Analysis Period (min)			15									
Description: Add EB/WB Rt turn bays												
Add NB/SB Left turn bays												

HCM Signalized Intersection Capacity Analysis

4: Hwy. 2 & Garfield St.

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	2097	17	46	2168	266	52	29	118	215	23	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
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	0.88		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	1770	1638		1805	1665	
Flt Permitted	0.05	1.00	1.00	0.05	1.00	1.00	0.58	1.00		0.55	1.00	
Satd. Flow (perm)	85	3574	1599	88	3574	1599	1072	1638		1037	1665	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	152	2255	18	49	2331	286	56	31	127	231	25	118
RTOR Reduction (vph)	0	0	4	0	0	70	0	52	0	0	51	0
Lane Group Flow (vph)	152	2255	14	49	2331	216	56	106	0	231	92	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6		6	2		2	4			8		
Actuated Green, G (s)	94.7	88.2	88.2	89.7	85.7	85.7	32.0	32.0		32.0	32.0	
Effective Green, g (s)	94.7	88.2	88.2	89.7	85.7	85.7	32.0	32.0		32.0	32.0	
Actuated g/C Ratio	0.68	0.63	0.63	0.64	0.61	0.61	0.23	0.23		0.23	0.23	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.1	3.1	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	136	2248	1006	105	2185	977	245	374		237	380	
v/s Ratio Prot	c0.05	0.63		0.01	0.65			0.06			0.06	
v/s Ratio Perm	c0.70		0.01	0.29		0.13	0.05			c0.22		
v/c Ratio	1.12	1.00	0.01	0.47	1.07	0.22	0.23	0.28		0.97	0.24	
Uniform Delay, d1	46.8	26.0	9.7	33.8	27.2	12.2	44.1	44.6		53.7	44.2	
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	112.2	19.7	0.0	3.3	40.0	0.1	0.5	0.4		50.9	0.3	
Delay (s)	159.1	45.7	9.7	37.0	67.2	12.4	44.5	45.1		104.6	44.5	
Level of Service	F	D	A	D	E	B	D	D		F	D	
Approach Delay (s)		52.6			60.8			44.9			81.6	
Approach LOS		D			E			D			F	

Intersection Summary

HCM Average Control Delay	58.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.2	Sum of lost time (s)	10.5
Intersection Capacity Utilization	105.9%	ICU Level of Service	G
Analysis Period (min)	15		

Description: Optimized Timing/Phasing

























Add NB Lt turn bay, reconfigure SB approach

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Hwy. 2 & Hayford Rd.

2/22/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	582	1853	154	179	2073	264	113	248	213	438	168	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	0.89
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	3467	3196	3196
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)	3467	3574	1599	1787	3574	1599	1805	3610	1615	3467	3196	3196
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	619	1971	164	190	2205	281	120	264	227	466	179	428
RTOR Reduction (vph)	0	0	31	0	0	105	0	0	2	0	233	0
Lane Group Flow (vph)	619	1971	133	190	2205	176	120	264	225	466	374	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	pm+ov		Prot	Perm		Prot	pm+ov		Prot		
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2			6			8			
Actuated Green, G (s)	17.5	60.1	71.9	10.5	53.1	53.1	11.8	18.2	28.7	13.5	19.9	
Effective Green, g (s)	17.5	60.1	71.9	10.5	53.1	53.1	11.8	18.2	28.7	13.5	19.9	
Actuated g/C Ratio	0.14	0.48	0.58	0.08	0.43	0.43	0.09	0.15	0.23	0.11	0.16	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
Vehicle Extension (s)	3.0	2.5	3.0	3.0	2.1	2.1	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	488	1728	996	151	1527	683	171	529	444	377	512	
v/s Ratio Prot	0.18	c0.55	0.01	0.11	c0.62		0.07	0.07	0.04	c0.13	c0.12	
v/s Ratio Perm			0.07			0.11			0.10			
v/c Ratio	1.27	1.14	0.13	1.26	1.44	0.26	0.70	0.50	0.51	1.24	0.88dr	
Uniform Delay, d1	53.4	32.1	12.0	56.9	35.6	22.9	54.5	48.9	41.6	55.4	49.6	
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	136.3	70.8	0.1	158.7	203.6	0.1	12.3	0.7	0.9	127.1	5.2	
Delay (s)	189.7	102.9	12.0	215.6	239.2	23.0	66.8	49.6	42.6	182.5	54.8	
Level of Service	F	F	B	F	F	C	E	D	D	F	D	
Approach Delay (s)		117.0			214.8			50.4			110.3	
Approach LOS		F			F			D			F	

Intersection Summary

HCM Average Control Delay	147.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	124.3	Sum of lost time (s)	11.0
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		

Description: Dual SB Left Turn lane





















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

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: SR-902 & Craig

2/14/2011

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	346	11	17	346	78	6	101	6	112	149	222
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1000	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	1.00		1.00	0.97		1.00	0.99		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1873		1805	1847		1770	972		1787	1712	
Flt Permitted	0.24	1.00		0.41	1.00		0.36	1.00		0.59	1.00	
Satd. Flow (perm)	447	1873		770	1847		663	972		1102	1712	
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)	87	384	12	19	384	87	7	112	7	124	166	247
RTOR Reduction (vph)	0	2	0	0	13	0	0	4	0	0	90	0
Lane Group Flow (vph)	87	394	0	19	458	0	7	115	0	124	323	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.0	19.0		18.2	17.6		14.8	14.2		19.4	16.5	
Effective Green, g (s)	21.0	19.0		18.2	17.6		14.8	14.2		19.4	16.5	
Actuated g/C Ratio	0.40	0.36		0.35	0.33		0.28	0.27		0.37	0.31	
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)	229	675		278	617		199	262		443	536	
v/s Ratio Prot	c0.01	0.21		0.00	c0.25		0.00	0.12		c0.02	c0.19	
v/s Ratio Perm	0.14			0.02			0.01			0.09		
v/c Ratio	0.38	0.58		0.07	0.74		0.04	0.44		0.28	0.60	
Uniform Delay, d1	11.0	13.6		11.6	15.5		13.9	16.0		11.4	15.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.3		0.1	4.8		0.1	1.2		0.3	1.9	
Delay (s)	12.1	14.9		11.7	20.4		13.9	17.1		11.7	17.2	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		14.4			20.0			17.0			16.0	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	52.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
Description: Signalized, Optimized			
SB right turn bay			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

2/14/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑↑	↘↙	↑
Volume (vph)	703	60	576	775	439	1193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	0.95	0.97	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)	3471	1553	3467	3574	3502	1615
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	3574	3502	1615
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	976	83	800	1076	610	1657
RTOR Reduction (vph)	0	57	0	0	0	0
Lane Group Flow (vph)	976	26	800	1076	610	1657
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	24.1	24.1	19.1	49.2	18.9	78.1
Effective Green, g (s)	24.1	24.1	19.1	49.2	18.9	78.1
Actuated g/C Ratio	0.31	0.31	0.24	0.63	0.24	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1071	479	848	2251	847	1615
v/s Ratio Prot	0.28		0.23	0.30	0.17	
v/s Ratio Perm		0.02				c1.03
v/c Ratio	0.91	0.05	0.94	0.48	0.72	1.03
Uniform Delay, d1	26.0	19.0	29.0	7.7	27.2	39.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.5	0.0	18.5	0.2	3.0	29.3
Delay (s)	37.5	19.0	47.5	7.8	30.2	68.3
Level of Service	D	B	D	A	C	E
Approach Delay (s)	36.0			24.7	58.1	
Approach LOS	D			C	E	
Intersection Summary						
HCM Average Control Delay			41.6		HCM Level of Service	D
HCM Volume to Capacity ratio			1.03			
Actuated Cycle Length (s)			78.1		Sum of lost time (s)	0.0
Intersection Capacity Utilization			61.7%		ICU Level of Service	B
Analysis Period (min)			15			
Description: Add NB Lt turn bay and WB through lane						
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

14: Hwy. 2 & Middle Access

2/14/2011

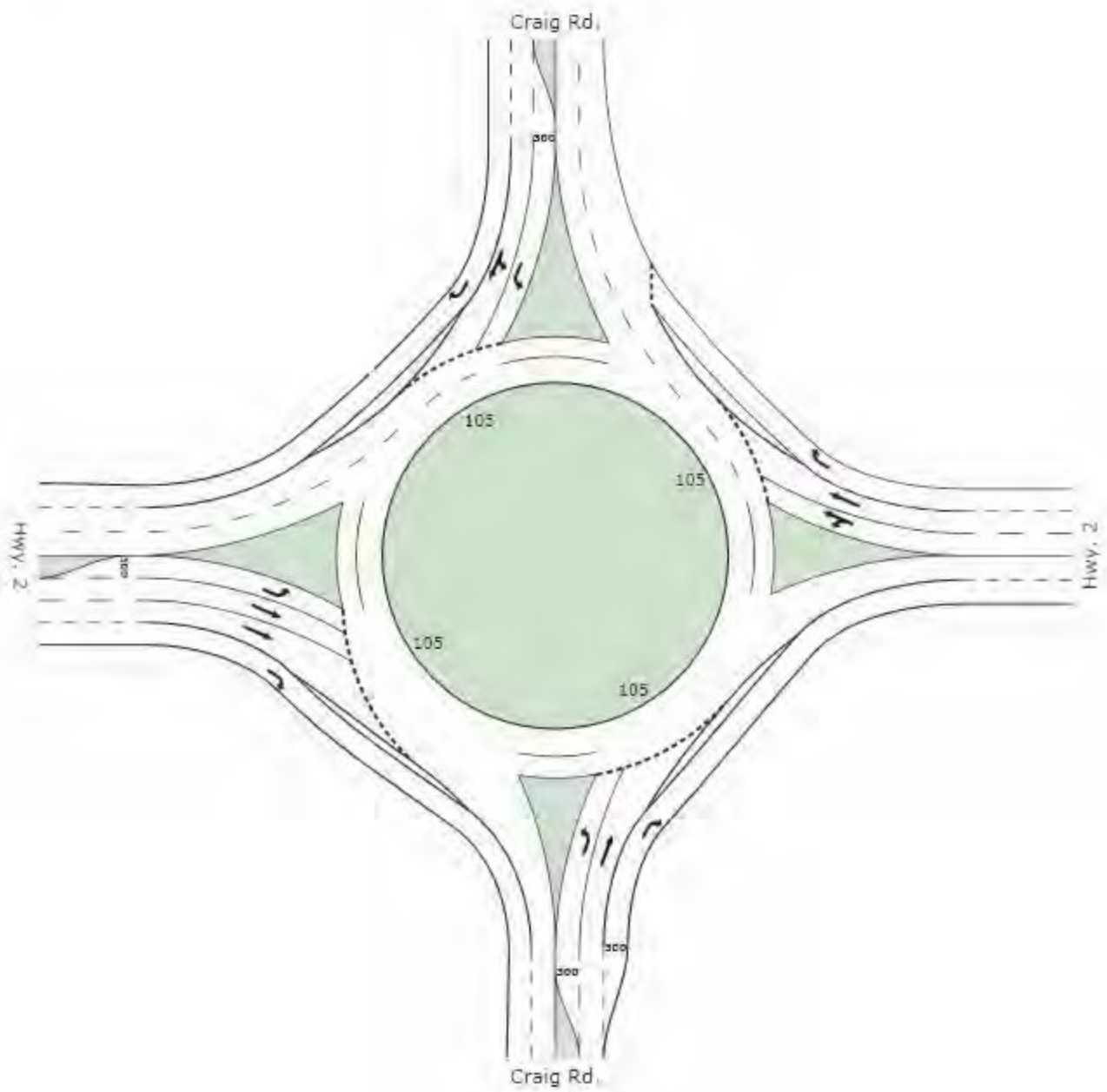


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	289	1829	1589	361	607	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3539	3539	1583	3433	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	314	1988	1727	392	660	128
RTOR Reduction (vph)	0	0	0	196	0	101
Lane Group Flow (vph)	314	1988	1727	196	660	27
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	22.0	86.0	60.0	60.0	25.0	25.0
Effective Green, g (s)	22.0	86.0	60.0	60.0	25.0	25.0
Actuated g/C Ratio	0.18	0.72	0.50	0.50	0.21	0.21
Clearance Time (s)	5.0	5.0	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)	325	2536	1770	792	715	330
v/s Ratio Prot	c0.18	0.56	c0.49		c0.19	
v/s Ratio Perm				0.12		0.02
v/c Ratio	0.97	0.78	0.98	0.25	0.92	0.08
Uniform Delay, d1	48.6	11.0	29.3	17.1	46.6	38.2
Progression Factor	1.00	1.00	1.00	1.00	0.99	0.98
Incremental Delay, d2	40.5	2.5	16.4	0.7	19.4	0.5
Delay (s)	89.1	13.5	45.6	17.9	65.4	37.9
Level of Service	F	B	D	B	E	D
Approach Delay (s)		23.8	40.5		61.0	
Approach LOS		C	D		E	

Intersection Summary

HCM Average Control Delay	36.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
Description: Signalized, Optimized			
c Critical Lane Group			

APPENDIX F
SIDRA ANALYSIS
WORKSHEETS



INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4212 veh/h	5064 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.693	
Practical Spare Capacity	22.6 %	
Effective Intersection Capacity	6076 veh/h	
Control Delay (Total)	9.13 veh-h/h	10.95 pers-h/h
Control Delay (Average)	7.8 sec	7.8 sec
Control Delay (Worst Lane)	21.4 sec	
Control Delay (Worst Movement)	21.4 sec	21.4 sec
Geometric Delay (Average)	4.4 sec	
Stop-Line Delay (Average)	3.4 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	8.3 veh	
95% Back of Queue - Distance (Worst Lane)	209.0 ft	
Total Effective Stops	2916 veh/h	3499 pers/h
Effective Stop Rate	0.69 per veh	0.69 per pers
Proportion Queued	0.66	0.65
Performance Index	81.7	81.7
Travel Distance (Total)	1522.6 veh-mi/h	1827.1 pers-mi/h
Travel Distance (Average)	1909 ft	1905 ft
Travel Time (Total)	53.3 veh-h/h	64.0 pers-h/h
Travel Time (Average)	45.6 sec	45.5 sec
Travel Speed	28.5 mph	28.5 mph
Cost (Total)	866.26 \$/h	866.26 \$/h
Fuel Consumption (Total)	66.8 gal/h	
Carbon Dioxide (Total)	632.5 kg/h	
Hydrocarbons (Total)	1.036 kg/h	
Carbon Monoxide (Total)	44.76 kg/h	
NOx (Total)	1.414 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,021,678 veh/y	2,430,813 pers/y
Delay	4,380 veh-h/y	5,256 pers-h/y
Effective Stops	1,399,521 veh/y	1,679,426 pers/y
Travel Distance	730,851 veh-mi/y	877,022 pers-mi/y
Travel Time	25,604 veh-h/y	30,724 pers-h/y
Cost	415,806 \$/y	415,806 \$/y
Fuel Consumption	32,070 gal/y	
Carbon Dioxide	303,620 kg/y	
Hydrocarbons	497 kg/y	
Carbon Monoxide	21,484 kg/y	
NOx	679 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	174	1.0	0.446	21.4	LOS C	3.0	75.5	0.86	1.01	25.4
8T	T	86	1.0	0.308	15.1	LOS B	1.7	43.3	0.85	0.93	27.8
8R	R	71	1.0	0.044	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		331	1.0	0.446	16.5	LOS C	3.0	75.5	0.68	0.88	27.4
East: Hwy. 2											
1L	L	88	1.0	0.648	15.7	LOS B	7.1	179.1	0.74	0.93	29.0
6T	T	1337	1.0	0.649	5.4	LOS A	7.2	181.1	0.73	0.64	28.4
6R	R	229	1.0	0.177	5.0	LOS A	1.1	28.8	0.35	0.47	29.9
Approach		1654	1.0	0.649	5.9	LOS B	7.2	181.1	0.68	0.63	28.7
North: Craig Rd.											
7L	L	172	1.0	0.331	18.9	LOS B	2.2	54.3	0.84	0.98	24.1
4T	T	73	1.0	0.332	12.7	LOS B	2.2	54.3	0.85	0.93	28.7
4R	R	77	1.0	0.048	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		323	1.0	0.332	14.0	LOS B	2.2	54.3	0.64	0.83	26.4
West: Hwy. 2											
5L	L	100	1.0	0.139	12.5	LOS B	0.8	19.8	0.50	0.73	26.6
2T	T	1562	1.0	0.693	6.7	LOS A	8.3	209.0	0.75	0.71	28.6
2R	R	242	1.0	0.151	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		1904	1.0	0.693	6.9	LOS B	8.3	209.0	0.64	0.69	29.1
All Vehicles		4212	1.0	0.693	7.8	LOS A	8.3	209.0	0.66	0.69	28.5

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

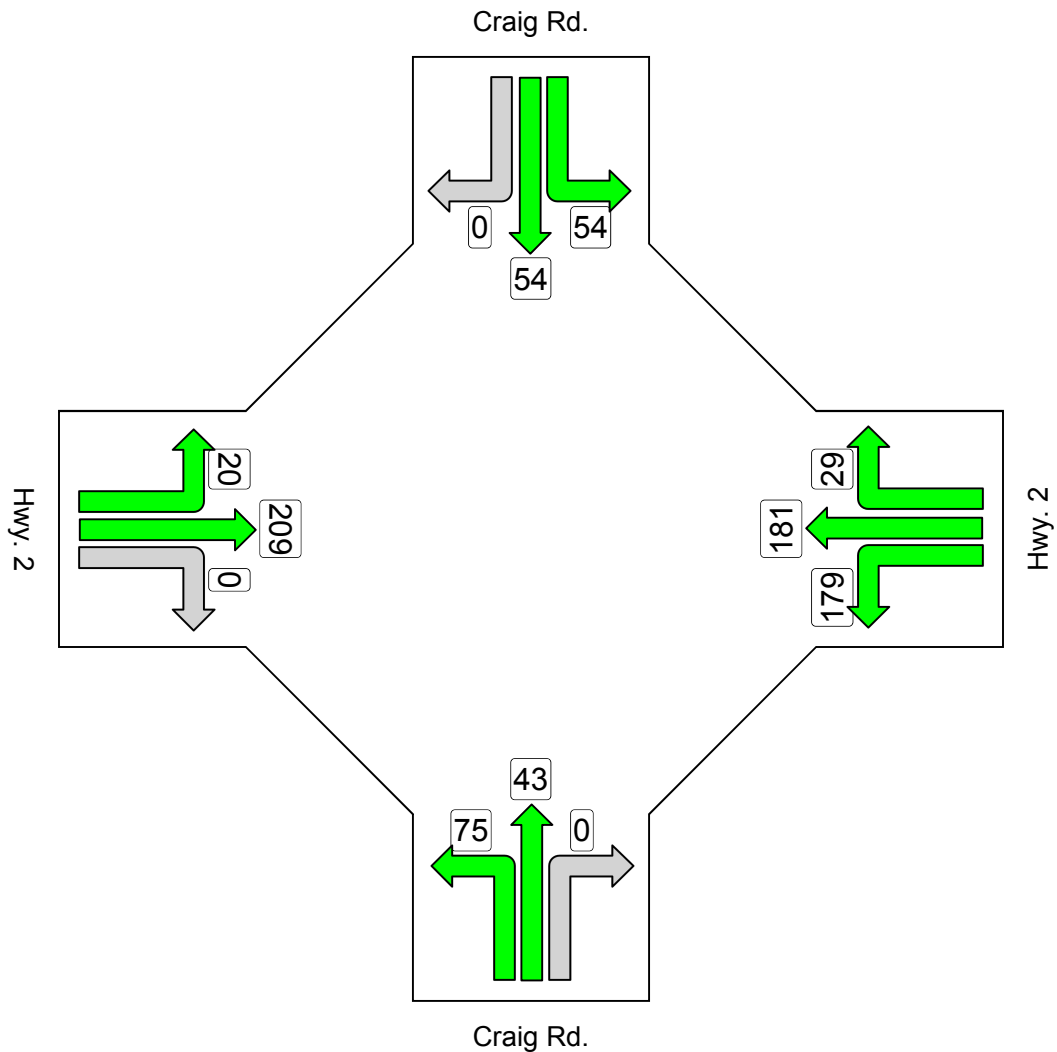
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

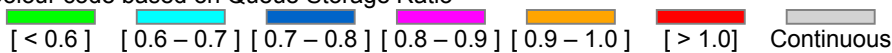
Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



Processed: Tuesday, February 08, 2011 1:21:51 PM

SIDRA INTERSECTION 5.0.5.1510

Project: P:\SIPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Craig-Hwy.2\Alt1-PH1-Craig.sip
8000011, DAVID EVANS & ASSOCIATES INC, SINGLE

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4990 veh/h	5998 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.851	
Practical Spare Capacity	-0.1 %	
Effective Intersection Capacity	5864 veh/h	
Control Delay (Total)	17.20 veh-h/h	20.64 pers-h/h
Control Delay (Average)	12.4 sec	12.4 sec
Control Delay (Worst Lane)	37.9 sec	
Control Delay (Worst Movement)	37.9 sec	37.9 sec
Geometric Delay (Average)	4.5 sec	
Stop-Line Delay (Average)	7.9 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS D	
Level of Service (Worst Lane)	LOS D	
95% Back of Queue - Vehicles (Worst Lane)	14.6 veh	
95% Back of Queue - Distance (Worst Lane)	368.1 ft	
Total Effective Stops	4800 veh/h	5760 pers/h
Effective Stop Rate	0.96 per veh	0.96 per pers
Proportion Queued	0.80	0.80
Performance Index	120.4	120.4
Travel Distance (Total)	1807.9 veh-mi/h	2169.5 pers-mi/h
Travel Distance (Average)	1913 ft	1910 ft
Travel Time (Total)	68.1 veh-h/h	81.7 pers-h/h
Travel Time (Average)	49.1 sec	49.0 sec
Travel Speed	26.6 mph	26.6 mph
Cost (Total)	1097.97 \$/h	1097.97 \$/h
Fuel Consumption (Total)	83.8 gal/h	
Carbon Dioxide (Total)	792.9 kg/h	
Hydrocarbons (Total)	1.325 kg/h	
Carbon Monoxide (Total)	58.21 kg/h	
NOx (Total)	1.789 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,395,355 veh/y	2,879,226 pers/y
Delay	8,257 veh-h/y	9,909 pers-h/y
Effective Stops	2,304,148 veh/y	2,764,978 pers/y
Travel Distance	867,784 veh-mi/y	1,041,341 pers-mi/y
Travel Time	32,665 veh-h/y	39,198 pers-h/y
Cost	527,026 \$/y	527,026 \$/y
Fuel Consumption	40,203 gal/y	
Carbon Dioxide	380,613 kg/y	
Hydrocarbons	636 kg/y	
Carbon Monoxide	27,942 kg/y	
NOx	859 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	210	1.0	0.760	37.9	LOS D	6.4	162.2	0.96	1.17	19.8
8T	T	106	1.0	0.549	26.0	LOS C	3.5	87.5	0.94	1.04	22.8
8R	R	78	1.0	0.049	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		395	1.0	0.759	28.3	LOS D	6.4	162.2	0.76	1.00	22.3
East: Hwy. 2											
1L	L	92	1.0	0.804	19.7	LOS B	11.9	300.7	0.92	1.09	27.0
6T	T	1526	1.0	0.802	9.1	LOS A	12.3	310.4	0.91	1.01	27.2
6R	R	332	1.0	0.269	5.4	LOS A	1.9	47.7	0.44	0.52	29.5
Approach		1951	1.0	0.802	9.0	LOS B	12.3	310.4	0.83	0.93	27.6
North: Craig Rd.											
7L	L	254	1.0	0.634	29.9	LOS C	5.1	128.3	0.94	1.11	20.3
4T	T	91	1.0	0.635	22.6	LOS C	5.1	128.3	0.94	1.08	23.6
4R	R	115	1.0	0.072	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		460	1.0	0.635	22.1	LOS C	5.1	128.3	0.70	0.93	22.8
West: Hwy. 2											
5L	L	153	1.0	0.231	13.3	LOS B	1.4	34.8	0.59	0.81	26.4
2T	T	1755	1.0	0.851	11.0	LOS B	14.6	368.1	0.96	1.08	27.1
2R	R	277	1.0	0.173	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2185	1.0	0.851	10.6	LOS B	14.6	368.1	0.81	0.99	27.7
All Vehicles		4990	1.0	0.851	12.4	LOS B	14.6	368.1	0.80	0.96	26.6

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

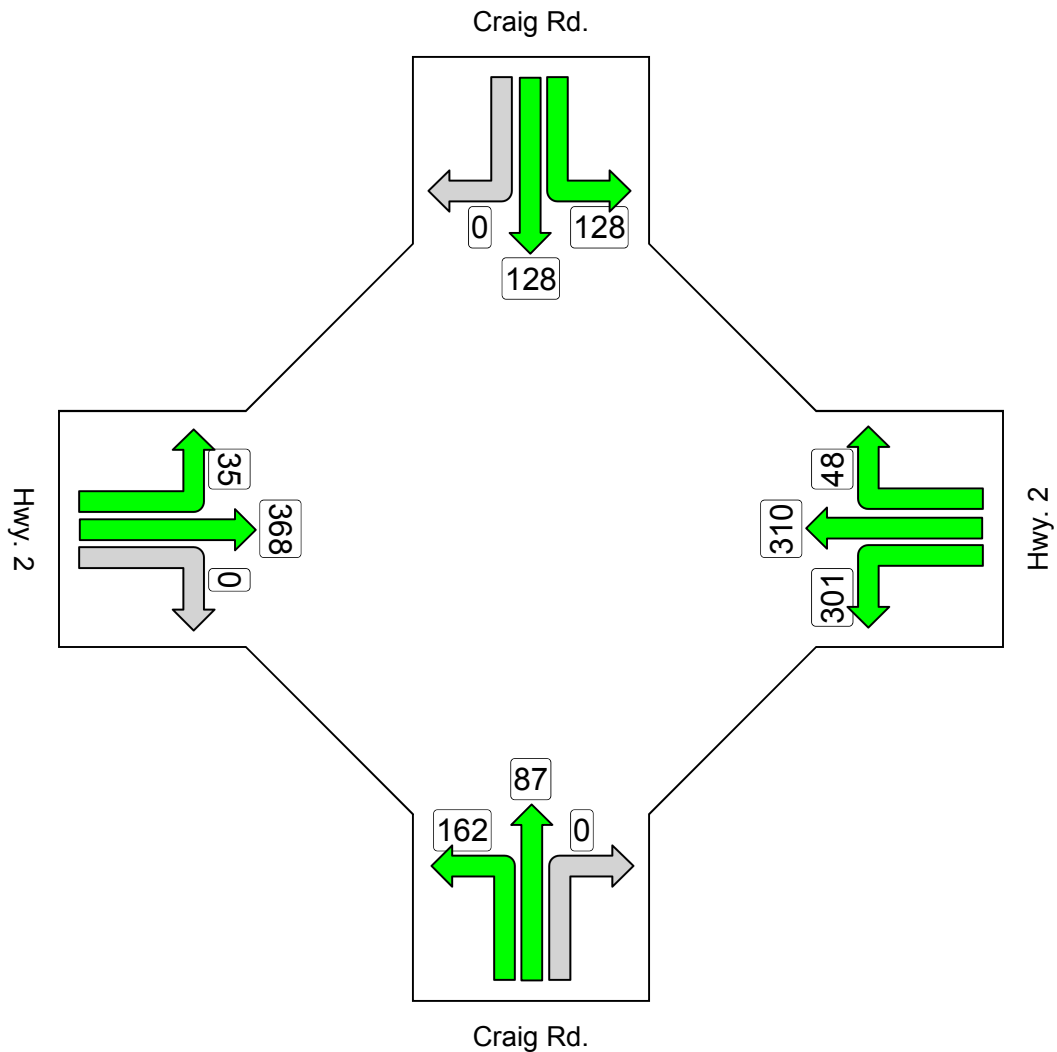
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

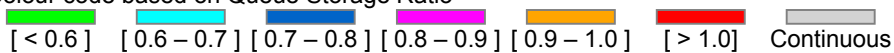
Craig Rd./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

Project: P:\S\SPTR00000001\0600\INFO\Traffic\February-2011-TIA\Sidra\Craig-Hwy.2\Alt1-PH2-Craig.sip
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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	6205 veh/h	7456 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.280	
Practical Spare Capacity	-33.6 %	
Effective Intersection Capacity	4848 veh/h	
Control Delay (Total)	81.62 veh-h/h	97.95 pers-h/h
Control Delay (Average)	47.4 sec	47.3 sec
Control Delay (Worst Lane)	195.4 sec	
Control Delay (Worst Movement)	195.4 sec	195.4 sec
Geometric Delay (Average)	4.8 sec	
Stop-Line Delay (Average)	42.6 sec	
Level of Service (Aver. Int. Delay)	LOS D	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	35.7 veh	
95% Back of Queue - Distance (Worst Lane)	900.9 ft	
Total Effective Stops	9857 veh/h	11829 pers/h
Effective Stop Rate	1.59 per veh	1.59 per pers
Proportion Queued	0.86	0.86
Performance Index	287.6	287.6
Travel Distance (Total)	2257.9 veh-mi/h	2709.5 pers-mi/h
Travel Distance (Average)	1921 ft	1919 ft
Travel Time (Total)	145.3 veh-h/h	174.4 pers-h/h
Travel Time (Average)	84.3 sec	84.2 sec
Travel Speed	15.5 mph	15.5 mph
Cost (Total)	2104.40 \$/h	2104.40 \$/h
Fuel Consumption (Total)	134.2 gal/h	
Carbon Dioxide (Total)	1270.5 kg/h	
Hydrocarbons (Total)	2.302 kg/h	
Carbon Monoxide (Total)	89.73 kg/h	
NOx (Total)	2.630 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,978,581 veh/y	3,579,097 pers/y
Delay	39,179 veh-h/y	47,015 pers-h/y
Effective Stops	4,731,501 veh/y	5,677,802 pers/y
Travel Distance	1,083,793 veh-mi/y	1,300,551 pers-mi/y
Travel Time	69,745 veh-h/y	83,694 pers-h/y
Cost	1,010,110 \$/y	1,010,110 \$/y
Fuel Consumption	64,413 gal/y	
Carbon Dioxide	609,820 kg/y	
Hydrocarbons	1,105 kg/y	
Carbon Monoxide	43,072 kg/y	
NOx	1,263 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	242	1.0	1.280	195.4	LOS F	28.2	709.8	1.00	2.01	6.4
8T	T	123	1.0	0.958	98.4	LOS F	9.0	226.2	1.00	1.35	10.4
8R	R	81	1.0	0.050	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		445	1.0	1.280	134.4	LOS F	28.2	709.8	0.82	1.55	8.4
East: Hwy. 2											
1L	L	97	1.0	1.008	45.8	LOS D	30.7	772.4	1.00	1.77	18.4
6T	T	1727	1.0	1.007	34.3	LOS C	33.5	844.7	1.00	1.87	17.3
6R	R	575	1.0	0.535	7.2	LOS A	5.2	130.4	0.72	0.71	28.4
Approach		2399	1.0	1.007	28.3	LOS D	33.5	844.7	0.93	1.58	19.3
North: Craig Rd.											
7L	L	434	1.0	1.256	167.8	LOS F	31.4	790.8	1.00	2.14	6.9
4T	T	108	1.0	1.250	159.4	LOS F	31.4	790.8	1.00	2.13	7.0
4R	R	233	1.0	0.145	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		775	1.0	1.257	117.4	LOS F	31.4	790.8	0.70	1.62	8.9
West: Hwy. 2											
5L	L	314	1.0	0.474	14.7	LOS B	3.6	90.5	0.73	0.94	25.7
2T	T	1958	1.0	1.024	35.1	LOS D	35.7	900.9	1.00	1.87	18.1
2R	R	314	1.0	0.196	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2586	1.0	1.024	29.1	LOS D	35.7	900.9	0.85	1.59	20.0
All Vehicles		6205	1.0	1.280	47.4	LOS D	35.7	900.9	0.86	1.59	15.5

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

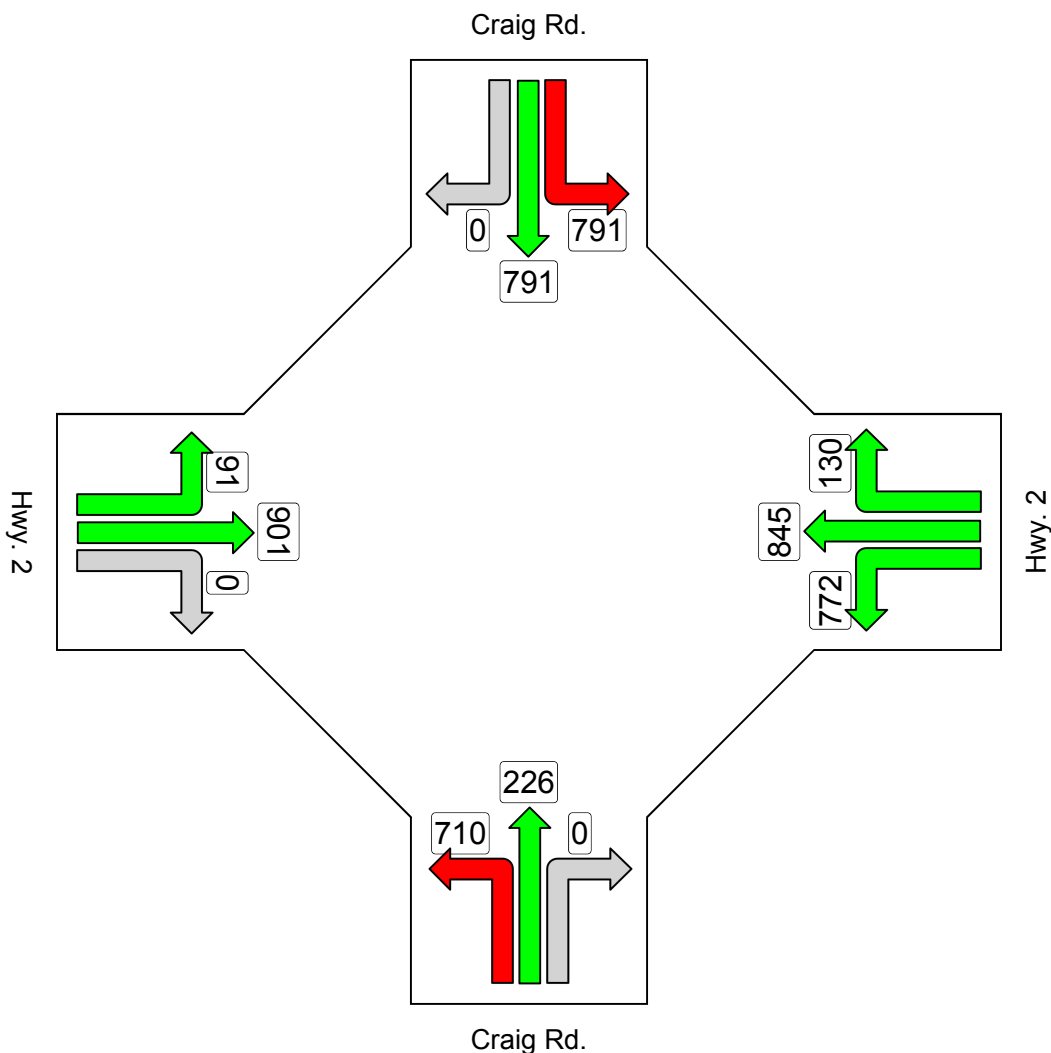
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

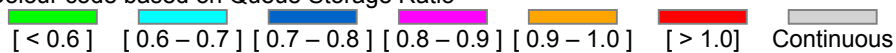
Craig Rd./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



Processed: Tuesday, February 08, 2011 1:49:11 PM

SIDRA INTERSECTION 5.0.5.1510

Project: P:\S\SPTR00000001\0600\INFO\Traffic\February-2011-TIA\Sidra\Craig-Hwy.2\Alt1-PH3-Craig.sip
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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.2. Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4212 veh/h	5064 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.693	
Practical Spare Capacity	22.6 %	
Effective Intersection Capacity	6076 veh/h	
Control Delay (Total)	9.13 veh-h/h	10.95 pers-h/h
Control Delay (Average)	7.8 sec	7.8 sec
Control Delay (Worst Lane)	21.4 sec	
Control Delay (Worst Movement)	21.4 sec	21.4 sec
Geometric Delay (Average)	4.4 sec	
Stop-Line Delay (Average)	3.4 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	8.3 veh	
95% Back of Queue - Distance (Worst Lane)	209.0 ft	
Total Effective Stops	2916 veh/h	3499 pers/h
Effective Stop Rate	0.69 per veh	0.69 per pers
Proportion Queued	0.66	0.65
Performance Index	81.7	81.7
Travel Distance (Total)	1522.6 veh-mi/h	1827.1 pers-mi/h
Travel Distance (Average)	1909 ft	1905 ft
Travel Time (Total)	53.3 veh-h/h	64.0 pers-h/h
Travel Time (Average)	45.6 sec	45.5 sec
Travel Speed	28.5 mph	28.5 mph
Cost (Total)	866.26 \$/h	866.26 \$/h
Fuel Consumption (Total)	66.8 gal/h	
Carbon Dioxide (Total)	632.5 kg/h	
Hydrocarbons (Total)	1.036 kg/h	
Carbon Monoxide (Total)	44.76 kg/h	
NOx (Total)	1.414 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,021,678 veh/y	2,430,813 pers/y
Delay	4,380 veh-h/y	5,256 pers-h/y
Effective Stops	1,399,521 veh/y	1,679,426 pers/y
Travel Distance	730,851 veh-mi/y	877,022 pers-mi/y
Travel Time	25,604 veh-h/y	30,724 pers-h/y
Cost	415,806 \$/y	415,806 \$/y
Fuel Consumption	32,070 gal/y	
Carbon Dioxide	303,620 kg/y	
Hydrocarbons	497 kg/y	
Carbon Monoxide	21,484 kg/y	
NOx	679 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.2. Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	174	1.0	0.446	21.4	LOS C	3.0	75.5	0.86	1.01	25.4
8T	T	86	1.0	0.308	15.1	LOS B	1.7	43.3	0.85	0.93	27.8
8R	R	71	1.0	0.044	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		331	1.0	0.446	16.5	LOS C	3.0	75.5	0.68	0.88	27.4
East: Hwy. 2											
1L	L	88	1.0	0.648	15.7	LOS B	7.1	179.1	0.74	0.93	29.0
6T	T	1337	1.0	0.649	5.4	LOS A	7.2	181.1	0.73	0.64	28.4
6R	R	229	1.0	0.177	5.0	LOS A	1.1	28.8	0.35	0.47	29.9
Approach		1654	1.0	0.649	5.9	LOS B	7.2	181.1	0.68	0.63	28.7
North: Craig Rd.											
7L	L	172	1.0	0.331	18.9	LOS B	2.2	54.3	0.84	0.98	24.1
4T	T	73	1.0	0.332	12.7	LOS B	2.2	54.3	0.85	0.93	28.7
4R	R	77	1.0	0.048	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		323	1.0	0.332	14.0	LOS B	2.2	54.3	0.64	0.83	26.4
West: Hwy. 2											
5L	L	100	1.0	0.139	12.5	LOS B	0.8	19.8	0.50	0.73	26.6
2T	T	1562	1.0	0.693	6.7	LOS A	8.3	209.0	0.75	0.71	28.6
2R	R	242	1.0	0.151	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		1904	1.0	0.693	6.9	LOS B	8.3	209.0	0.64	0.69	29.1
All Vehicles		4212	1.0	0.693	7.8	LOS A	8.3	209.0	0.66	0.69	28.5

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

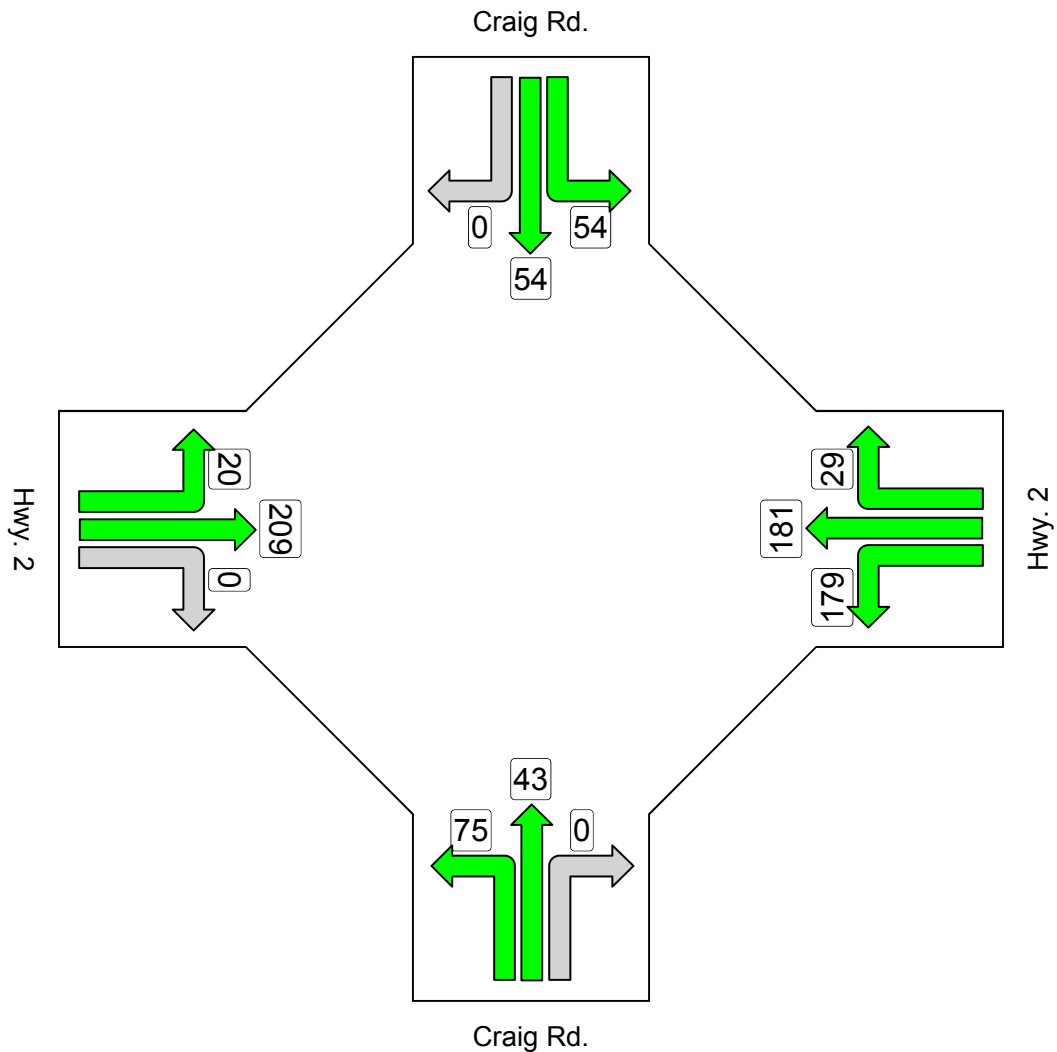
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

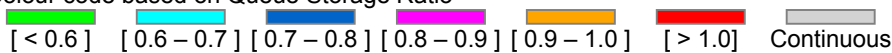
Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.2. Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

Project: P:\SIPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Craig-Hwy.2\Alt2-Buildout-Craig.sip

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3788 veh/h	4556 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.612	
Practical Spare Capacity	38.8 %	
Effective Intersection Capacity	6188 veh/h	
Control Delay (Total)	6.56 veh-h/h	7.87 pers-h/h
Control Delay (Average)	6.2 sec	6.2 sec
Control Delay (Worst Lane)	18.7 sec	
Control Delay (Worst Movement)	18.7 sec	18.7 sec
Geometric Delay (Average)	4.3 sec	
Stop-Line Delay (Average)	1.9 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	6.0 veh	
95% Back of Queue - Distance (Worst Lane)	151.2 ft	
Total Effective Stops	2024 veh/h	2429 pers/h
Effective Stop Rate	0.53 per veh	0.53 per pers
Proportion Queued	0.55	0.55
Performance Index	65.4	65.4
Travel Distance (Total)	1366.7 veh-mi/h	1640.1 pers-mi/h
Travel Distance (Average)	1905 ft	1901 ft
Travel Time (Total)	46.9 veh-h/h	56.2 pers-h/h
Travel Time (Average)	44.5 sec	44.4 sec
Travel Speed	29.2 mph	29.2 mph
Cost (Total)	758.75 \$/h	758.75 \$/h
Fuel Consumption (Total)	58.3 gal/h	
Carbon Dioxide (Total)	552.0 kg/h	
Hydrocarbons (Total)	0.895 kg/h	
Carbon Monoxide (Total)	37.89 kg/h	
NOx (Total)	1.218 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,818,323 veh/y	2,186,787 pers/y
Delay	3,148 veh-h/y	3,777 pers-h/y
Effective Stops	971,552 veh/y	1,165,862 pers/y
Travel Distance	656,020 veh-mi/y	787,224 pers-mi/y
Travel Time	22,495 veh-h/y	26,994 pers-h/y
Cost	364,201 \$/y	364,201 \$/y
Fuel Consumption	27,986 gal/y	
Carbon Dioxide	264,950 kg/y	
Hydrocarbons	430 kg/y	
Carbon Monoxide	18,187 kg/y	
NOx	584 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	143	1.0	0.316	18.7	LOS B	1.9	47.8	0.81	0.96	26.6
8T	T	43	1.0	0.162	14.7	LOS B	0.8	20.0	0.81	0.89	28.1
8R	R	71	1.0	0.044	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		257	1.0	0.316	14.5	LOS B	1.9	47.8	0.58	0.82	28.5
East: Hwy. 2											
1L	L	88	1.0	0.565	14.2	LOS B	5.1	129.7	0.63	0.85	29.7
6T	T	1232	1.0	0.564	4.0	LOS A	5.2	130.1	0.62	0.45	29.0
6R	R	166	1.0	0.124	4.8	LOS A	0.7	18.8	0.28	0.44	30.1
Approach		1486	1.0	0.564	4.7	LOS B	5.2	130.1	0.58	0.47	29.2
North: Craig Rd.											
7L	L	122	1.0	0.186	16.7	LOS B	1.1	27.8	0.78	0.94	25.0
4T	T	40	1.0	0.186	10.8	LOS B	1.1	27.8	0.78	0.87	29.8
4R	R	77	1.0	0.048	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		239	1.0	0.186	11.7	LOS B	1.1	27.8	0.53	0.76	27.4
West: Hwy. 2											
5L	L	100	1.0	0.129	12.1	LOS B	0.7	18.4	0.44	0.70	26.8
2T	T	1487	1.0	0.612	5.1	LOS A	6.0	151.2	0.61	0.50	29.2
2R	R	219	1.0	0.137	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		1806	1.0	0.612	5.6	LOS B	6.0	151.2	0.53	0.51	29.5
All Vehicles		3788	1.0	0.612	6.2	LOS A	6.0	151.2	0.55	0.53	29.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

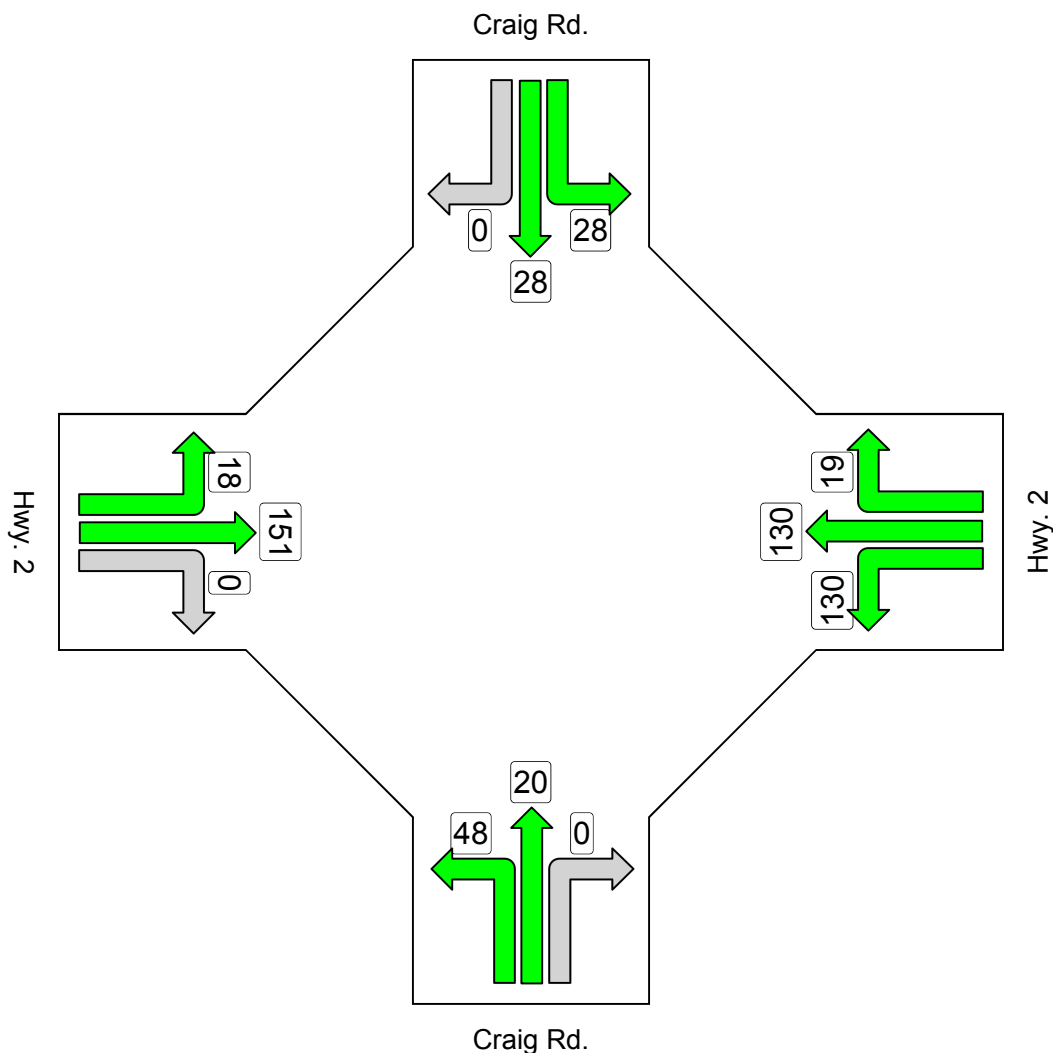
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)

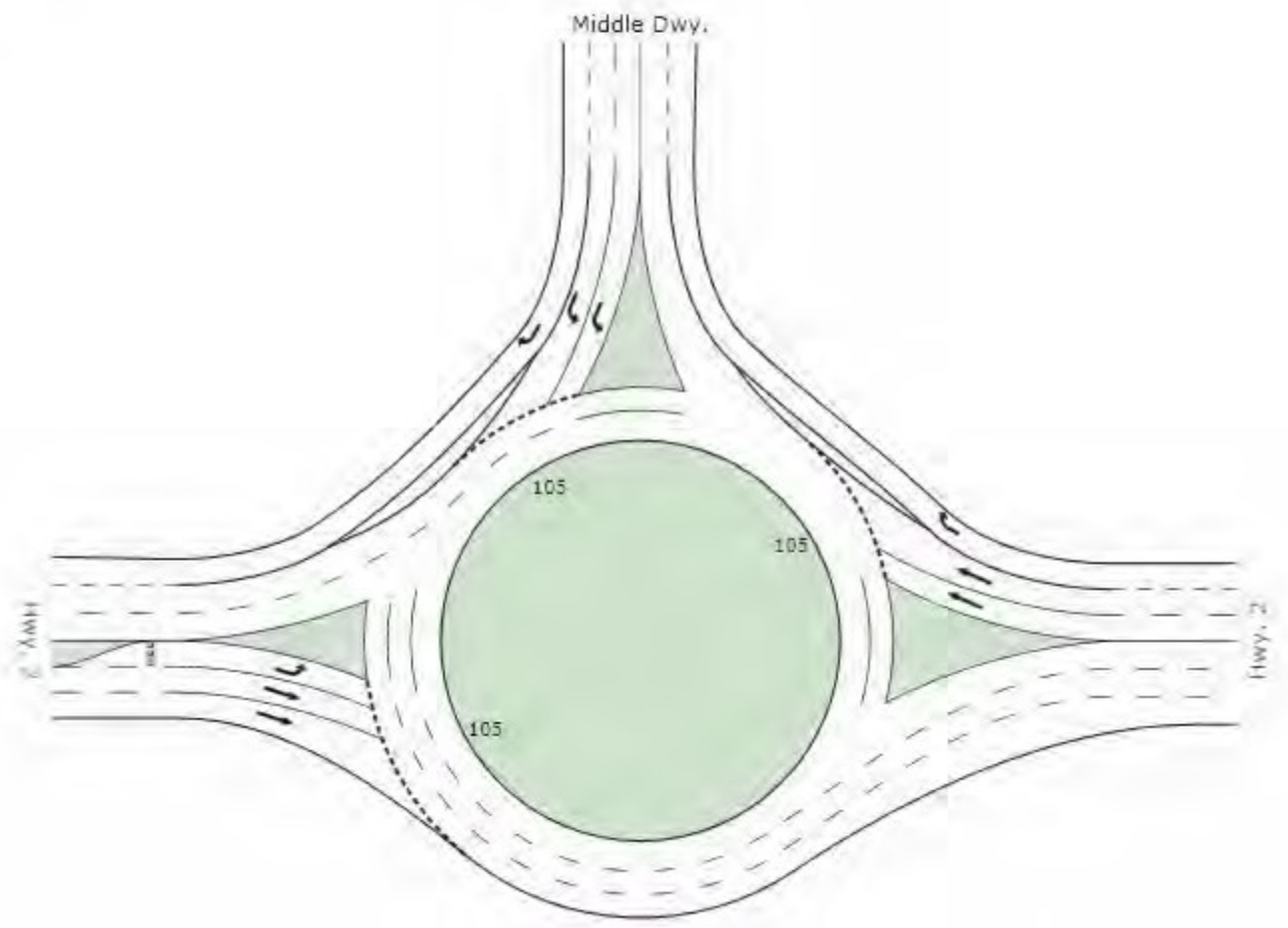
West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous



INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3975 veh/h	4780 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.777	
Practical Spare Capacity	9.3 %	
Effective Intersection Capacity	5113 veh/h	
Control Delay (Total)	10.85 veh-h/h	13.02 pers-h/h
Control Delay (Average)	9.8 sec	9.8 sec
Control Delay (Worst Lane)	19.2 sec	
Control Delay (Worst Movement)	18.8 sec	18.8 sec
Geometric Delay (Average)	5.1 sec	
Stop-Line Delay (Average)	4.7 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	7.9 veh	
95% Back of Queue - Distance (Worst Lane)	199.4 ft	
Total Effective Stops	3331 veh/h	3997 pers/h
Effective Stop Rate	0.84 per veh	0.84 per pers
Proportion Queued	0.68	0.67
Performance Index	84.9	84.9
Travel Distance (Total)	1449.9 veh-mi/h	1739.9 pers-mi/h
Travel Distance (Average)	1926 ft	1922 ft
Travel Time (Total)	52.9 veh-h/h	63.4 pers-h/h
Travel Time (Average)	47.9 sec	47.8 sec
Travel Speed	27.4 mph	27.4 mph
Cost (Total)	845.68 \$/h	845.68 \$/h
Fuel Consumption (Total)	63.9 gal/h	
Carbon Dioxide (Total)	605.0 kg/h	
Hydrocarbons (Total)	0.996 kg/h	
Carbon Monoxide (Total)	42.67 kg/h	
NOx (Total)	1.328 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,908,000 veh/y	2,294,400 pers/y
Delay	5,210 veh-h/y	6,251 pers-h/y
Effective Stops	1,598,910 veh/y	1,918,692 pers/y
Travel Distance	695,971 veh-mi/y	835,165 pers-mi/y
Travel Time	25,374 veh-h/y	30,449 pers-h/y
Cost	405,926 \$/y	405,926 \$/y
Fuel Consumption	30,674 gal/y	
Carbon Dioxide	290,395 kg/y	
Hydrocarbons	478 kg/y	
Carbon Monoxide	20,482 kg/y	
NOx	637 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1067	1.0	0.579	5.7	LOS A	5.9	149.0	0.73	0.67	28.5
6R	R	474	1.0	0.295	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1541	1.0	0.579	5.3	LOS A	5.9	149.0	0.50	0.59	29.4
North: Middle Dwy.											
7L	L	733	1.0	0.665	18.8	LOS B	5.6	141.8	0.86	1.08	24.0
4R	R	157	1.0	0.098	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		889	1.0	0.666	16.2	LOS B	5.6	141.8	0.71	0.96	24.9
West: Hwy. 2											
5L	L	346	1.0	0.533	14.5	LOS B	3.6	91.6	0.72	0.96	25.8
2T	T	1199	1.0	0.778	9.6	LOS A	7.9	199.4	0.86	1.04	27.9
Approach		1545	1.0	0.777	10.7	LOS B	7.9	199.4	0.83	1.02	27.4
All Vehicles		3975	1.0	0.777	9.8	LOS A	7.9	199.4	0.68	0.84	27.4

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

Processed: Tuesday, February 08, 2011 2:36:50 PM

SIDRA INTERSECTION 5.0.5.1510

Project: P:\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Hwy.2-Middle Dwy\Alt1-PH1.sip

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INTERSECTION

QUEUE DISTANCE

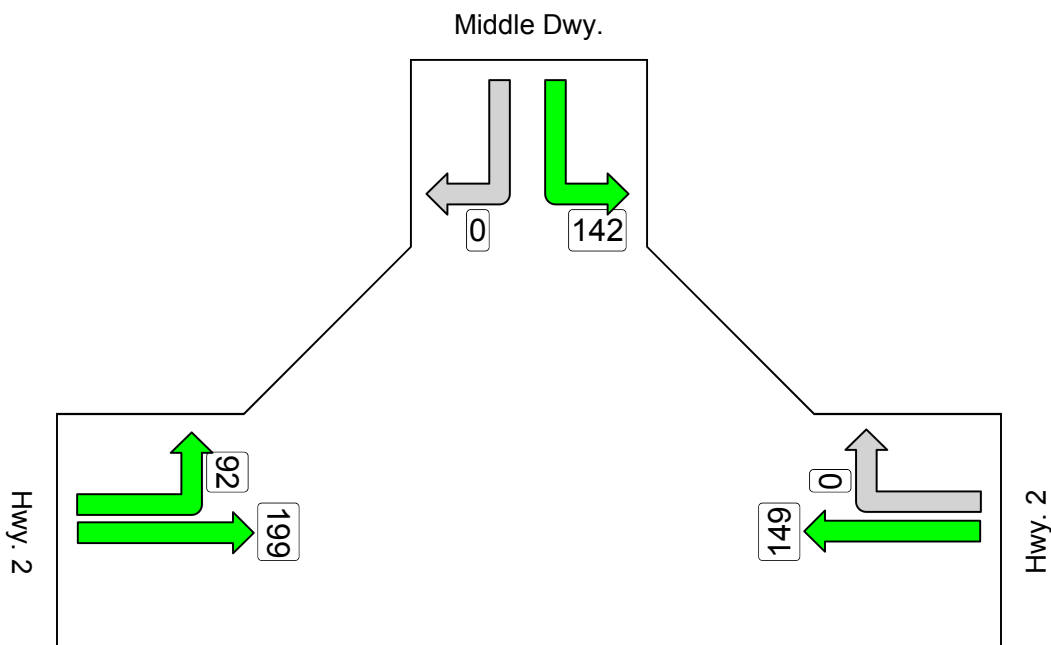
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA INTERSECTION 5.0.5.1510

Project: P:\S\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Hwy.2-Middle Dwy\Alt1-PH1.sip
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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4599 veh/h	5529 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.987	
Practical Spare Capacity	-13.9 %	
Effective Intersection Capacity	4660 veh/h	
Control Delay (Total)	23.79 veh-h/h	28.55 pers-h/h
Control Delay (Average)	18.6 sec	18.6 sec
Control Delay (Worst Lane)	36.4 sec	
Control Delay (Worst Movement)	35.3 sec	35.3 sec
Geometric Delay (Average)	5.2 sec	
Stop-Line Delay (Average)	13.4 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS D	
Level of Service (Worst Lane)	LOS D	
95% Back of Queue - Vehicles (Worst Lane)	18.9 veh	
95% Back of Queue - Distance (Worst Lane)	475.9 ft	
Total Effective Stops	5203 veh/h	6243 pers/h
Effective Stop Rate	1.13 per veh	1.13 per pers
Proportion Queued	0.78	0.78
Performance Index	130.8	130.8
Travel Distance (Total)	1678.9 veh-mi/h	2014.7 pers-mi/h
Travel Distance (Average)	1928 ft	1924 ft
Travel Time (Total)	71.9 veh-h/h	86.3 pers-h/h
Travel Time (Average)	56.3 sec	56.2 sec
Travel Speed	23.3 mph	23.3 mph
Cost (Total)	1118.24 \$/h	1118.24 \$/h
Fuel Consumption (Total)	80.6 gal/h	
Carbon Dioxide (Total)	763.0 kg/h	
Hydrocarbons (Total)	1.296 kg/h	
Carbon Monoxide (Total)	54.78 kg/h	
NOx (Total)	1.658 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,207,478 veh/y	2,653,774 pers/y
Delay	11,420 veh-h/y	13,705 pers-h/y
Effective Stops	2,497,310 veh/y	2,996,772 pers/y
Travel Distance	805,880 veh-mi/y	967,056 pers-mi/y
Travel Time	34,526 veh-h/y	41,431 pers-h/y
Cost	536,757 \$/y	536,757 \$/y
Fuel Consumption	38,686 gal/y	
Carbon Dioxide	366,251 kg/y	
Hydrocarbons	622 kg/y	
Carbon Monoxide	26,295 kg/y	
NOx	796 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1211	1.0	0.699	8.2	LOS A	9.1	229.7	0.86	0.90	27.9
6R	R	586	1.0	0.365	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1797	1.0	0.699	7.0	LOS A	9.1	229.7	0.58	0.74	29.0
North: Middle Dwy.											
7L	L	874	1.0	0.938	35.3	LOS D	13.0	326.4	0.98	1.44	18.8
4R	R	189	1.0	0.118	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1063	1.0	0.938	29.8	LOS D	13.0	326.4	0.81	1.25	20.1
West: Hwy. 2											
5L	L	398	1.0	0.693	16.8	LOS B	5.6	140.9	0.83	1.04	24.8
2T	T	1341	1.0	0.987	26.0	LOS C	18.9	475.9	1.00	1.59	20.7
Approach		1739	1.0	0.987	23.9	LOS C	18.9	475.9	0.96	1.46	21.6
All Vehicles		4599	1.0	0.987	18.6	LOS B	18.9	475.9	0.78	1.13	23.3

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

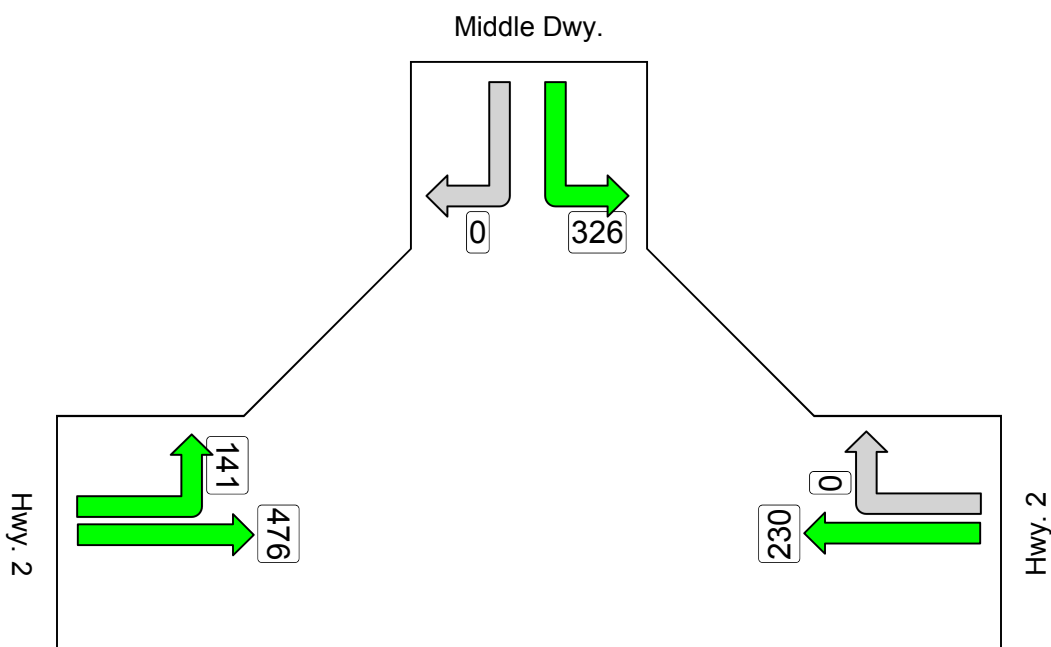
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

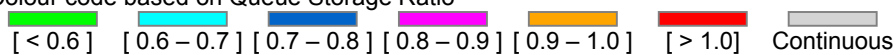
Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	5445 veh/h	6543 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.446	
Practical Spare Capacity	-41.2 %	
Effective Intersection Capacity	3766 veh/h	
Control Delay (Total)	92.78 veh-h/h	111.33 pers-h/h
Control Delay (Average)	61.3 sec	61.3 sec
Control Delay (Worst Lane)	227.8 sec	
Control Delay (Worst Movement)	226.8 sec	226.8 sec
Geometric Delay (Average)	5.2 sec	
Stop-Line Delay (Average)	56.2 sec	
Level of Service (Aver. Int. Delay)	LOS E	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	64.4 veh	
95% Back of Queue - Distance (Worst Lane)	1624.0 ft	
Total Effective Stops	9345 veh/h	11214 pers/h
Effective Stop Rate	1.72 per veh	1.71 per pers
Proportion Queued	0.82	0.81
Performance Index	286.6	286.6
Travel Distance (Total)	1986.3 veh-mi/h	2383.6 pers-mi/h
Travel Distance (Average)	1926 ft	1923 ft
Travel Time (Total)	149.7 veh-h/h	179.7 pers-h/h
Travel Time (Average)	99.0 sec	98.9 sec
Travel Speed	13.3 mph	13.3 mph
Cost (Total)	2084.71 \$/h	2084.71 \$/h
Fuel Consumption (Total)	123.8 gal/h	
Carbon Dioxide (Total)	1172.1 kg/h	
Hydrocarbons (Total)	2.158 kg/h	
Carbon Monoxide (Total)	77.10 kg/h	
NOx (Total)	2.271 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,613,392 veh/y	3,140,870 pers/y
Delay	44,534 veh-h/y	53,441 pers-h/y
Effective Stops	4,485,569 veh/y	5,382,683 pers/y
Travel Distance	953,435 veh-mi/y	1,144,122 pers-mi/y
Travel Time	71,871 veh-h/y	86,245 pers-h/y
Cost	1,000,661 \$/y	1,000,661 \$/y
Fuel Consumption	59,426 gal/y	
Carbon Dioxide	562,602 kg/y	
Hydrocarbons	1,036 kg/y	
Carbon Monoxide	37,010 kg/y	
NOx	1,090 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1446	1.0	0.879	16.3	LOS B	17.7	446.8	1.00	1.25	23.5
6R	R	698	1.0	0.435	4.4	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		2143	1.0	0.879	12.4	LOS B	17.7	446.8	0.67	0.97	25.7
North: Middle Dwy.											
7L	L	1025	1.0	1.446	226.8	LOS F	64.4	1624.0	1.00	3.40	5.3
4R	R	228	1.0	0.142	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1253	1.0	1.446	186.3	LOS F	64.4	1624.0	0.82	2.85	6.2
West: Hwy. 2											
5L	L	453	1.0	0.713	16.5	LOS B	6.2	157.0	0.83	1.05	24.9
2T	T	1595	1.0	1.049	41.7	LOS D	30.5	769.3	1.00	2.01	16.6
Approach		2048	1.0	1.049	36.1	LOS D	30.5	769.3	0.96	1.80	18.0
All Vehicles		5445	1.0	1.446	61.3	LOS E	64.4	1624.0	0.82	1.72	13.3

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

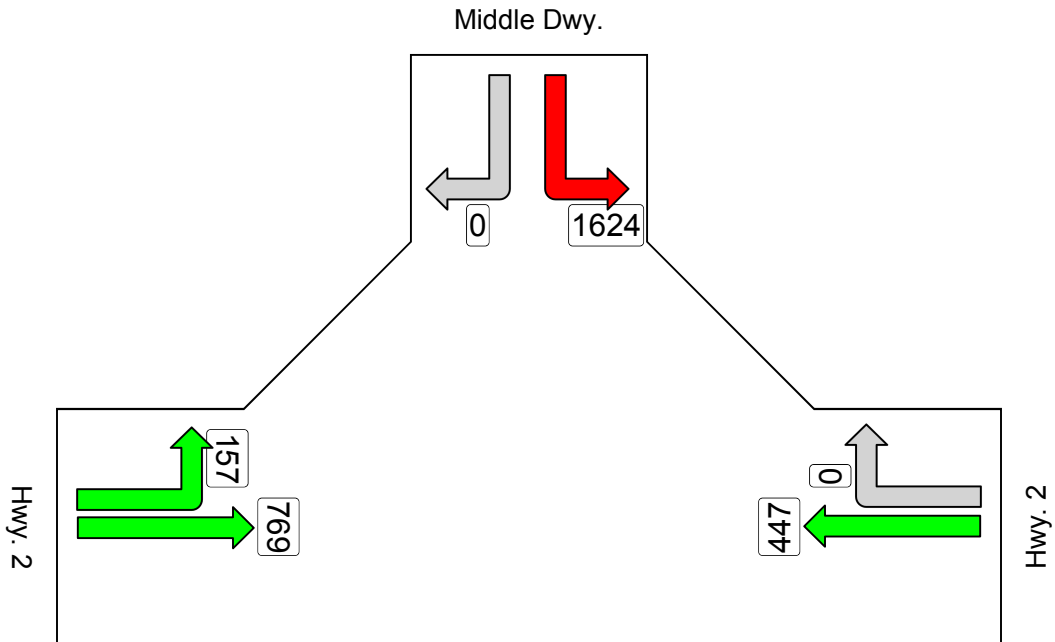
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

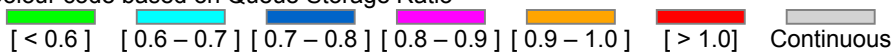
Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3975 veh/h	4780 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.777	
Practical Spare Capacity	9.3 %	
Effective Intersection Capacity	5113 veh/h	
Control Delay (Total)	10.85 veh-h/h	13.02 pers-h/h
Control Delay (Average)	9.8 sec	9.8 sec
Control Delay (Worst Lane)	19.2 sec	
Control Delay (Worst Movement)	18.8 sec	18.8 sec
Geometric Delay (Average)	5.1 sec	
Stop-Line Delay (Average)	4.7 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	7.9 veh	
95% Back of Queue - Distance (Worst Lane)	199.4 ft	
Total Effective Stops	3331 veh/h	3997 pers/h
Effective Stop Rate	0.84 per veh	0.84 per pers
Proportion Queued	0.68	0.67
Performance Index	84.9	84.9
Travel Distance (Total)	1449.9 veh-mi/h	1739.9 pers-mi/h
Travel Distance (Average)	1926 ft	1922 ft
Travel Time (Total)	52.9 veh-h/h	63.4 pers-h/h
Travel Time (Average)	47.9 sec	47.8 sec
Travel Speed	27.4 mph	27.4 mph
Cost (Total)	845.68 \$/h	845.68 \$/h
Fuel Consumption (Total)	63.9 gal/h	
Carbon Dioxide (Total)	605.0 kg/h	
Hydrocarbons (Total)	0.996 kg/h	
Carbon Monoxide (Total)	42.67 kg/h	
NOx (Total)	1.328 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,908,000 veh/y	2,294,400 pers/y
Delay	5,210 veh-h/y	6,251 pers-h/y
Effective Stops	1,598,910 veh/y	1,918,692 pers/y
Travel Distance	695,971 veh-mi/y	835,165 pers-mi/y
Travel Time	25,374 veh-h/y	30,449 pers-h/y
Cost	405,926 \$/y	405,926 \$/y
Fuel Consumption	30,674 gal/y	
Carbon Dioxide	290,395 kg/y	
Hydrocarbons	478 kg/y	
Carbon Monoxide	20,482 kg/y	
NOx	637 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1067	1.0	0.579	5.7	LOS A	5.9	149.0	0.73	0.67	28.5
6R	R	474	1.0	0.295	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1541	1.0	0.579	5.3	LOS A	5.9	149.0	0.50	0.59	29.4
North: Middle Dwy.											
7L	L	733	1.0	0.665	18.8	LOS B	5.6	141.8	0.86	1.08	24.0
4R	R	157	1.0	0.098	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		889	1.0	0.666	16.2	LOS B	5.6	141.8	0.71	0.96	24.9
West: Hwy. 2											
5L	L	346	1.0	0.533	14.5	LOS B	3.6	91.6	0.72	0.96	25.8
2T	T	1199	1.0	0.778	9.6	LOS A	7.9	199.4	0.86	1.04	27.9
Approach		1545	1.0	0.777	10.7	LOS B	7.9	199.4	0.83	1.02	27.4
All Vehicles		3975	1.0	0.777	9.8	LOS A	7.9	199.4	0.68	0.84	27.4

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

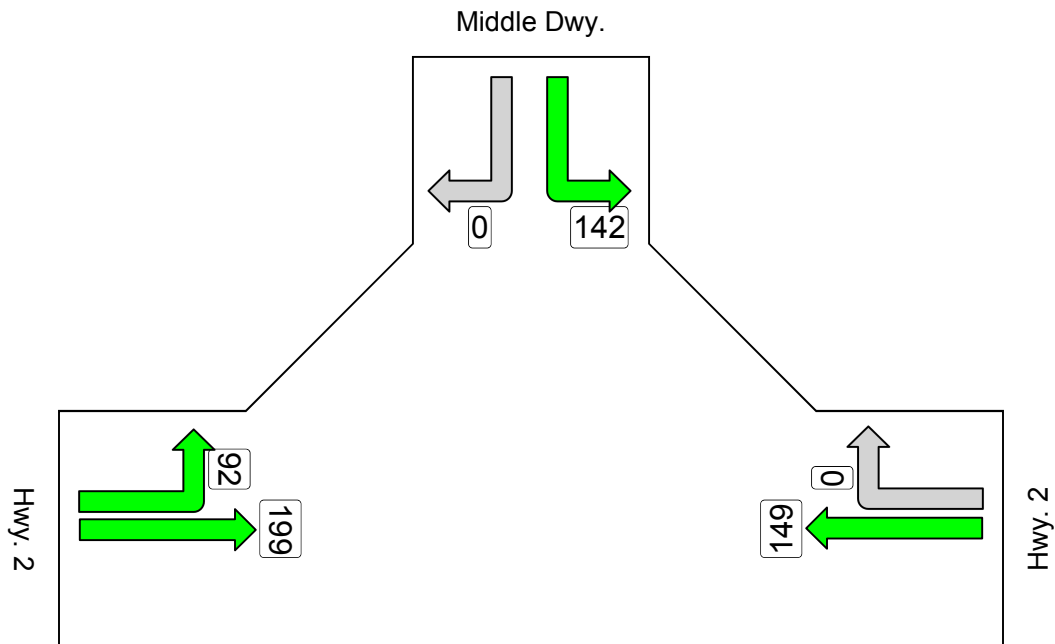
⁹ Continuous movement

QUEUE DISTANCE

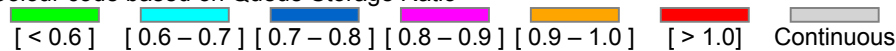
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio



INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3682 veh/h	4428 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.724	
Practical Spare Capacity	17.5 %	
Effective Intersection Capacity	5088 veh/h	
Control Delay (Total)	8.78 veh-h/h	10.54 pers-h/h
Control Delay (Average)	8.6 sec	8.6 sec
Control Delay (Worst Lane)	17.3 sec	
Control Delay (Worst Movement)	17.0 sec	17.0 sec
Geometric Delay (Average)	5.0 sec	
Stop-Line Delay (Average)	3.6 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	6.9 veh	
95% Back of Queue - Distance (Worst Lane)	173.8 ft	
Total Effective Stops	2737 veh/h	3285 pers/h
Effective Stop Rate	0.74 per veh	0.74 per pers
Proportion Queued	0.64	0.64
Performance Index	73.6	73.6
Travel Distance (Total)	1338.6 veh-mi/h	1606.4 pers-mi/h
Travel Distance (Average)	1920 ft	1916 ft
Travel Time (Total)	48.0 veh-h/h	57.6 pers-h/h
Travel Time (Average)	46.9 sec	46.8 sec
Travel Speed	27.9 mph	27.9 mph
Cost (Total)	767.58 \$/h	767.58 \$/h
Fuel Consumption (Total)	58.0 gal/h	
Carbon Dioxide (Total)	549.5 kg/h	
Hydrocarbons (Total)	0.899 kg/h	
Carbon Monoxide (Total)	38.22 kg/h	
NOx (Total)	1.200 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,767,130 veh/y	2,125,357 pers/y
Delay	4,214 veh-h/y	5,057 pers-h/y
Effective Stops	1,313,889 veh/y	1,576,666 pers/y
Travel Distance	642,544 veh-mi/y	771,053 pers-mi/y
Travel Time	23,030 veh-h/y	27,636 pers-h/y
Cost	368,439 \$/y	368,439 \$/y
Fuel Consumption	27,861 gal/y	
Carbon Dioxide	263,767 kg/y	
Hydrocarbons	432 kg/y	
Carbon Monoxide	18,344 kg/y	
NOx	576 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1053	1.0	0.534	4.5	LOS A	4.8	121.4	0.65	0.51	28.9
6R	R	378	1.0	0.236	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1432	1.0	0.535	4.5	LOS A	4.8	121.4	0.48	0.48	29.6
North: Middle Dwy.											
7L	L	634	1.0	0.554	17.0	LOS B	4.1	104.6	0.81	1.02	24.7
4R	R	128	1.0	0.080	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		762	1.0	0.554	14.9	LOS B	4.1	104.6	0.68	0.91	25.6
West: Hwy. 2											
5L	L	289	1.0	0.444	13.8	LOS B	2.7	68.1	0.65	0.91	26.2
2T	T	1199	1.0	0.724	8.2	LOS A	6.9	173.8	0.80	0.91	28.4
Approach		1488	1.0	0.724	9.3	LOS B	6.9	173.8	0.77	0.91	27.9
All Vehicles		3682	1.0	0.724	8.6	LOS A	6.9	173.8	0.64	0.74	27.9

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

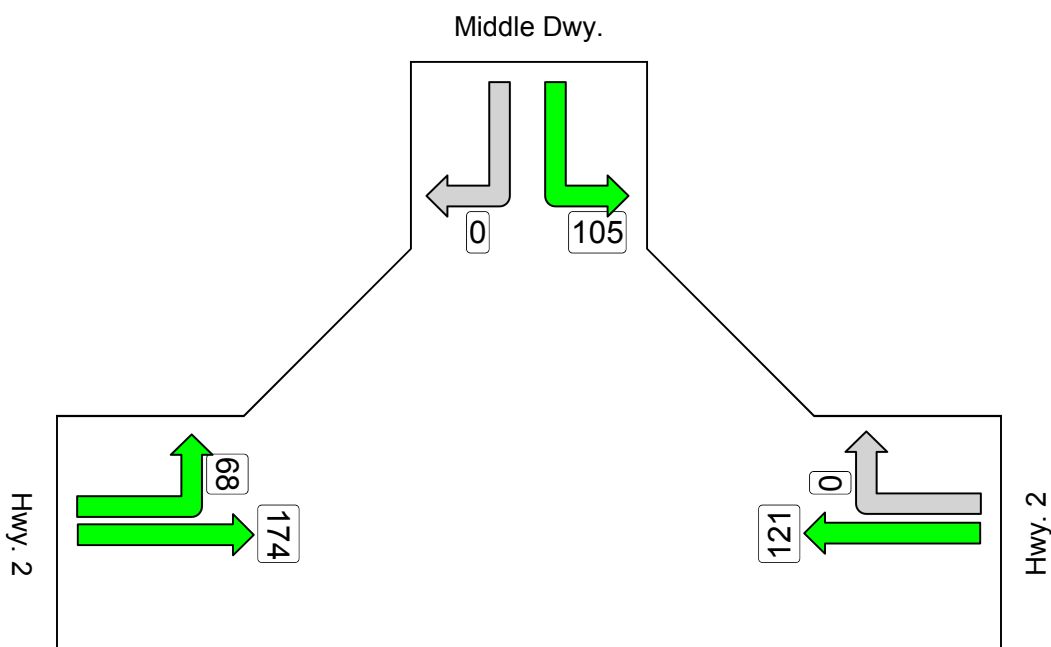
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)

West Plains Development

Roundabout

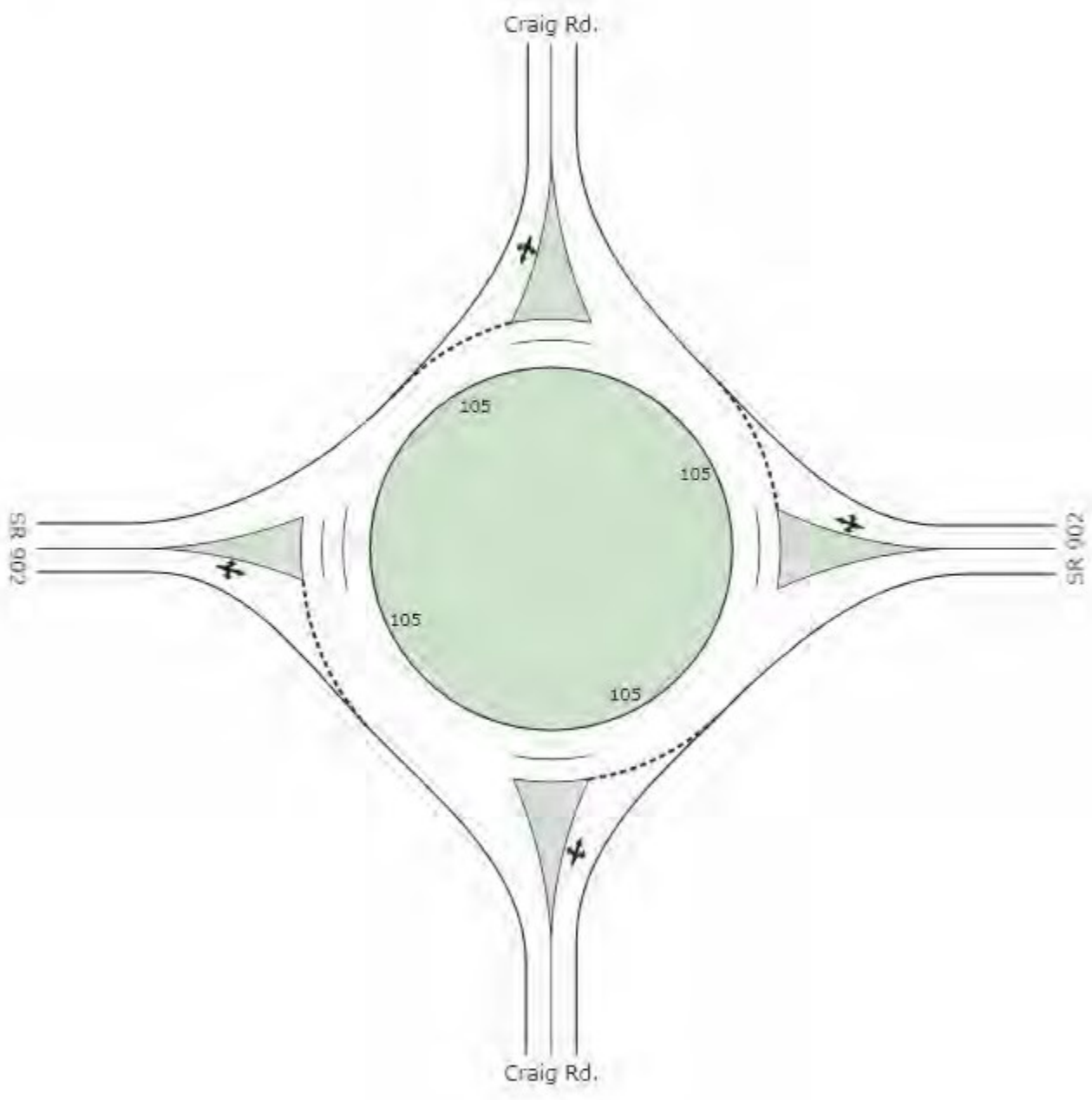


Colour code based on Queue Storage Ratio

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SIDRA
INTERSECTION



INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1472 veh/h	1777 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.643	
Practical Spare Capacity	32.1 %	
Effective Intersection Capacity	2287 veh/h	
Control Delay (Total)	3.50 veh-h/h	4.21 pers-h/h
Control Delay (Average)	8.6 sec	8.5 sec
Control Delay (Worst Lane)	11.6 sec	
Control Delay (Worst Movement)	15.9 sec	15.9 sec
Geometric Delay (Average)	4.8 sec	
Stop-Line Delay (Average)	3.7 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	7.1 veh	
95% Back of Queue - Distance (Worst Lane)	179.6 ft	
Total Effective Stops	1065 veh/h	1278 pers/h
Effective Stop Rate	0.72 per veh	0.72 per pers
Proportion Queued	0.65	0.65
Performance Index	30.0	30.0
Travel Distance (Total)	539.1 veh-mi/h	646.9 pers-mi/h
Travel Distance (Average)	1933 ft	1923 ft
Travel Time (Total)	18.8 veh-h/h	22.5 pers-h/h
Travel Time (Average)	45.9 sec	45.7 sec
Travel Speed	28.7 mph	28.7 mph
Cost (Total)	309.07 \$/h	309.07 \$/h
Fuel Consumption (Total)	24.2 gal/h	
Carbon Dioxide (Total)	229.1 kg/h	
Hydrocarbons (Total)	0.375 kg/h	
Carbon Monoxide (Total)	16.59 kg/h	
NOx (Total)	0.521 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	706,667 veh/y	852,800 pers/y
Delay	1,682 veh-h/y	2,019 pers-h/y
Effective Stops	511,185 veh/y	613,422 pers/y
Travel Distance	258,775 veh-mi/y	310,530 pers-mi/y
Travel Time	9,020 veh-h/y	10,824 pers-h/y
Cost	148,353 \$/y	148,353 \$/y
Fuel Consumption	11,615 gal/y	
Carbon Dioxide	109,972 kg/y	
Hydrocarbons	180 kg/y	
Carbon Monoxide	7,965 kg/y	
NOx	250 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	6	2.0	0.198	15.9	LOS B	1.2	31.5	0.61	0.93	28.8
8T	T	120	2.0	0.202	8.6	LOS A	1.2	31.5	0.61	0.71	31.6
8R	R	6	2.0	0.198	9.7	LOS A	1.2	31.5	0.61	0.76	31.5
Approach		131	2.0	0.202	9.0	LOS B	1.2	31.5	0.61	0.72	31.4
East: SR 902											
1L	L	16	1.0	0.471	14.1	LOS B	3.8	94.8	0.53	0.84	29.6
6T	T	316	1.0	0.470	4.2	LOS A	3.8	94.8	0.53	0.47	29.3
6R	R	103	1.0	0.470	6.3	LOS A	3.8	94.8	0.53	0.60	29.3
Approach		434	1.0	0.469	5.0	LOS B	3.8	94.8	0.53	0.51	29.3
North: Craig Rd.											
7L	L	131	1.0	0.643	15.8	LOS B	7.1	179.6	0.77	0.95	25.7
4T	T	161	1.0	0.642	10.5	LOS B	7.1	179.6	0.77	0.84	30.1
4R	R	211	1.0	0.644	9.9	LOS A	7.1	179.6	0.77	0.85	27.6
Approach		503	1.0	0.643	11.6	LOS B	7.1	179.6	0.77	0.87	27.8
West: SR 902											
5L	L	78	1.0	0.564	14.0	LOS B	4.7	117.7	0.65	0.94	26.7
2T	T	316	1.0	0.562	7.0	LOS A	4.7	117.7	0.65	0.72	28.8
2R	R	10	1.0	0.556	9.6	LOS A	4.7	117.7	0.65	0.79	31.2
Approach		403	1.0	0.563	8.4	LOS B	4.7	117.7	0.65	0.77	28.4
All Vehicles		1472	1.1	0.643	8.6	LOS A	7.1	179.6	0.65	0.72	28.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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INTERSECTION

QUEUE DISTANCE

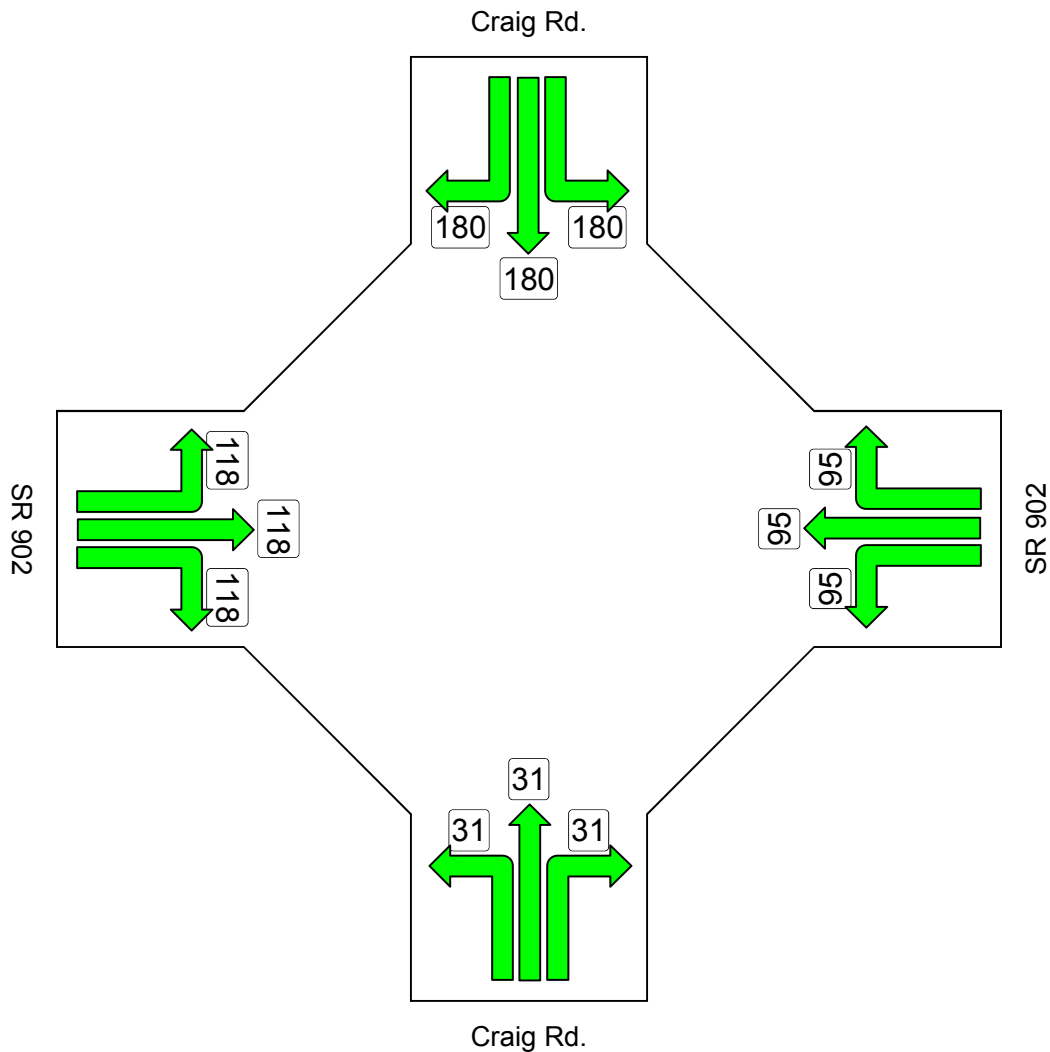
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

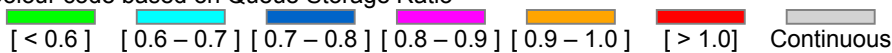
Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.1,PH.1)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1569 veh/h	1893 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.699	
Practical Spare Capacity	21.6 %	
Effective Intersection Capacity	2245 veh/h	
Control Delay (Total)	4.12 veh-h/h	4.94 pers-h/h
Control Delay (Average)	9.4 sec	9.4 sec
Control Delay (Worst Lane)	12.7 sec	
Control Delay (Worst Movement)	16.8 sec	16.8 sec
Geometric Delay (Average)	4.9 sec	
Stop-Line Delay (Average)	4.5 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	8.7 veh	
95% Back of Queue - Distance (Worst Lane)	220.1 ft	
Total Effective Stops	1221 veh/h	1465 pers/h
Effective Stop Rate	0.78 per veh	0.77 per pers
Proportion Queued	0.71	0.70
Performance Index	33.5	33.5
Travel Distance (Total)	575.9 veh-mi/h	691.1 pers-mi/h
Travel Distance (Average)	1938 ft	1928 ft
Travel Time (Total)	20.4 veh-h/h	24.4 pers-h/h
Travel Time (Average)	46.7 sec	46.5 sec
Travel Speed	28.3 mph	28.3 mph
Cost (Total)	335.48 \$/h	335.48 \$/h
Fuel Consumption (Total)	26.3 gal/h	
Carbon Dioxide (Total)	249.1 kg/h	
Hydrocarbons (Total)	0.410 kg/h	
Carbon Monoxide (Total)	18.34 kg/h	
NOx (Total)	0.571 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	753,067 veh/y	908,480 pers/y
Delay	1,977 veh-h/y	2,372 pers-h/y
Effective Stops	585,993 veh/y	703,192 pers/y
Travel Distance	276,436 veh-mi/y	331,724 pers-mi/y
Travel Time	9,771 veh-h/y	11,725 pers-h/y
Cost	161,029 \$/y	161,029 \$/y
Fuel Consumption	12,630 gal/y	
Carbon Dioxide	119,576 kg/y	
Hydrocarbons	197 kg/y	
Carbon Monoxide	8,804 kg/y	
NOx	274 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	6	2.0	0.242	16.2	LOS B	1.5	38.7	0.65	0.95	28.6
8T	T	140	2.0	0.241	9.0	LOS A	1.5	38.7	0.65	0.75	31.4
8R	R	6	2.0	0.242	10.0	LOS B	1.5	38.7	0.65	0.79	31.4
Approach		151	2.0	0.241	9.3	LOS B	1.5	38.7	0.65	0.75	31.3
East: SR 902											
1L	L	16	1.0	0.519	14.5	LOS B	4.2	107.0	0.59	0.85	29.5
6T	T	316	1.0	0.511	4.6	LOS A	4.2	107.0	0.59	0.51	29.0
6R	R	126	1.0	0.512	6.7	LOS A	4.2	107.0	0.59	0.64	29.1
Approach		457	1.0	0.512	5.5	LOS B	4.2	107.0	0.59	0.56	29.0
North: Craig Rd.											
7L	L	152	1.0	0.698	16.8	LOS B	8.7	220.1	0.83	0.98	25.3
4T	T	179	1.0	0.699	11.5	LOS B	8.7	220.1	0.83	0.89	29.5
4R	R	218	1.0	0.698	10.9	LOS B	8.7	220.1	0.83	0.90	27.1
Approach		549	1.0	0.699	12.7	LOS B	8.7	220.1	0.83	0.92	27.2
West: SR 902											
5L	L	87	1.0	0.606	15.0	LOS B	5.4	136.7	0.71	0.99	26.3
2T	T	316	1.0	0.605	8.0	LOS A	5.4	136.7	0.71	0.80	28.5
2R	R	10	1.0	0.588	10.6	LOS B	5.4	136.7	0.71	0.85	30.7
Approach		412	1.0	0.604	9.6	LOS B	5.4	136.7	0.71	0.84	28.0
All Vehicles		1569	1.1	0.699	9.4	LOS A	8.7	220.1	0.71	0.78	28.3

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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QUEUE DISTANCE

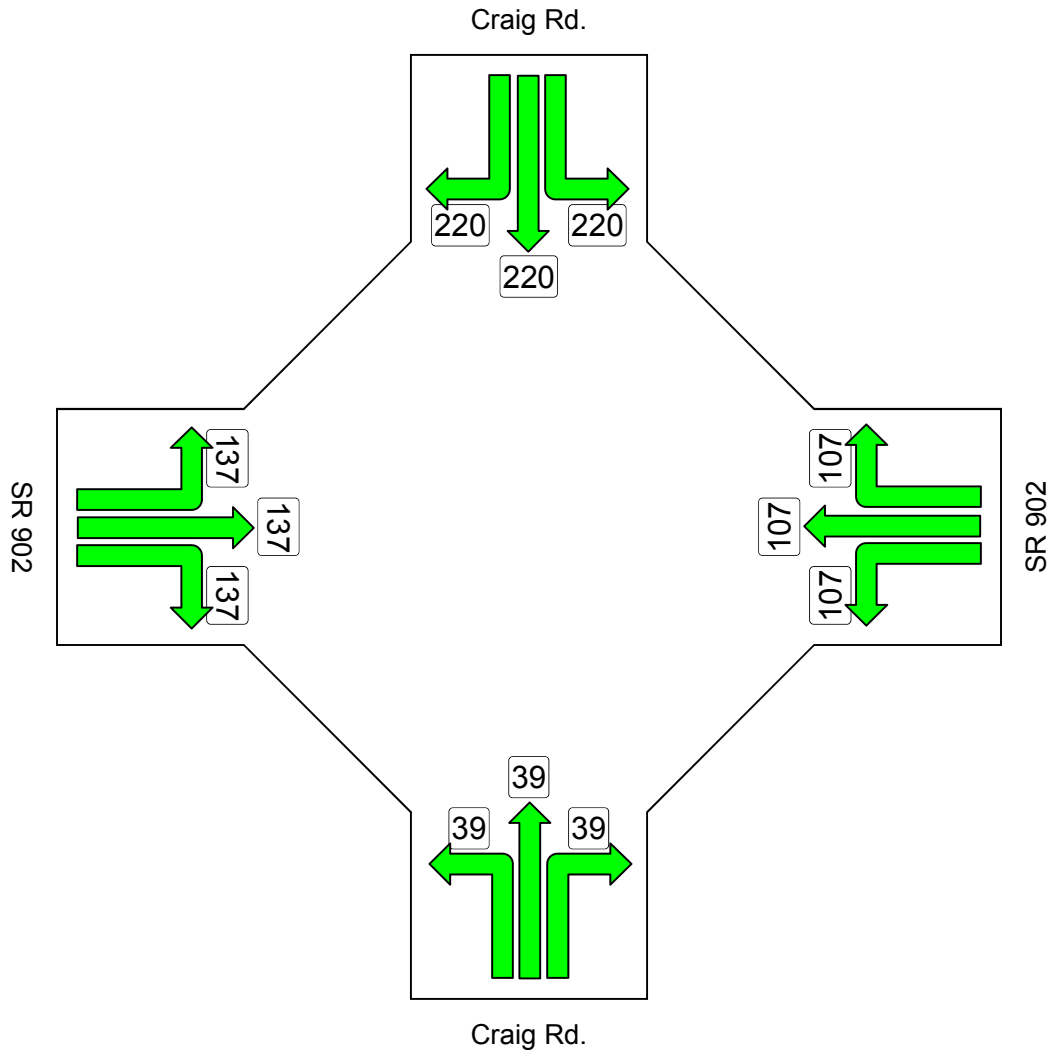
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2015 PM PEAK, ALT.1,PH.2)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1650 veh/h	1990 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.749	
Practical Spare Capacity	13.4 %	
Effective Intersection Capacity	2202 veh/h	
Control Delay (Total)	4.76 veh-h/h	5.72 pers-h/h
Control Delay (Average)	10.4 sec	10.3 sec
Control Delay (Worst Lane)	13.9 sec	
Control Delay (Worst Movement)	17.9 sec	17.9 sec
Geometric Delay (Average)	5.0 sec	
Stop-Line Delay (Average)	5.4 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	10.5 veh	
95% Back of Queue - Distance (Worst Lane)	264.4 ft	
Total Effective Stops	1379 veh/h	1654 pers/h
Effective Stop Rate	0.84 per veh	0.83 per pers
Proportion Queued	0.76	0.75
Performance Index	37.0	37.0
Travel Distance (Total)	606.8 veh-mi/h	728.2 pers-mi/h
Travel Distance (Average)	1942 ft	1932 ft
Travel Time (Total)	21.8 veh-h/h	26.2 pers-h/h
Travel Time (Average)	47.6 sec	47.3 sec
Travel Speed	27.8 mph	27.8 mph
Cost (Total)	359.58 \$/h	359.58 \$/h
Fuel Consumption (Total)	28.2 gal/h	
Carbon Dioxide (Total)	266.9 kg/h	
Hydrocarbons (Total)	0.442 kg/h	
Carbon Monoxide (Total)	19.92 kg/h	
NOx (Total)	0.615 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	792,000 veh/y	955,200 pers/y
Delay	2,286 veh-h/y	2,744 pers-h/y
Effective Stops	661,775 veh/y	794,130 pers/y
Travel Distance	291,267 veh-mi/y	349,521 pers-mi/y
Travel Time	10,467 veh-h/y	12,560 pers-h/y
Cost	172,599 \$/y	172,599 \$/y
Fuel Consumption	13,534 gal/y	
Carbon Dioxide	128,136 kg/y	
Hydrocarbons	212 kg/y	
Carbon Monoxide	9,564 kg/y	
NOx	295 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	6	2.0	0.278	16.5	LOS B	1.8	45.1	0.67	0.96	28.5
8T	T	156	2.0	0.273	9.3	LOS A	1.8	45.1	0.67	0.77	31.3
8R	R	6	2.0	0.278	10.3	LOS B	1.8	45.1	0.67	0.81	31.2
Approach		167	2.0	0.273	9.6	LOS B	1.8	45.1	0.67	0.78	31.2
East: SR 902											
1L	L	16	1.0	0.556	15.0	LOS B	4.8	122.2	0.63	0.87	29.2
6T	T	316	1.0	0.547	5.1	LOS A	4.8	122.2	0.63	0.58	28.8
6R	R	144	1.0	0.547	7.2	LOS A	4.8	122.2	0.63	0.68	28.9
Approach		476	1.0	0.547	6.1	LOS B	4.8	122.2	0.63	0.62	28.8
North: Craig Rd.											
7L	L	172	1.0	0.749	17.9	LOS B	10.5	264.4	0.88	1.02	24.8
4T	T	196	1.0	0.749	12.6	LOS B	10.5	264.4	0.88	0.95	28.7
4R	R	222	1.0	0.748	12.0	LOS B	10.5	264.4	0.88	0.96	26.4
Approach		590	1.0	0.749	13.9	LOS B	10.5	264.4	0.88	0.97	26.6
West: SR 902											
5L	L	92	1.0	0.640	16.0	LOS B	6.1	154.6	0.76	1.03	25.8
2T	T	316	1.0	0.640	9.1	LOS A	6.1	154.6	0.76	0.88	27.9
2R	R	10	1.0	0.625	11.7	LOS B	6.1	154.6	0.76	0.92	30.0
Approach		418	1.0	0.641	10.7	LOS B	6.1	154.6	0.76	0.91	27.4
All Vehicles		1650	1.1	0.749	10.4	LOS B	10.5	264.4	0.76	0.84	27.8

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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SIDRA INTERSECTION 5.0.5.1510

Project: P:\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\SR902-Craig Rd\Alt1-PH3-SR902.sip
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INTERSECTION

QUEUE DISTANCE

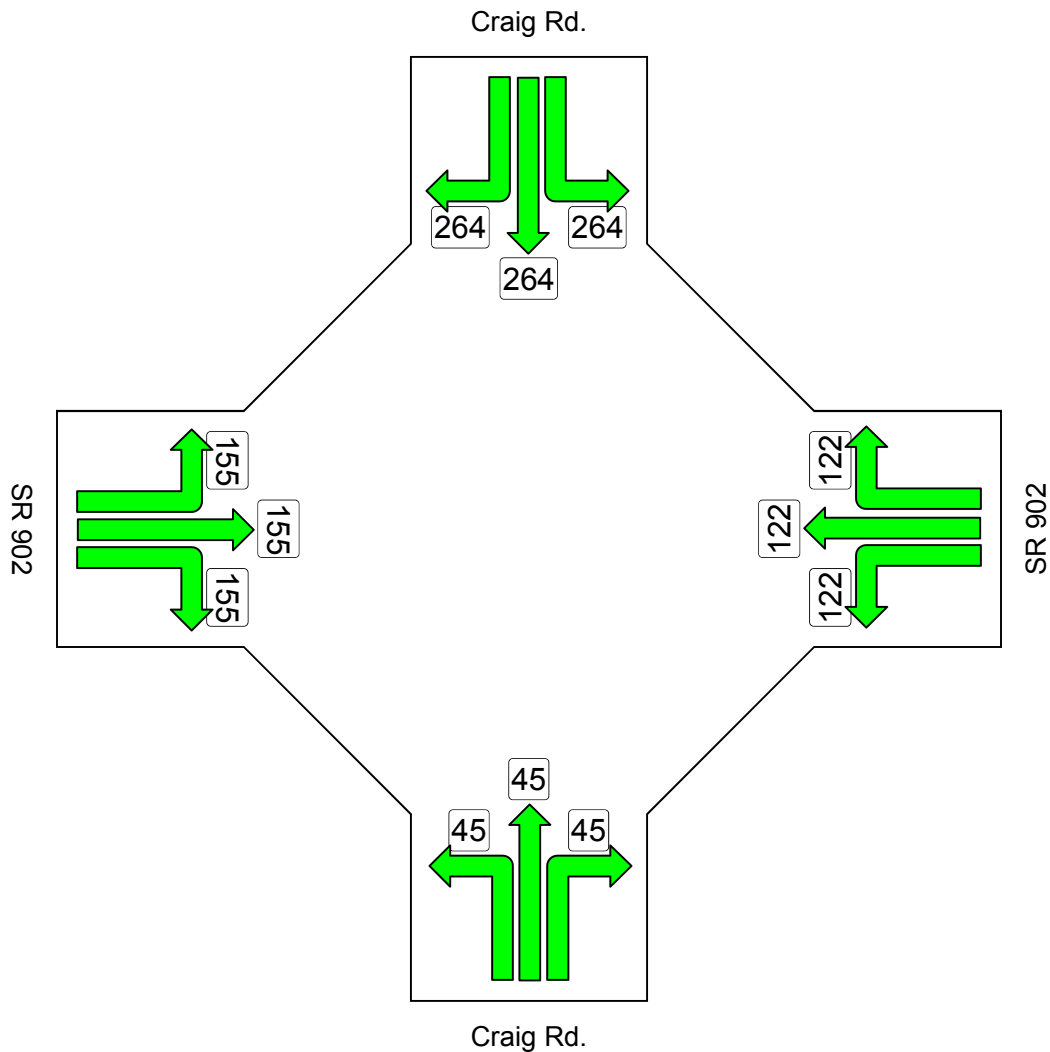
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2019 PM PEAK, ALT.1,PH.3)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA INTERSECTION 5.0.5.1510

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1472 veh/h	1777 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.643	
Practical Spare Capacity	32.1 %	
Effective Intersection Capacity	2287 veh/h	
Control Delay (Total)	3.50 veh-h/h	4.21 pers-h/h
Control Delay (Average)	8.6 sec	8.5 sec
Control Delay (Worst Lane)	11.6 sec	
Control Delay (Worst Movement)	15.9 sec	15.9 sec
Geometric Delay (Average)	4.8 sec	
Stop-Line Delay (Average)	3.7 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	7.1 veh	
95% Back of Queue - Distance (Worst Lane)	179.6 ft	
Total Effective Stops	1065 veh/h	1278 pers/h
Effective Stop Rate	0.72 per veh	0.72 per pers
Proportion Queued	0.65	0.65
Performance Index	30.0	30.0
Travel Distance (Total)	539.1 veh-mi/h	646.9 pers-mi/h
Travel Distance (Average)	1933 ft	1923 ft
Travel Time (Total)	18.8 veh-h/h	22.5 pers-h/h
Travel Time (Average)	45.9 sec	45.7 sec
Travel Speed	28.7 mph	28.7 mph
Cost (Total)	309.07 \$/h	309.07 \$/h
Fuel Consumption (Total)	24.2 gal/h	
Carbon Dioxide (Total)	229.1 kg/h	
Hydrocarbons (Total)	0.375 kg/h	
Carbon Monoxide (Total)	16.59 kg/h	
NOx (Total)	0.521 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	706,667 veh/y	852,800 pers/y
Delay	1,682 veh-h/y	2,019 pers-h/y
Effective Stops	511,185 veh/y	613,422 pers/y
Travel Distance	258,775 veh-mi/y	310,530 pers-mi/y
Travel Time	9,020 veh-h/y	10,824 pers-h/y
Cost	148,353 \$/y	148,353 \$/y
Fuel Consumption	11,615 gal/y	
Carbon Dioxide	109,972 kg/y	
Hydrocarbons	180 kg/y	
Carbon Monoxide	7,965 kg/y	
NOx	250 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	6	2.0	0.198	15.9	LOS B	1.2	31.5	0.61	0.93	28.8
8T	T	120	2.0	0.202	8.6	LOS A	1.2	31.5	0.61	0.71	31.6
8R	R	6	2.0	0.198	9.7	LOS A	1.2	31.5	0.61	0.76	31.5
Approach		131	2.0	0.202	9.0	LOS B	1.2	31.5	0.61	0.72	31.4
East: SR 902											
1L	L	16	1.0	0.471	14.1	LOS B	3.8	94.8	0.53	0.84	29.6
6T	T	316	1.0	0.470	4.2	LOS A	3.8	94.8	0.53	0.47	29.3
6R	R	103	1.0	0.470	6.3	LOS A	3.8	94.8	0.53	0.60	29.3
Approach		434	1.0	0.469	5.0	LOS B	3.8	94.8	0.53	0.51	29.3
North: Craig Rd.											
7L	L	131	1.0	0.643	15.8	LOS B	7.1	179.6	0.77	0.95	25.7
4T	T	161	1.0	0.642	10.5	LOS B	7.1	179.6	0.77	0.84	30.1
4R	R	211	1.0	0.644	9.9	LOS A	7.1	179.6	0.77	0.85	27.6
Approach		503	1.0	0.643	11.6	LOS B	7.1	179.6	0.77	0.87	27.8
West: SR 902											
5L	L	78	1.0	0.564	14.0	LOS B	4.7	117.7	0.65	0.94	26.7
2T	T	316	1.0	0.562	7.0	LOS A	4.7	117.7	0.65	0.72	28.8
2R	R	10	1.0	0.556	9.6	LOS A	4.7	117.7	0.65	0.79	31.2
Approach		403	1.0	0.563	8.4	LOS B	4.7	117.7	0.65	0.77	28.4
All Vehicles		1472	1.1	0.643	8.6	LOS A	7.1	179.6	0.65	0.72	28.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

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SIDRA INTERSECTION 5.0.5.1510

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INTERSECTION

QUEUE DISTANCE

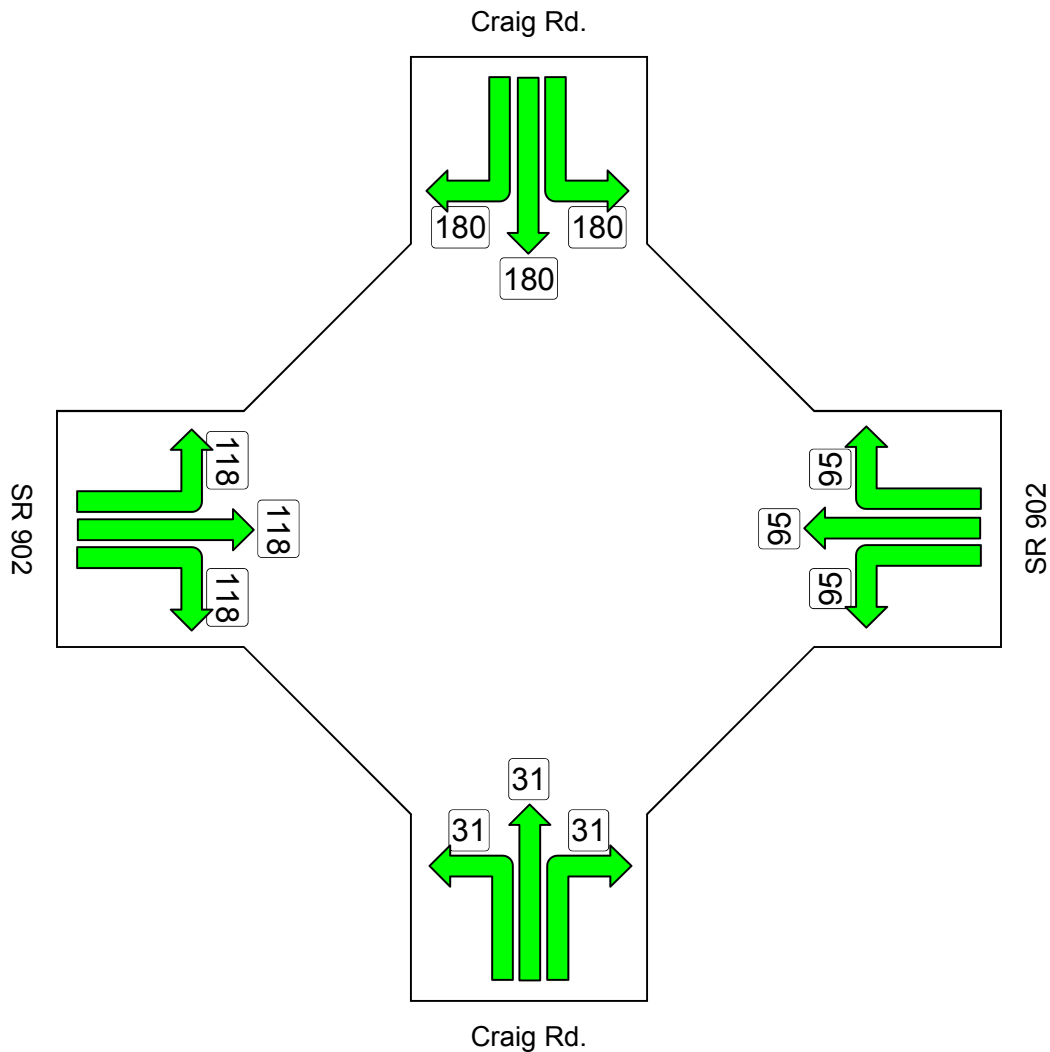
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.2,Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1370 veh/h	1654 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.588	
Practical Spare Capacity	44.6 %	
Effective Intersection Capacity	2330 veh/h	
Control Delay (Total)	2.96 veh-h/h	3.56 pers-h/h
Control Delay (Average)	7.8 sec	7.7 sec
Control Delay (Worst Lane)	10.7 sec	
Control Delay (Worst Movement)	15.5 sec	15.5 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	3.0 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	5.8 veh	
95% Back of Queue - Distance (Worst Lane)	146.4 ft	
Total Effective Stops	910 veh/h	1092 pers/h
Effective Stop Rate	0.66 per veh	0.66 per pers
Proportion Queued	0.60	0.59
Performance Index	26.6	26.6
Travel Distance (Total)	500.3 veh-mi/h	600.4 pers-mi/h
Travel Distance (Average)	1928 ft	1917 ft
Travel Time (Total)	17.2 veh-h/h	20.7 pers-h/h
Travel Time (Average)	45.3 sec	45.0 sec
Travel Speed	29.0 mph	29.0 mph
Cost (Total)	282.64 \$/h	282.64 \$/h
Fuel Consumption (Total)	22.1 gal/h	
Carbon Dioxide (Total)	208.8 kg/h	
Hydrocarbons (Total)	0.340 kg/h	
Carbon Monoxide (Total)	14.86 kg/h	
NOx (Total)	0.471 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	657,600 veh/y	793,920 pers/y
Delay	1,423 veh-h/y	1,707 pers-h/y
Effective Stops	436,977 veh/y	524,372 pers/y
Travel Distance	240,152 veh-mi/y	288,182 pers-mi/y
Travel Time	8,273 veh-h/y	9,928 pers-h/y
Cost	135,669 \$/y	135,669 \$/y
Fuel Consumption	10,588 gal/y	
Carbon Dioxide	100,244 kg/y	
Hydrocarbons	163 kg/y	
Carbon Monoxide	7,131 kg/y	
NOx	226 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	6	2.0	0.159	15.5	LOS B	1.0	24.3	0.58	0.92	28.9
8T	T	97	2.0	0.161	8.3	LOS A	1.0	24.3	0.58	0.68	31.7
8R	R	6	2.0	0.159	9.3	LOS A	1.0	24.3	0.58	0.73	31.6
Approach		108	2.0	0.161	8.7	LOS B	1.0	24.3	0.58	0.69	31.5
East: SR 902											
1L	L	16	1.0	0.420	13.7	LOS B	3.3	82.1	0.47	0.84	29.8
6T	T	316	1.0	0.423	3.8	LOS A	3.3	82.1	0.47	0.42	29.7
6R	R	77	1.0	0.424	5.9	LOS A	3.3	82.1	0.47	0.56	29.5
Approach		408	1.0	0.423	4.6	LOS B	3.3	82.1	0.47	0.46	29.6
North: Craig Rd.											
7L	L	111	1.0	0.588	15.0	LOS B	5.8	146.4	0.72	0.92	26.1
4T	T	143	1.0	0.587	9.7	LOS A	5.8	146.4	0.72	0.79	30.6
4R	R	204	1.0	0.587	9.1	LOS A	5.8	146.4	0.72	0.80	28.1
Approach		459	1.0	0.588	10.7	LOS B	5.8	146.4	0.72	0.83	28.3
West: SR 902											
5L	L	70	1.0	0.526	13.1	LOS B	4.0	101.1	0.59	0.91	27.1
2T	T	316	1.0	0.525	6.2	LOS A	4.0	101.1	0.59	0.62	29.1
2R	R	10	1.0	0.526	8.8	LOS A	4.0	101.1	0.59	0.73	31.5
Approach		396	1.0	0.525	7.5	LOS B	4.0	101.1	0.59	0.67	28.7
All Vehicles		1370	1.1	0.588	7.8	LOS A	5.8	146.4	0.60	0.66	29.0

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

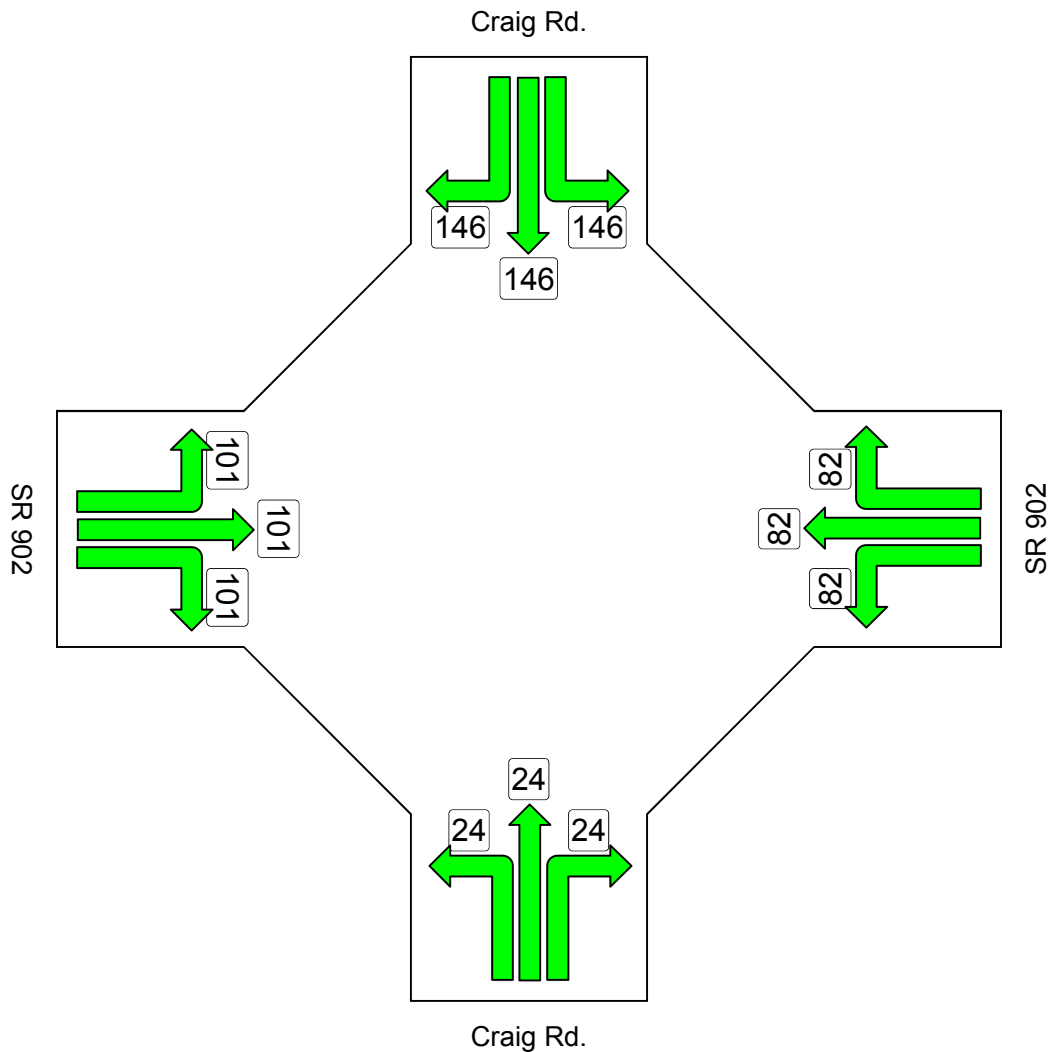
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2012 PM PEAK, ALT.3,Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA
INTERSECTION

**YEAR 2032
SIDRA ANALYSIS
WORKSHEETS**

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4961 veh/h	5964 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.822	
Practical Spare Capacity	3.4 %	
Effective Intersection Capacity	6038 veh/h	
Control Delay (Total)	14.09 veh-h/h	16.91 pers-h/h
Control Delay (Average)	10.2 sec	10.2 sec
Control Delay (Worst Lane)	24.2 sec	
Control Delay (Worst Movement)	24.2 sec	24.2 sec
Geometric Delay (Average)	4.6 sec	
Stop-Line Delay (Average)	5.6 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	12.9 veh	
95% Back of Queue - Distance (Worst Lane)	325.4 ft	
Total Effective Stops	4425 veh/h	5310 pers/h
Effective Stop Rate	0.89 per veh	0.89 per pers
Proportion Queued	0.77	0.77
Performance Index	111.4	111.4
Travel Distance (Total)	1797.1 veh-mi/h	2156.5 pers-mi/h
Travel Distance (Average)	1913 ft	1909 ft
Travel Time (Total)	65.4 veh-h/h	78.5 pers-h/h
Travel Time (Average)	47.5 sec	47.4 sec
Travel Speed	27.5 mph	27.5 mph
Cost (Total)	1057.87 \$/h	1057.87 \$/h
Fuel Consumption (Total)	81.0 gal/h	
Carbon Dioxide (Total)	767.2 kg/h	
Hydrocarbons (Total)	1.270 kg/h	
Carbon Monoxide (Total)	55.67 kg/h	
NOx (Total)	1.719 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,381,420 veh/y	2,862,504 pers/y
Delay	6,765 veh-h/y	8,117 pers-h/y
Effective Stops	2,123,919 veh/y	2,548,702 pers/y
Travel Distance	862,593 veh-mi/y	1,035,112 pers-mi/y
Travel Time	31,404 veh-h/y	37,684 pers-h/y
Cost	507,778 \$/y	507,778 \$/y
Fuel Consumption	38,896 gal/y	
Carbon Dioxide	368,236 kg/y	
Hydrocarbons	610 kg/y	
Carbon Monoxide	26,723 kg/y	
NOx	825 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	47	1.0	0.192	24.2	LOS C	1.2	30.7	0.90	0.97	24.2
8T	T	2	1.0	0.015	22.1	LOS C	0.1	2.0	0.90	0.89	24.4
8R	R	98	1.0	0.061	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		147	1.0	0.192	12.0	LOS C	1.2	30.7	0.30	0.65	29.8
East: Hwy. 2											
1L	L	117	1.0	0.761	19.1	LOS B	11.3	285.3	0.90	1.02	27.3
6T	T	1443	1.0	0.759	8.6	LOS A	11.7	294.2	0.89	0.93	27.5
6R	R	471	1.0	0.424	6.2	LOS A	3.6	91.5	0.63	0.59	28.7
Approach		2031	1.0	0.759	8.7	LOS B	11.7	294.2	0.83	0.86	27.7
North: Craig Rd.											
7L	L	337	1.0	0.512	20.9	LOS C	3.7	92.7	0.89	1.03	23.2
4T	T	2	1.0	0.538	14.8	LOS B	3.7	92.7	0.90	1.00	26.8
4R	R	274	1.0	0.171	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		613	1.0	0.512	13.5	LOS C	3.7	92.7	0.49	0.75	26.1
West: Hwy. 2											
5L	L	373	1.0	0.468	13.6	LOS B	3.6	90.0	0.68	0.87	26.2
2T	T	1683	1.0	0.822	10.3	LOS B	12.9	325.4	0.92	1.04	27.5
2R	R	114	1.0	0.071	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2170	1.0	0.822	10.6	LOS B	12.9	325.4	0.83	0.98	27.5
All Vehicles		4961	1.0	0.822	10.2	LOS B	12.9	325.4	0.77	0.89	27.5

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

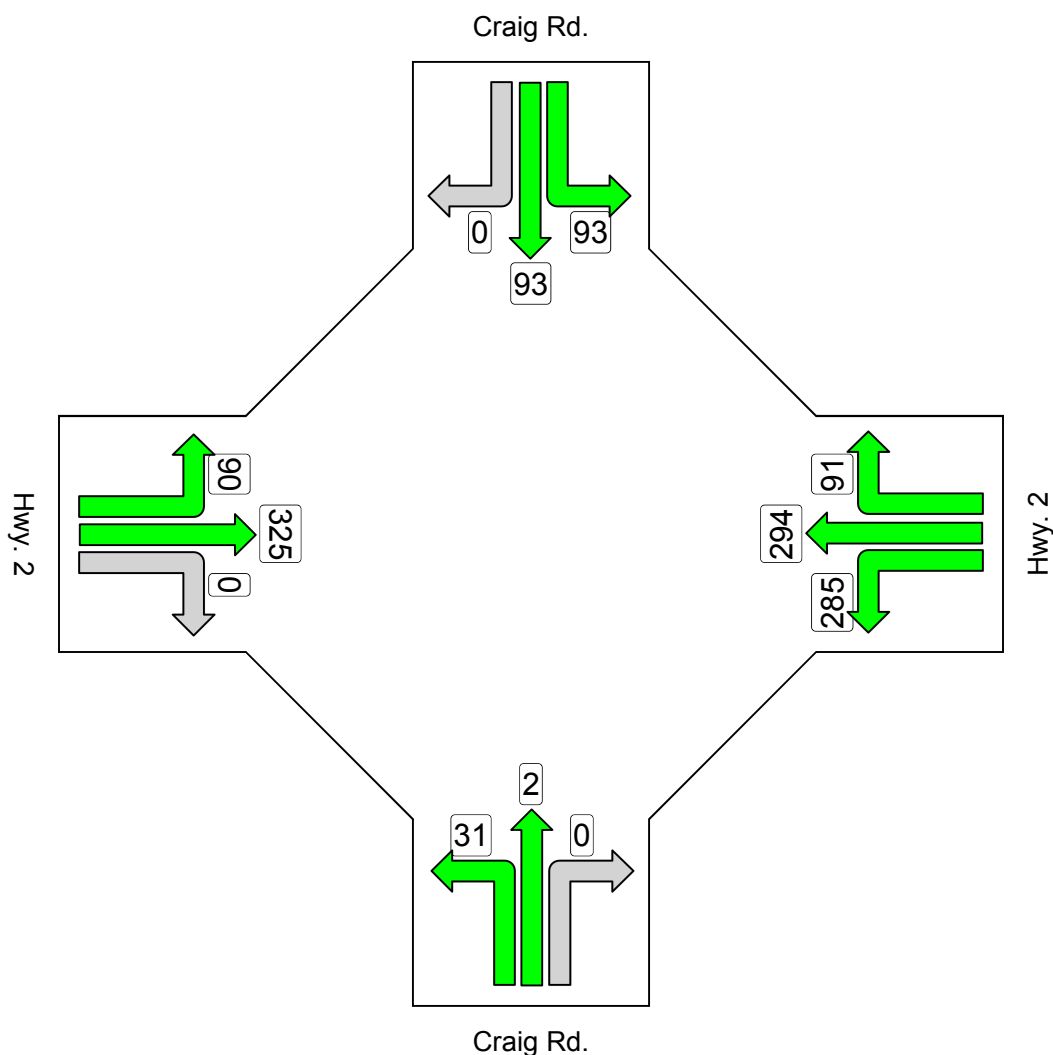
⁹ Continuous movement

QUEUE DISTANCE

Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio

[< 0.6]
[0.6 – 0.7]
[0.7 – 0.8]
[0.8 – 0.9]
[0.9 – 1.0]
[> 1.0]
Continuous

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	7089 veh/h	8517 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.354	
Practical Spare Capacity	-37.2 %	
Effective Intersection Capacity	5240 veh/h	
Control Delay (Total)	186.89 veh-h/h	224.27 pers-h/h
Control Delay (Average)	94.9 sec	94.8 sec
Control Delay (Worst Lane)	229.1 sec	
Control Delay (Worst Movement)	229.1 sec	229.1 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	90.2 sec	
Level of Service (Aver. Int. Delay)	LOS F	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	87.7 veh	
95% Back of Queue - Distance (Worst Lane)	2209.6 ft	
Total Effective Stops	18841 veh/h	22610 pers/h
Effective Stop Rate	2.66 per veh	2.65 per pers
Proportion Queued	0.87	0.87
Performance Index	533.6	533.6
Travel Distance (Total)	2577.8 veh-mi/h	3093.4 pers-mi/h
Travel Distance (Average)	1920 ft	1918 ft
Travel Time (Total)	259.4 veh-h/h	311.3 pers-h/h
Travel Time (Average)	131.7 sec	131.6 sec
Travel Speed	9.9 mph	9.9 mph
Cost (Total)	3552.87 \$/h	3552.87 \$/h
Fuel Consumption (Total)	200.3 gal/h	
Carbon Dioxide (Total)	1896.3 kg/h	
Hydrocarbons (Total)	3.659 kg/h	
Carbon Monoxide (Total)	131.02 kg/h	
NOx (Total)	3.656 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3,402,839 veh/y	4,088,207 pers/y
Delay	89,706 veh-h/y	107,647 pers-h/y
Effective Stops	9,043,874 veh/y	10,852,650 pers/y
Travel Distance	1,237,356 veh-mi/y	1,484,828 pers-mi/y
Travel Time	124,529 veh-h/y	149,434 pers-h/y
Cost	1,705,379 \$/y	1,705,379 \$/y
Fuel Consumption	96,145 gal/y	
Carbon Dioxide	910,235 kg/y	
Hydrocarbons	1,757 kg/y	
Carbon Monoxide	62,891 kg/y	
NOx	1,755 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	244	1.0	1.353	229.1	LOS F	31.6	797.2	1.00	2.09	5.6
8T	T	131	1.0	0.998	111.6	LOS F	10.6	267.1	1.00	1.39	9.4
8R	R	98	1.0	0.061	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		472	1.0	1.354	150.3	LOS F	31.6	797.2	0.79	1.56	7.7
East: Hwy. 2											
1L	L	117	1.0	1.208	121.4	LOS F	70.7	1781.5	1.00	3.14	9.5
6T	T	1984	1.0	1.209	110.2	LOS F	81.9	2063.0	1.00	3.52	8.3
6R	R	659	1.0	0.653	9.4	LOS A	8.2	206.0	0.84	0.89	27.9
Approach		2760	1.0	1.209	86.6	LOS F	81.9	2063.0	0.96	2.87	10.1
North: Craig Rd.											
7L	L	495	1.0	1.265	166.1	LOS F	34.0	857.4	1.00	2.26	6.9
4T	T	109	1.0	1.263	158.1	LOS F	34.0	857.4	1.00	2.24	7.1
4R	R	282	1.0	0.176	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		885	1.0	1.266	113.6	LOS F	34.0	857.4	0.68	1.67	9.1
West: Hwy. 2											
5L	L	380	1.0	0.582	16.1	LOS B	5.1	127.8	0.79	1.00	25.1
2T	T	2258	1.0	1.221	112.5	LOS F	87.7	2209.6	1.00	3.61	8.8
2R	R	334	1.0	0.208	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2972	1.0	1.221	88.2	LOS F	87.7	2209.6	0.86	2.92	10.6
All Vehicles		7089	1.0	1.354	94.9	LOS F	87.7	2209.6	0.87	2.66	9.9

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

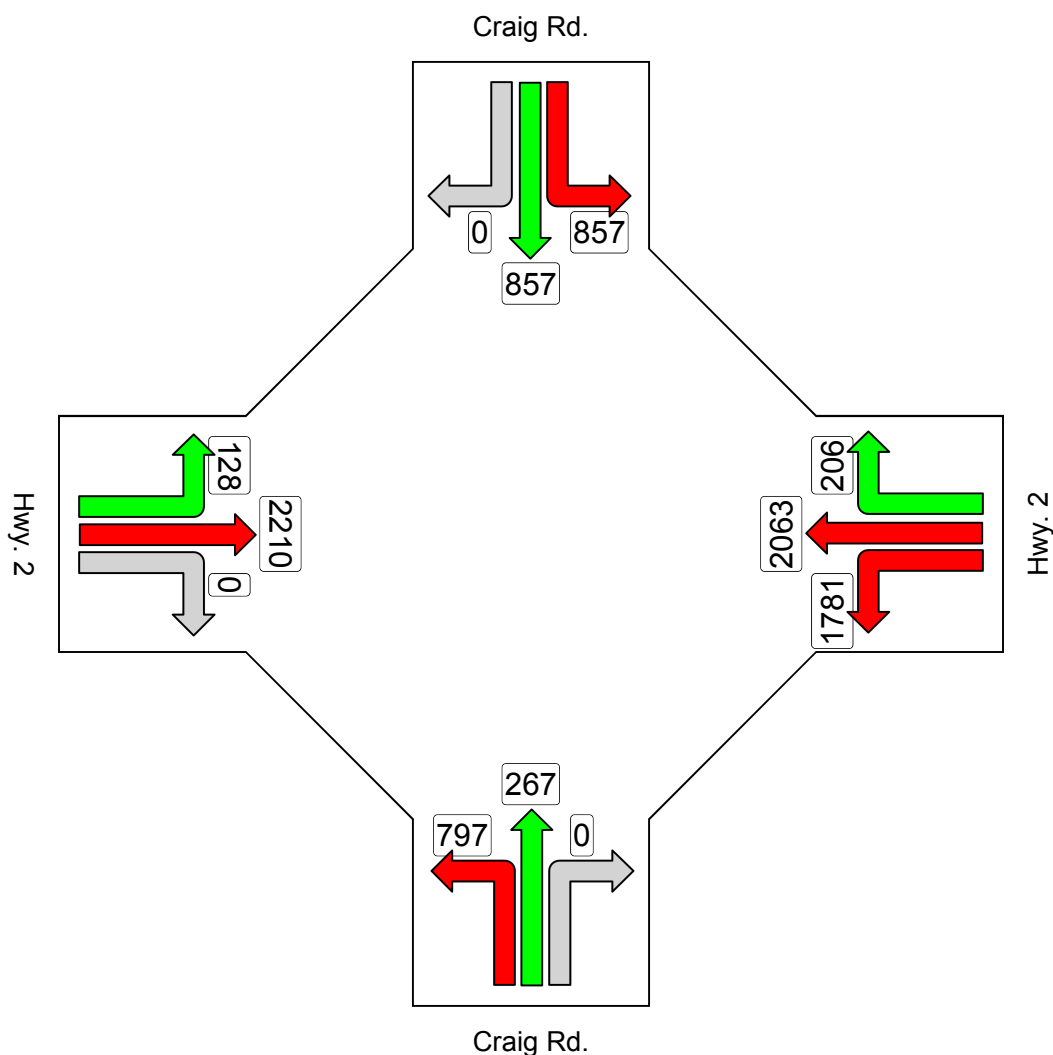
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

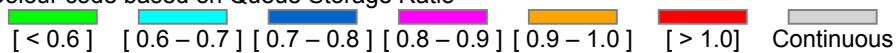
Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT2 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	6400 veh/h	7690 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.156	
Practical Spare Capacity	-26.8 %	
Effective Intersection Capacity	5514 veh/h	
Control Delay (Total)	96.57 veh-h/h	115.89 pers-h/h
Control Delay (Average)	54.3 sec	54.3 sec
Control Delay (Worst Lane)	130.2 sec	
Control Delay (Worst Movement)	127.3 sec	127.3 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	49.6 sec	
Level of Service (Aver. Int. Delay)	LOS D	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	54.5 veh	
95% Back of Queue - Distance (Worst Lane)	1372.3 ft	
Total Effective Stops	12449 veh/h	14939 pers/h
Effective Stop Rate	1.95 per veh	1.94 per pers
Proportion Queued	0.86	0.86
Performance Index	333.6	333.6
Travel Distance (Total)	2325.2 veh-mi/h	2790.2 pers-mi/h
Travel Distance (Average)	1918 ft	1916 ft
Travel Time (Total)	162.3 veh-h/h	194.8 pers-h/h
Travel Time (Average)	91.3 sec	91.2 sec
Travel Speed	14.3 mph	14.3 mph
Cost (Total)	2340.48 \$/h	2340.48 \$/h
Fuel Consumption (Total)	146.7 gal/h	
Carbon Dioxide (Total)	1388.6 kg/h	
Hydrocarbons (Total)	2.556 kg/h	
Carbon Monoxide (Total)	100.20 kg/h	
NOx (Total)	2.870 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	3,072,000 veh/y	3,691,201 pers/y
Delay	46,355 veh-h/y	55,626 pers-h/y
Effective Stops	5,975,708 veh/y	7,170,850 pers/y
Travel Distance	1,116,084 veh-mi/y	1,339,301 pers-mi/y
Travel Time	77,922 veh-h/y	93,506 pers-h/y
Cost	1,123,429 \$/y	1,123,429 \$/y
Fuel Consumption	70,404 gal/y	
Carbon Dioxide	666,530 kg/y	
Hydrocarbons	1,227 kg/y	
Carbon Monoxide	48,096 kg/y	
NOx	1,377 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT2 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	183	1.0	1.021	112.9	LOS F	13.5	340.4	1.00	1.52	9.9
8T	T	86	1.0	0.723	62.6	LOS E	5.0	124.8	0.98	1.15	14.2
8R	R	98	1.0	0.061	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		367	1.0	1.019	72.5	LOS F	13.5	340.4	0.73	1.16	13.2
East: Hwy. 2											
1L	L	117	1.0	1.075	69.0	LOS E	43.6	1097.9	1.00	2.24	14.3
6T	T	1804	1.0	1.078	57.5	LOS E	48.9	1231.9	1.00	2.42	13.0
6R	R	603	1.0	0.582	8.0	LOS A	6.3	159.4	0.78	0.80	28.1
Approach		2525	1.0	1.078	46.2	LOS E	48.9	1231.9	0.95	2.03	15.1
North: Craig Rd.											
7L	L	443	1.0	1.157	127.3	LOS F	24.3	613.2	1.00	1.92	8.5
4T	T	73	1.0	1.161	119.0	LOS F	24.3	613.2	1.00	1.90	8.9
4R	R	282	1.0	0.176	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		798	1.0	1.156	83.1	LOS F	24.3	613.2	0.65	1.38	11.3
West: Hwy. 2											
5L	L	380	1.0	0.555	15.5	LOS B	4.7	119.0	0.77	0.98	25.4
2T	T	2069	1.0	1.103	63.1	LOS E	54.5	1372.3	1.00	2.56	13.1
2R	R	262	1.0	0.164	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2711	1.0	1.103	50.9	LOS E	54.5	1372.3	0.87	2.14	15.1
All Vehicles		6400	1.0	1.156	54.3	LOS D	54.5	1372.3	0.86	1.95	14.3

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

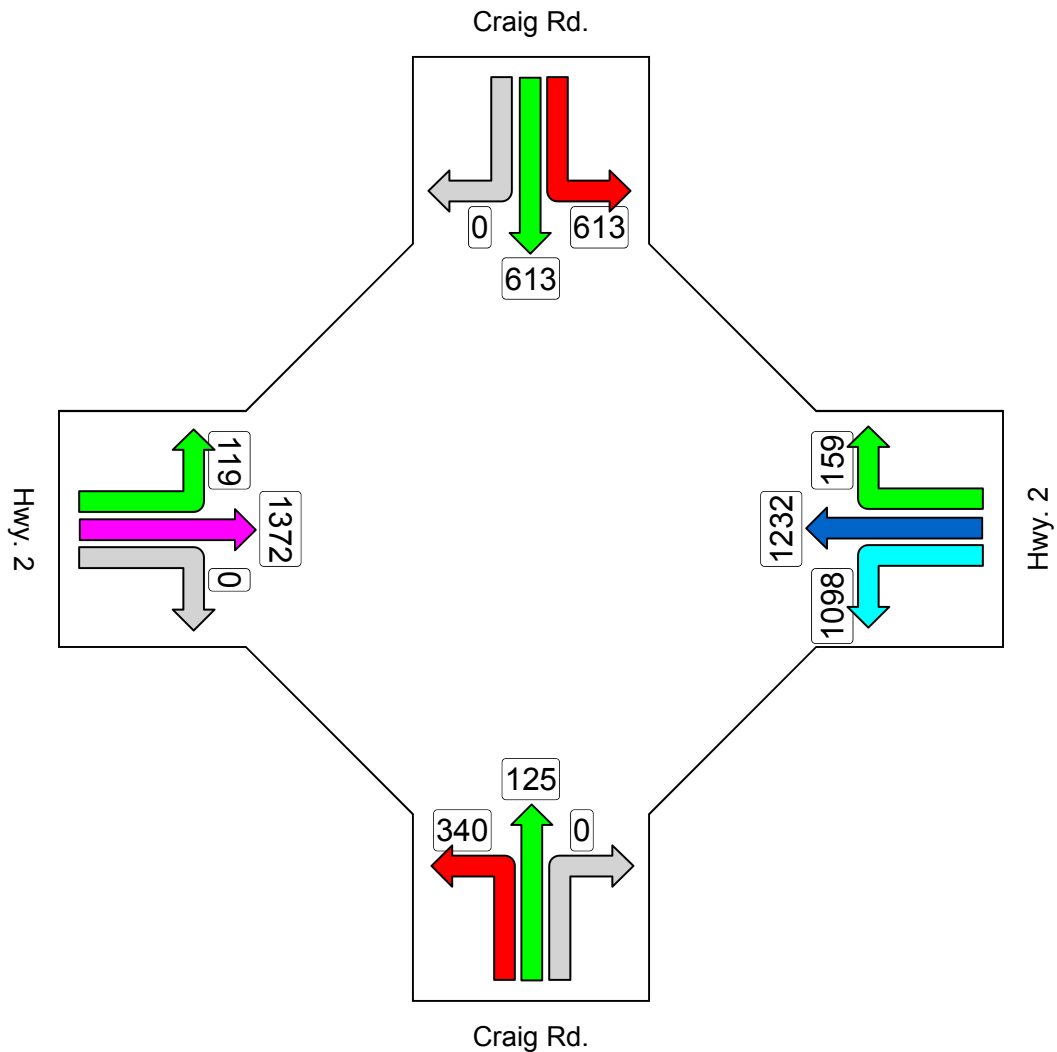
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT2 Buildout)

West Plains Development

Roundabout



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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT3 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	5977 veh/h	7183 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.057	
Practical Spare Capacity	-19.5 %	
Effective Intersection Capacity	5658 veh/h	
Control Delay (Total)	56.08 veh-h/h	67.30 pers-h/h
Control Delay (Average)	33.8 sec	33.7 sec
Control Delay (Worst Lane)	79.8 sec	
Control Delay (Worst Movement)	79.8 sec	79.8 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	29.1 sec	
Level of Service (Aver. Int. Delay)	LOS C	
Level of Service (Worst Movement)	LOS E	
Level of Service (Worst Lane)	LOS E	
95% Back of Queue - Vehicles (Worst Lane)	42.8 veh	
95% Back of Queue - Distance (Worst Lane)	1079.7 ft	
Total Effective Stops	9226 veh/h	11071 pers/h
Effective Stop Rate	1.54 per veh	1.54 per pers
Proportion Queued	0.85	0.85
Performance Index	236.3	236.3
Travel Distance (Total)	2169.6 veh-mi/h	2603.5 pers-mi/h
Travel Distance (Average)	1916 ft	1914 ft
Travel Time (Total)	117.7 veh-h/h	141.2 pers-h/h
Travel Time (Average)	70.9 sec	70.8 sec
Travel Speed	18.4 mph	18.4 mph
Cost (Total)	1773.55 \$/h	1773.55 \$/h
Fuel Consumption (Total)	120.5 gal/h	
Carbon Dioxide (Total)	1140.4 kg/h	
Hydrocarbons (Total)	2.026 kg/h	
Carbon Monoxide (Total)	84.39 kg/h	
NOx (Total)	2.462 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,869,162 veh/y	3,447,794 pers/y
Delay	26,918 veh-h/y	32,302 pers-h/y
Effective Stops	4,428,386 veh/y	5,314,065 pers/y
Travel Distance	1,041,409 veh-mi/y	1,249,691 pers-mi/y
Travel Time	56,479 veh-h/y	67,774 pers-h/y
Cost	851,304 \$/y	851,304 \$/y
Fuel Consumption	57,819 gal/y	
Carbon Dioxide	547,384 kg/y	
Hydrocarbons	972 kg/y	
Carbon Monoxide	40,505 kg/y	
NOx	1,182 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT3 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	151	1.0	0.860	79.8	LOS E	8.3	209.1	0.99	1.30	12.7
8T	T	44	1.0	0.404	40.1	LOS D	2.4	60.0	0.96	1.03	18.5
8R	R	98	1.0	0.061	5.9	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.49	34.1
Approach		292	1.0	0.861	49.1	LOS E	8.3	209.1	0.65	0.99	16.8
East: Hwy. 2											
1L	L	117	1.0	0.985	40.3	LOS D	28.3	712.0	1.00	1.64	19.7
6T	T	1701	1.0	0.982	28.8	LOS C	30.5	769.8	1.00	1.69	18.8
6R	R	540	1.0	0.506	6.8	LOS A	4.7	118.9	0.71	0.65	28.4
Approach		2358	1.0	0.982	24.4	LOS D	30.5	769.8	0.93	1.45	20.5
North: Craig Rd.											
7L	L	392	1.0	0.969	70.3	LOS E	12.2	307.8	1.00	1.46	12.9
4T	T	40	1.0	0.970	61.9	LOS E	12.2	307.8	1.00	1.43	14.0
4R	R	282	1.0	0.176	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		714	1.0	0.969	43.8	LOS E	12.2	307.8	0.60	1.04	16.6
West: Hwy. 2											
5L	L	380	1.0	0.544	15.2	LOS B	4.6	115.6	0.76	0.98	25.5
2T	T	1994	1.0	1.056	45.9	LOS D	42.8	1079.7	1.00	2.15	15.7
2R	R	240	1.0	0.149	6.1	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.50	34.0
Approach		2613	1.0	1.057	37.8	LOS D	42.8	1079.7	0.87	1.83	17.7
All Vehicles		5977	1.0	1.057	33.8	LOS C	42.8	1079.7	0.85	1.54	18.4

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

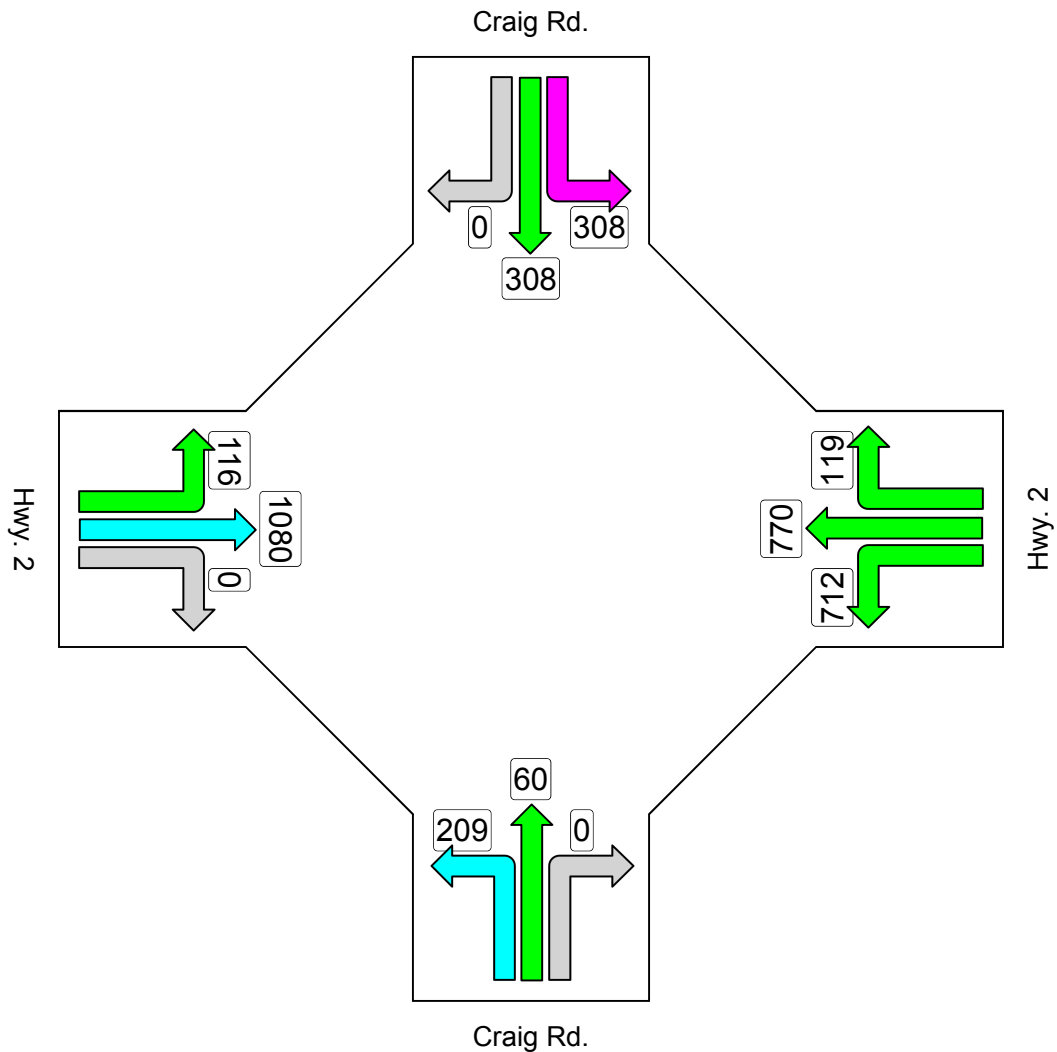
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT3 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 - 0.7] [0.7 - 0.8] [0.8 - 0.9] [0.9 - 1.0] [> 1.0] Continuous

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	4128 veh/h	4964 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	0.836	
Practical Spare Capacity	1.6 %	
Effective Intersection Capacity	4937 veh/h	
Control Delay (Total)	6.16 veh-h/h	7.39 pers-h/h
Control Delay (Average)	5.4 sec	5.4 sec
Control Delay (Worst Lane)	17.8 sec	
Control Delay (Worst Movement)	17.1 sec	17.1 sec
Geometric Delay (Average)	3.5 sec	
Stop-Line Delay (Average)	1.9 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	13.6 veh	
95% Back of Queue - Distance (Worst Lane)	341.6 ft	
Total Effective Stops	2134 veh/h	2561 pers/h
Effective Stop Rate	0.52 per veh	0.52 per pers
Proportion Queued	0.67	0.67
Performance Index	75.9	75.9
Travel Distance (Total)	1461.9 veh-mi/h	1754.3 pers-mi/h
Travel Distance (Average)	1870 ft	1866 ft
Travel Time (Total)	51.2 veh-h/h	61.4 pers-h/h
Travel Time (Average)	44.6 sec	44.6 sec
Travel Speed	28.6 mph	28.6 mph
Cost (Total)	816.25 \$/h	816.25 \$/h
Fuel Consumption (Total)	61.5 gal/h	
Carbon Dioxide (Total)	582.0 kg/h	
Hydrocarbons (Total)	0.946 kg/h	
Carbon Monoxide (Total)	39.25 kg/h	
NOx (Total)	1.257 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,981,565 veh/y	2,382,678 pers/y
Delay	2,957 veh-h/y	3,549 pers-h/y
Effective Stops	1,024,415 veh/y	1,229,298 pers/y
Travel Distance	701,718 veh-mi/y	842,062 pers-mi/y
Travel Time	24,572 veh-h/y	29,486 pers-h/y
Cost	391,801 \$/y	391,801 \$/y
Fuel Consumption	29,510 gal/y	
Carbon Dioxide	279,379 kg/y	
Hydrocarbons	454 kg/y	
Carbon Monoxide	18,841 kg/y	
NOx	603 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1705	1.0	0.703	3.8	LOS A	8.3	210.4	0.59	0.42	29.2
6R	R	78	1.0	0.049	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1784	1.0	0.703	3.8	LOS A	8.3	210.4	0.57	0.42	29.3
North: Middle Dwy.											
7L	L	147	1.0	0.191	17.1	LOS B	1.1	27.8	0.80	0.93	24.7
4R	R	5	1.0	0.003	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		152	1.0	0.191	16.6	LOS B	1.1	27.8	0.77	0.92	24.9
West: Hwy. 2											
5L	L	140	1.0	0.209	11.6	LOS B	1.1	28.0	0.37	0.68	27.0
2T	T	2052	1.0	0.836	5.5	LOS A	13.6	341.6	0.78	0.56	28.5
Approach		2192	1.0	0.836	5.9	LOS B	13.6	341.6	0.75	0.57	28.4
All Vehicles		4128	1.0	0.836	5.4	LOS A	13.6	341.6	0.67	0.52	28.6

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

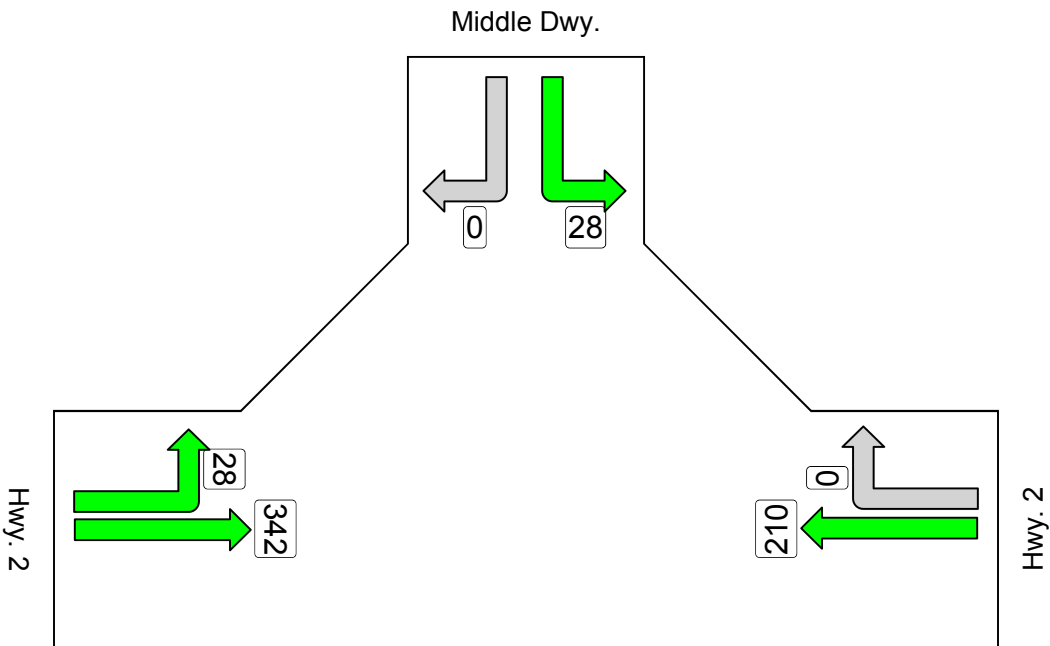
⁹ Continuous movement

QUEUE DISTANCE

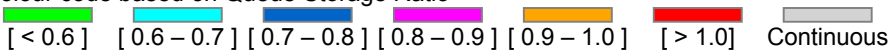
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio



INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	6177 veh/h	7423 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.702	
Practical Spare Capacity	-50.0 %	
Effective Intersection Capacity	3632 veh/h	
Control Delay (Total)	188.68 veh-h/h	226.41 pers-h/h
Control Delay (Average)	110.0 sec	109.8 sec
Control Delay (Worst Lane)	343.4 sec	
Control Delay (Worst Movement)	342.2 sec	342.2 sec
Geometric Delay (Average)	5.0 sec	
Stop-Line Delay (Average)	105.0 sec	
Level of Service (Aver. Int. Delay)	LOS F	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	85.5 veh	
95% Back of Queue - Distance (Worst Lane)	2154.9 ft	
Total Effective Stops	15381 veh/h	18457 pers/h
Effective Stop Rate	2.49 per veh	2.49 per pers
Proportion Queued	0.84	0.83
Performance Index	493.0	493.0
Travel Distance (Total)	2245.7 veh-mi/h	2694.9 pers-mi/h
Travel Distance (Average)	1920 ft	1917 ft
Travel Time (Total)	253.1 veh-h/h	303.7 pers-h/h
Travel Time (Average)	147.5 sec	147.3 sec
Travel Speed	8.9 mph	8.9 mph
Cost (Total)	3358.81 \$/h	3358.81 \$/h
Fuel Consumption (Total)	178.6 gal/h	
Carbon Dioxide (Total)	1690.4 kg/h	
Hydrocarbons (Total)	3.287 kg/h	
Carbon Monoxide (Total)	106.25 kg/h	
NOx (Total)	3.027 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,965,044 veh/y	3,562,852 pers/y
Delay	90,565 veh-h/y	108,678 pers-h/y
Effective Stops	7,382,769 veh/y	8,859,322 pers/y
Travel Distance	1,077,954 veh-mi/y	1,293,545 pers-mi/y
Travel Time	121,481 veh-h/y	145,778 pers-h/y
Cost	1,612,226 \$/y	1,612,226 \$/y
Fuel Consumption	85,706 gal/y	
Carbon Dioxide	811,401 kg/y	
Hydrocarbons	1,578 kg/y	
Carbon Monoxide	50,999 kg/y	
NOx	1,453 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1749	1.0	1.088	62.4	LOS E	47.7	1202.8	1.00	2.27	12.4
6R	R	711	1.0	0.443	4.4	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		2460	1.0	1.088	45.6	LOS E	47.7	1202.8	0.71	1.73	15.2
North: Middle Dwy.											
7L	L	1051	1.0	1.701	342.2	LOS F	85.5	2154.9	1.00	3.80	3.7
4R	R	228	1.0	0.142	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		1279	1.0	1.702	281.9	LOS F	85.5	2154.9	0.82	3.19	4.4
West: Hwy. 2											
5L	L	478	1.0	0.750	17.2	LOS B	7.1	178.8	0.84	1.07	24.6
2T	T	1960	1.0	1.199	101.1	LOS F	66.7	1680.7	1.00	3.33	9.5
Approach		2438	1.0	1.198	84.6	LOS F	66.7	1680.7	0.97	2.88	10.9
All Vehicles		6177	1.0	1.702	110.0	LOS F	85.5	2154.9	0.84	2.49	8.9

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

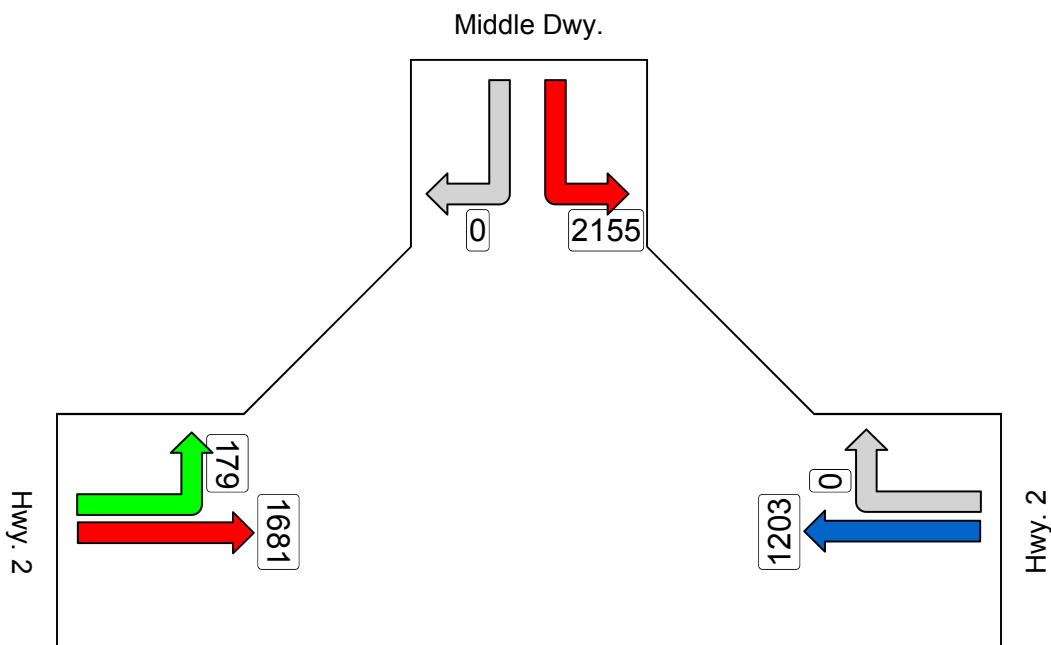
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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Project: P:\S\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Hwy.2-Middle Dwy\2032 Alt1-Buildout-Middle.sip

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	5504 veh/h	6615 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.370	
Practical Spare Capacity	-37.9 %	
Effective Intersection Capacity	4019 veh/h	
Control Delay (Total)	100.57 veh-h/h	120.68 pers-h/h
Control Delay (Average)	65.8 sec	65.7 sec
Control Delay (Worst Lane)	200.9 sec	
Control Delay (Worst Movement)	199.0 sec	199.0 sec
Geometric Delay (Average)	4.6 sec	
Stop-Line Delay (Average)	61.2 sec	
Level of Service (Aver. Int. Delay)	LOS E	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	59.7 veh	
95% Back of Queue - Distance (Worst Lane)	1503.6 ft	
Total Effective Stops	10973 veh/h	13168 pers/h
Effective Stop Rate	1.99 per veh	1.99 per pers
Proportion Queued	0.87	0.87
Performance Index	318.7	318.7
Travel Distance (Total)	1988.4 veh-mi/h	2386.1 pers-mi/h
Travel Distance (Average)	1907 ft	1905 ft
Travel Time (Total)	157.6 veh-h/h	189.2 pers-h/h
Travel Time (Average)	103.1 sec	102.9 sec
Travel Speed	12.6 mph	12.6 mph
Cost (Total)	2200.90 \$/h	2200.90 \$/h
Fuel Consumption (Total)	130.3 gal/h	
Carbon Dioxide (Total)	1233.4 kg/h	
Hydrocarbons (Total)	2.301 kg/h	
Carbon Monoxide (Total)	84.09 kg/h	
NOx (Total)	2.416 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,642,087 veh/y	3,175,305 pers/y
Delay	48,273 veh-h/y	57,928 pers-h/y
Effective Stops	5,267,057 veh/y	6,320,469 pers/y
Travel Distance	954,453 veh-mi/y	1,145,343 pers-mi/y
Travel Time	75,663 veh-h/y	90,795 pers-h/y
Cost	1,056,434 \$/y	1,056,434 \$/y
Fuel Consumption	62,534 gal/y	
Carbon Dioxide	592,022 kg/y	
Hydrocarbons	1,104 kg/y	
Carbon Monoxide	40,362 kg/y	
NOx	1,159 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1742	1.0	0.948	20.9	LOS C	26.0	654.5	1.00	1.34	21.6
6R	R	488	1.0	0.304	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		2230	1.0	0.948	17.2	LOS C	26.0	654.5	0.78	1.13	23.3
North: Middle Dwy.											
7L	L	759	1.0	1.369	199.0	LOS F	46.4	1169.4	1.00	2.75	6.0
4R	R	157	1.0	0.098	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		915	1.0	1.370	165.7	LOS F	46.4	1169.4	0.83	2.35	6.8
West: Hwy. 2											
5L	L	371	1.0	0.629	15.9	LOS B	4.9	124.2	0.76	0.99	25.2
2T	T	1988	1.0	1.159	83.5	LOS F	59.7	1503.6	1.00	2.98	10.9
Approach		2359	1.0	1.158	72.9	LOS F	59.7	1503.6	0.96	2.67	12.0
All Vehicles		5504	1.0	1.370	65.8	LOS E	59.7	1503.6	0.87	1.99	12.6

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

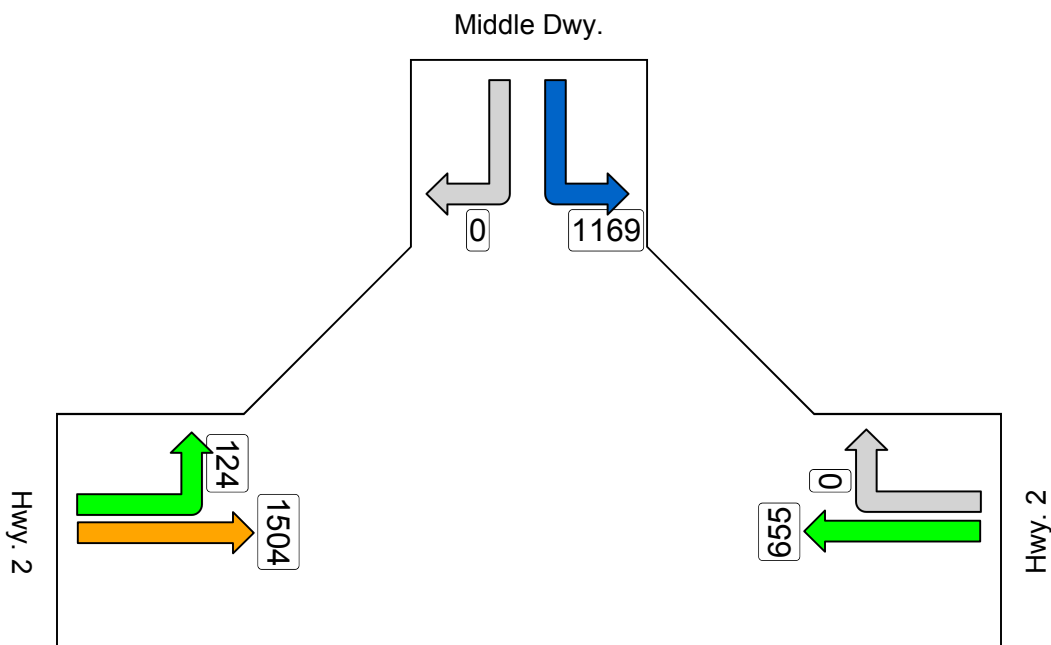
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA INTERSECTION 5.0.5.1510

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	5210 veh/h	6262 pers/h
Percent Heavy Vehicles	1.0 %	
Degree of Saturation	1.177	
Practical Spare Capacity	-27.7 %	
Effective Intersection Capacity	4430 veh/h	
Control Delay (Total)	77.38 veh-h/h	92.85 pers-h/h
Control Delay (Average)	53.5 sec	53.4 sec
Control Delay (Worst Lane)	121.4 sec	
Control Delay (Worst Movement)	119.2 sec	119.2 sec
Geometric Delay (Average)	4.4 sec	
Stop-Line Delay (Average)	49.0 sec	
Level of Service (Aver. Int. Delay)	LOS D	
Level of Service (Worst Movement)	LOS F	
Level of Service (Worst Lane)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	60.8 veh	
95% Back of Queue - Distance (Worst Lane)	1531.9 ft	
Total Effective Stops	9804 veh/h	11765 pers/h
Effective Stop Rate	1.88 per veh	1.88 per pers
Proportion Queued	0.88	0.88
Performance Index	267.7	267.7
Travel Distance (Total)	1876.8 veh-mi/h	2252.1 pers-mi/h
Travel Distance (Average)	1902 ft	1899 ft
Travel Time (Total)	131.2 veh-h/h	157.5 pers-h/h
Travel Time (Average)	90.7 sec	90.5 sec
Travel Speed	14.3 mph	14.3 mph
Cost (Total)	1875.51 \$/h	1875.51 \$/h
Fuel Consumption (Total)	115.9 gal/h	
Carbon Dioxide (Total)	1097.1 kg/h	
Hydrocarbons (Total)	2.016 kg/h	
Carbon Monoxide (Total)	77.20 kg/h	
NOx (Total)	2.219 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2,500,696 veh/y	3,005,635 pers/y
Delay	37,142 veh-h/y	44,570 pers-h/y
Effective Stops	4,706,073 veh/y	5,647,287 pers/y
Travel Distance	900,853 veh-mi/y	1,081,023 pers-mi/y
Travel Time	62,999 veh-h/y	75,599 pers-h/y
Cost	900,246 \$/y	900,246 \$/y
Fuel Consumption	55,623 gal/y	
Carbon Dioxide	526,598 kg/y	
Hydrocarbons	968 kg/y	
Carbon Monoxide	37,055 kg/y	
NOx	1,065 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1727	1.0	0.882	12.6	LOS B	19.1	481.5	1.00	1.07	25.3
6R	R	392	1.0	0.245	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		2120	1.0	0.882	11.1	LOS B	19.1	481.5	0.81	0.95	26.3
North: Middle Dwy.											
7L	L	660	1.0	1.176	119.2	LOS F	28.6	719.7	1.00	2.13	8.9
4R	R	128	1.0	0.080	4.3	NA ⁹	NA ⁹	NA ⁹	NA ⁹	0.41	31.4
Approach		788	1.0	1.177	100.5	LOS F	28.6	719.7	0.84	1.85	10.0
West: Hwy. 2											
5L	L	314	1.0	0.587	16.0	LOS B	4.2	106.5	0.74	0.98	25.1
2T	T	1988	1.0	1.164	85.9	LOS F	60.8	1531.9	1.00	3.03	10.6
Approach		2302	1.0	1.164	76.4	LOS F	60.8	1531.9	0.96	2.75	11.6
All Vehicles		5210	1.0	1.177	53.5	LOS D	60.8	1531.9	0.88	1.88	14.3

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

⁹ Continuous movement

QUEUE DISTANCE

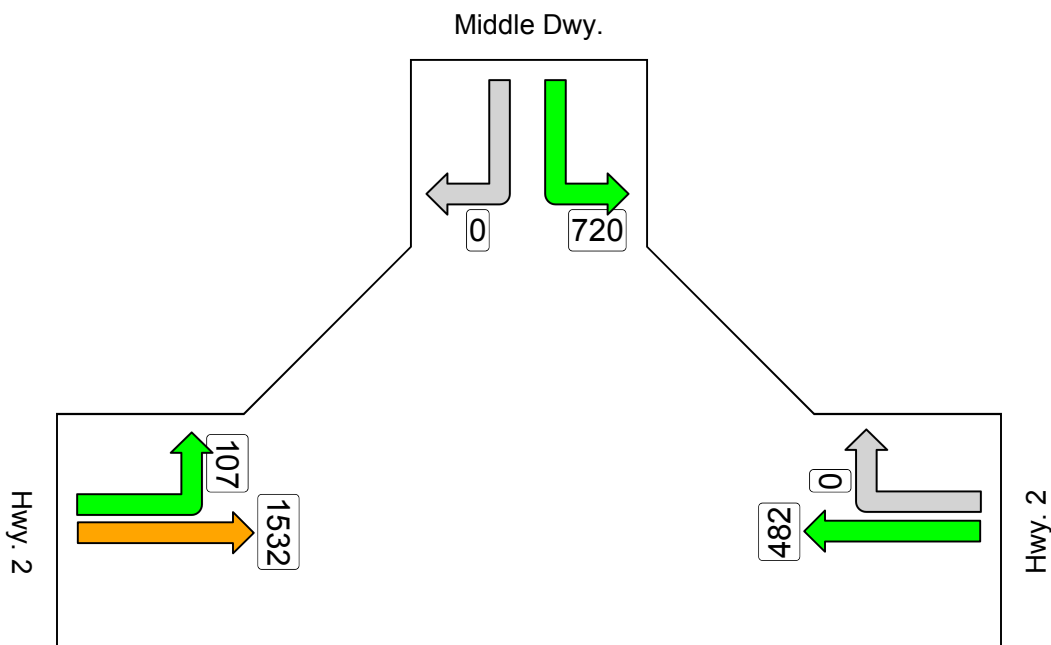
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

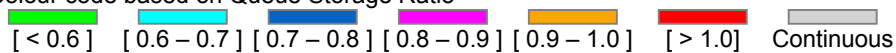
Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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SIDRA INTERSECTION 5.0.5.1510

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INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1387 veh/h	1674 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.556	
Practical Spare Capacity	53.0 %	
Effective Intersection Capacity	2496 veh/h	
Control Delay (Total)	2.73 veh-h/h	3.27 pers-h/h
Control Delay (Average)	7.1 sec	7.0 sec
Control Delay (Worst Lane)	10.8 sec	
Control Delay (Worst Movement)	15.7 sec	15.7 sec
Geometric Delay (Average)	4.4 sec	
Stop-Line Delay (Average)	2.7 sec	
Level of Service (Aver. Int. Delay)	LOS A	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	5.2 veh	
95% Back of Queue - Distance (Worst Lane)	130.2 ft	
Total Effective Stops	851 veh/h	1021 pers/h
Effective Stop Rate	0.61 per veh	0.61 per pers
Proportion Queued	0.56	0.56
Performance Index	25.9	25.9
Travel Distance (Total)	501.9 veh-mi/h	602.3 pers-mi/h
Travel Distance (Average)	1911 ft	1900 ft
Travel Time (Total)	17.2 veh-h/h	20.7 pers-h/h
Travel Time (Average)	44.7 sec	44.4 sec
Travel Speed	29.2 mph	29.2 mph
Cost (Total)	280.22 \$/h	280.22 \$/h
Fuel Consumption (Total)	21.7 gal/h	
Carbon Dioxide (Total)	205.0 kg/h	
Hydrocarbons (Total)	0.332 kg/h	
Carbon Monoxide (Total)	14.22 kg/h	
NOx (Total)	0.456 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	665,600 veh/y	803,520 pers/y
Delay	1,309 veh-h/y	1,571 pers-h/y
Effective Stops	408,505 veh/y	490,205 pers/y
Travel Distance	240,933 veh-mi/y	289,119 pers-mi/y
Travel Time	8,265 veh-h/y	9,918 pers-h/y
Cost	134,506 \$/y	134,506 \$/y
Fuel Consumption	10,395 gal/y	
Carbon Dioxide	98,419 kg/y	
Hydrocarbons	159 kg/y	
Carbon Monoxide	6,827 kg/y	
NOx	219 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	7	2.0	0.123	15.6	LOS B	0.7	18.4	0.58	0.90	28.9
8T	T	68	2.0	0.123	8.3	LOS A	0.7	18.4	0.58	0.67	31.7
8R	R	7	2.0	0.123	9.4	LOS A	0.7	18.4	0.58	0.72	31.6
Approach		81	2.0	0.124	9.0	LOS B	0.7	18.4	0.58	0.69	31.4
East: SR 902											
1L	L	19	1.0	0.429	13.5	LOS B	3.4	85.1	0.43	0.84	29.9
6T	T	384	1.0	0.432	3.6	LOS A	3.4	85.1	0.43	0.39	29.9
6R	R	33	1.0	0.433	5.7	LOS A	3.4	85.1	0.43	0.54	29.7
Approach		437	1.0	0.432	4.2	LOS B	3.4	85.1	0.43	0.42	29.9
North: Craig Rd.											
7L	L	61	1.0	0.556	15.7	LOS B	5.2	130.2	0.74	0.97	25.8
4T	T	111	1.0	0.556	10.4	LOS B	5.2	130.2	0.74	0.84	30.3
4R	R	229	1.0	0.556	9.8	LOS A	5.2	130.2	0.74	0.85	27.8
Approach		401	1.0	0.556	10.8	LOS B	5.2	130.2	0.74	0.86	28.1
West: SR 902											
5L	L	71	1.0	0.547	12.1	LOS B	4.2	107.0	0.53	0.85	27.6
2T	T	384	1.0	0.547	5.1	LOS A	4.2	107.0	0.53	0.51	29.4
2R	R	12	1.0	0.556	7.7	LOS A	4.2	107.0	0.53	0.64	31.7
Approach		468	1.0	0.547	6.2	LOS B	4.2	107.0	0.53	0.56	29.1
All Vehicles		1387	1.1	0.556	7.1	LOS A	5.2	130.2	0.56	0.61	29.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

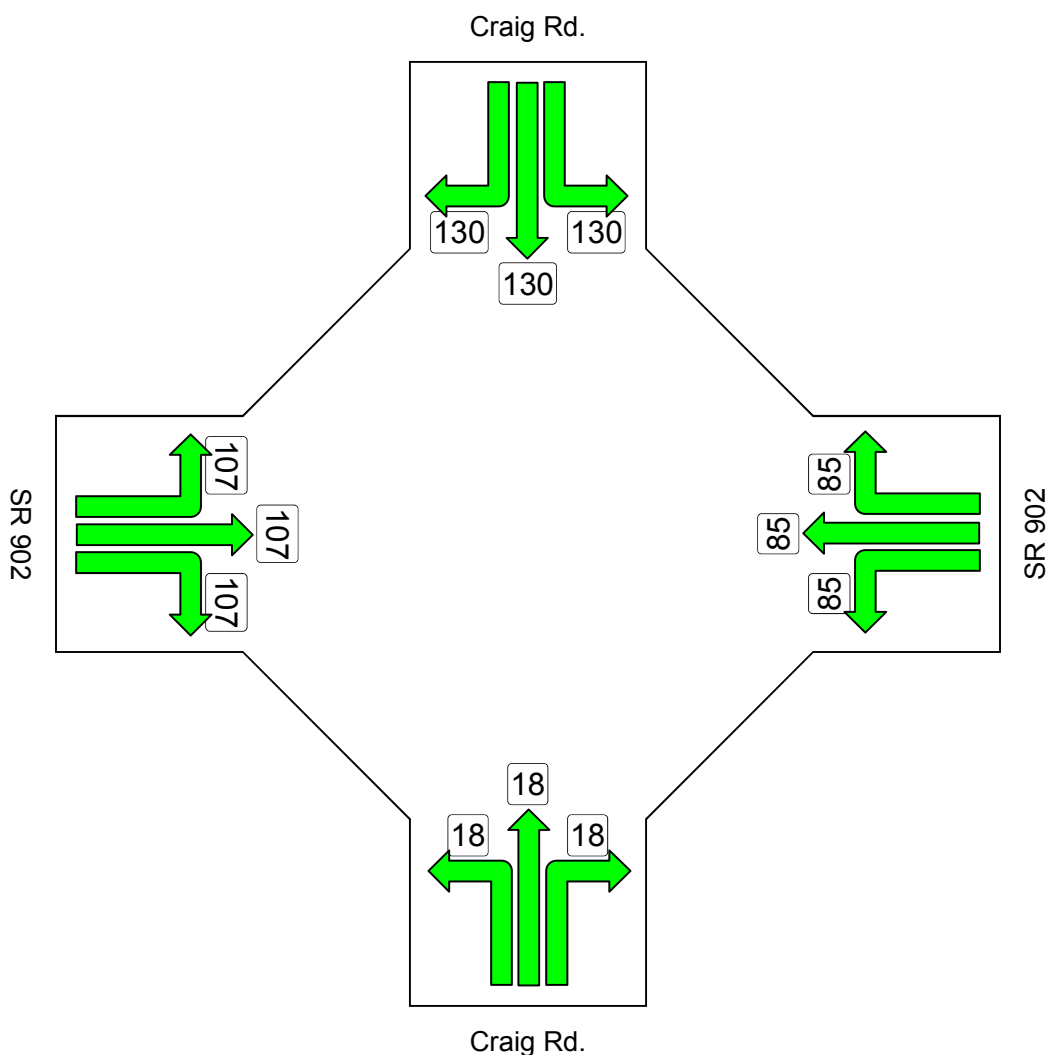
Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2032 Base PM PEAK)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio

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Processed: Thursday, February 10, 2011 11:28:24 AM
SIDRA INTERSECTION 5.0.5.1510
Project: P:\S\SPTR00000001\0600\INFO\Traffic\February-2011-TIA\Sidra\SR902-Craig Rd\2032 Base-SR902.sip
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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1782 veh/h	2149 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.912	
Practical Spare Capacity	-6.9 %	
Effective Intersection Capacity	1951 veh/h	
Control Delay (Total)	7.95 veh-h/h	9.54 pers-h/h
Control Delay (Average)	16.1 sec	16.0 sec
Control Delay (Worst Lane)	25.0 sec	
Control Delay (Worst Movement)	29.1 sec	29.1 sec
Geometric Delay (Average)	5.0 sec	
Stop-Line Delay (Average)	11.1 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS C	
95% Back of Queue - Vehicles (Worst Lane)	19.7 veh	
95% Back of Queue - Distance (Worst Lane)	495.8 ft	
Total Effective Stops	1880 veh/h	2255 pers/h
Effective Stop Rate	1.05 per veh	1.05 per pers
Proportion Queued	0.87	0.86
Performance Index	49.5	49.5
Travel Distance (Total)	654.6 veh-mi/h	785.5 pers-mi/h
Travel Distance (Average)	1939 ft	1930 ft
Travel Time (Total)	26.3 veh-h/h	31.5 pers-h/h
Travel Time (Average)	53.1 sec	52.8 sec
Travel Speed	24.9 mph	24.9 mph
Cost (Total)	424.09 \$/h	424.09 \$/h
Fuel Consumption (Total)	32.2 gal/h	
Carbon Dioxide (Total)	304.8 kg/h	
Hydrocarbons (Total)	0.516 kg/h	
Carbon Monoxide (Total)	23.07 kg/h	
NOx (Total)	0.698 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	855,467 veh/y	1,031,360 pers/y
Delay	3,815 veh-h/y	4,578 pers-h/y
Effective Stops	902,181 veh/y	1,082,617 pers/y
Travel Distance	314,209 veh-mi/y	377,051 pers-mi/y
Travel Time	12,611 veh-h/y	15,134 pers-h/y
Cost	203,565 \$/y	203,565 \$/y
Fuel Consumption	15,455 gal/y	
Carbon Dioxide	146,320 kg/y	
Hydrocarbons	248 kg/y	
Carbon Monoxide	11,076 kg/y	
NOx	335 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	7	2.0	0.333	17.6	LOS B	2.4	60.2	0.76	1.00	28.0
8T	T	168	2.0	0.340	10.4	LOS B	2.4	60.2	0.76	0.86	30.7
8R	R	7	2.0	0.333	11.4	LOS B	2.4	60.2	0.76	0.89	30.5
Approach		181	2.0	0.340	10.7	LOS B	2.4	60.2	0.76	0.86	30.6
East: SR 902											
1L	L	19	1.0	0.525	15.3	LOS B	4.5	114.3	0.64	0.89	29.1
6T	T	384	1.0	0.526	5.3	LOS A	4.5	114.3	0.64	0.60	28.8
6R	R	33	1.0	0.529	7.5	LOS A	4.5	114.3	0.64	0.71	28.9
Approach		437	1.0	0.526	5.9	LOS B	4.5	114.3	0.64	0.62	28.8
North: Craig Rd.											
7L	L	183	1.0	0.912	29.1	LOS C	19.7	495.8	1.00	1.35	20.9
4T	T	216	1.0	0.913	23.7	LOS C	19.7	495.8	1.00	1.31	23.2
4R	R	263	1.0	0.911	23.2	LOS C	19.7	495.8	1.00	1.35	21.6
Approach		662	1.0	0.912	25.0	LOS C	19.7	495.8	1.00	1.34	21.9
West: SR 902											
5L	L	106	1.0	0.806	20.5	LOS C	10.6	267.6	0.93	1.16	24.0
2T	T	384	1.0	0.804	13.5	LOS B	10.6	267.6	0.93	1.12	25.5
2R	R	12	1.0	0.815	16.1	LOS B	10.6	267.6	0.93	1.11	27.4
Approach		502	1.0	0.805	15.0	LOS C	10.6	267.6	0.93	1.13	25.2
All Vehicles		1782	1.1	0.912	16.1	LOS B	19.7	495.8	0.87	1.05	24.9

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

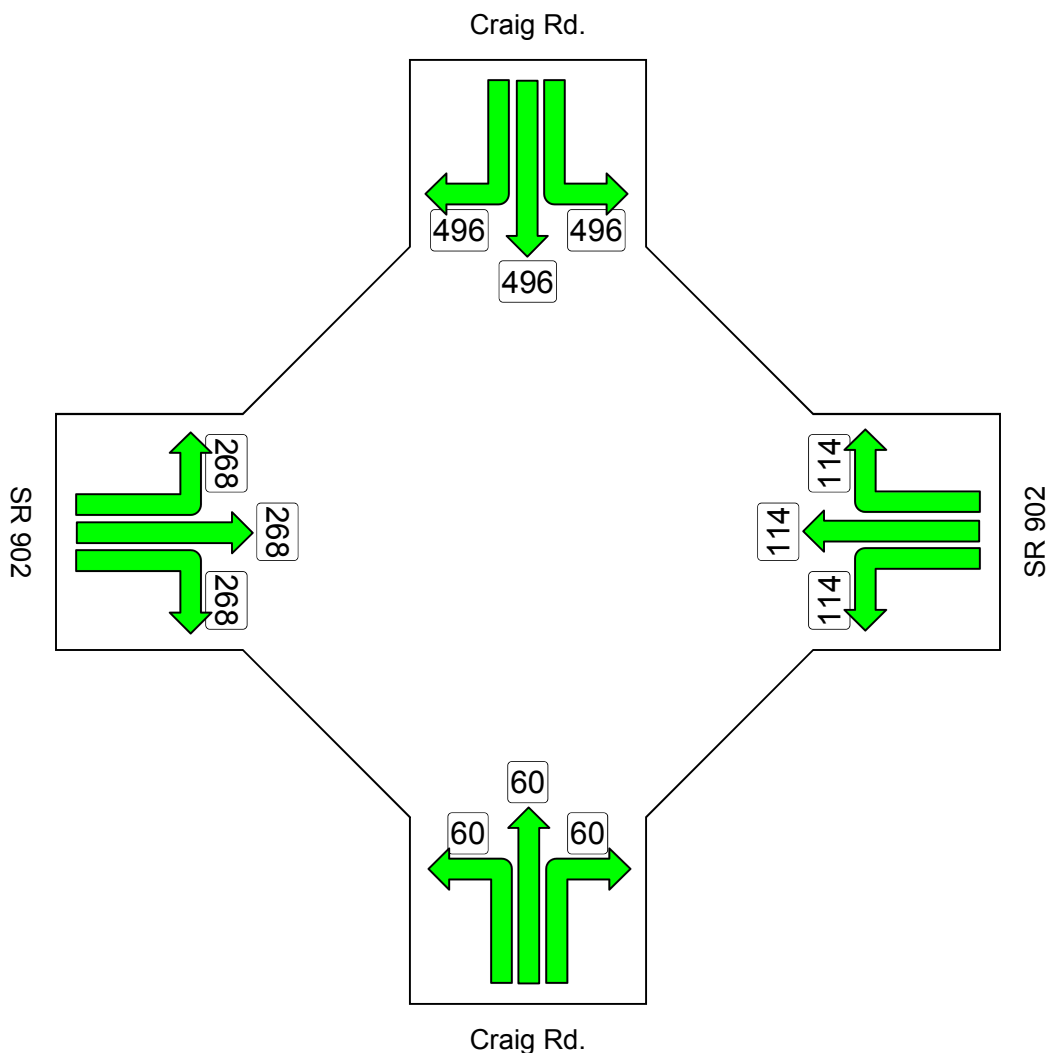
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 1 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

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Project: P:\S\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\SR902-Craig Rd\2032 Alt1-Buildout-SR902.sip

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1736 veh/h	2093 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.807	
Practical Spare Capacity	5.3 %	
Effective Intersection Capacity	2151 veh/h	
Control Delay (Total)	5.58 veh-h/h	6.70 pers-h/h
Control Delay (Average)	11.6 sec	11.5 sec
Control Delay (Worst Lane)	17.4 sec	
Control Delay (Worst Movement)	21.7 sec	21.7 sec
Geometric Delay (Average)	4.8 sec	
Stop-Line Delay (Average)	6.8 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	12.6 veh	
95% Back of Queue - Distance (Worst Lane)	317.7 ft	
Total Effective Stops	1555 veh/h	1866 pers/h
Effective Stop Rate	0.90 per veh	0.89 per pers
Proportion Queued	0.80	0.80
Performance Index	41.3	41.3
Travel Distance (Total)	634.7 veh-mi/h	761.7 pers-mi/h
Travel Distance (Average)	1931 ft	1922 ft
Travel Time (Total)	23.5 veh-h/h	28.2 pers-h/h
Travel Time (Average)	48.7 sec	48.5 sec
Travel Speed	27.0 mph	27.0 mph
Cost (Total)	384.06 \$/h	384.06 \$/h
Fuel Consumption (Total)	29.8 gal/h	
Carbon Dioxide (Total)	281.8 kg/h	
Hydrocarbons (Total)	0.469 kg/h	
Carbon Monoxide (Total)	21.01 kg/h	
NOx (Total)	0.645 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	833,067 veh/y	1,004,480 pers/y
Delay	2,679 veh-h/y	3,214 pers-h/y
Effective Stops	746,544 veh/y	895,853 pers/y
Travel Distance	304,675 veh-mi/y	365,610 pers-mi/y
Travel Time	11,273 veh-h/y	13,528 pers-h/y
Cost	184,348 \$/y	184,348 \$/y
Fuel Consumption	14,287 gal/y	
Carbon Dioxide	135,260 kg/y	
Hydrocarbons	225 kg/y	
Carbon Monoxide	10,087 kg/y	
NOx	310 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	7	2.0	0.256	16.9	LOS B	1.7	43.8	0.70	0.96	28.3
8T	T	136	2.0	0.260	9.6	LOS A	1.7	43.8	0.70	0.80	31.1
8R	R	7	2.0	0.256	10.7	LOS B	1.7	43.8	0.70	0.83	30.9
Approach		149	2.0	0.260	10.0	LOS B	1.7	43.8	0.70	0.80	31.0
East: SR 902											
1L	L	19	1.0	0.572	15.0	LOS B	5.4	136.2	0.64	0.86	29.2
6T	T	384	1.0	0.576	5.1	LOS A	5.4	136.2	0.64	0.58	28.8
6R	R	113	1.0	0.575	7.2	LOS A	5.4	136.2	0.64	0.68	28.9
Approach		517	1.0	0.576	5.9	LOS B	5.4	136.2	0.64	0.61	28.8
North: Craig Rd.											
7L	L	144	1.0	0.807	21.7	LOS C	12.6	317.7	0.96	1.16	23.4
4T	T	182	1.0	0.806	16.4	LOS B	12.6	317.7	0.96	1.12	26.6
4R	R	252	1.0	0.806	15.8	LOS B	12.6	317.7	0.96	1.14	24.6
Approach		579	1.0	0.807	17.4	LOS C	12.6	317.7	0.96	1.14	24.8
West: SR 902											
5L	L	94	1.0	0.715	16.7	LOS B	8.0	202.9	0.81	1.04	25.6
2T	T	384	1.0	0.716	9.7	LOS A	8.0	202.9	0.81	0.92	27.5
2R	R	12	1.0	0.719	12.3	LOS B	8.0	202.9	0.81	0.95	29.7
Approach		491	1.0	0.716	11.1	LOS B	8.0	202.9	0.81	0.94	27.2
All Vehicles		1736	1.1	0.807	11.6	LOS B	12.6	317.7	0.80	0.90	27.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

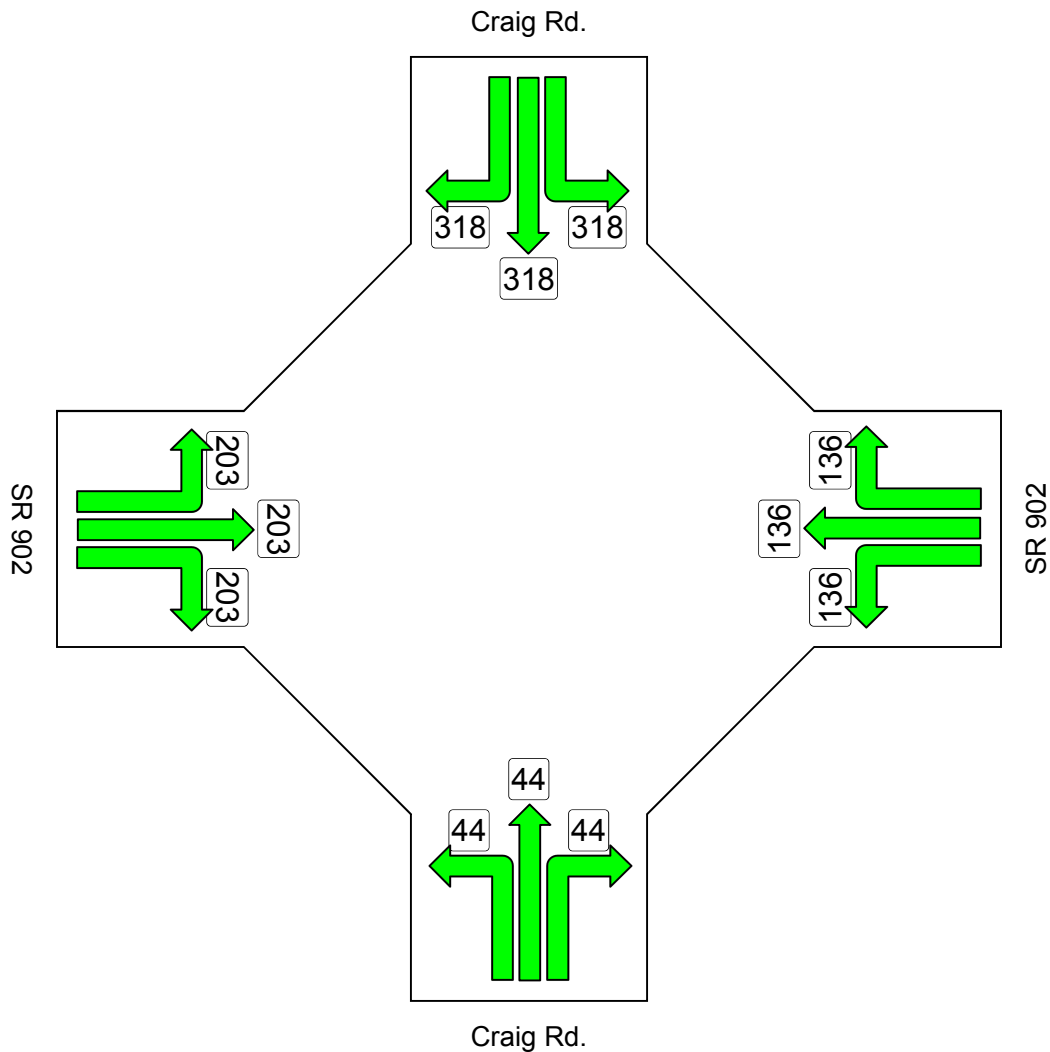
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 2 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

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SIDRA
INTERSECTION

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1636 veh/h	1973 pers/h
Percent Heavy Vehicles	1.1 %	
Degree of Saturation	0.747	
Practical Spare Capacity	13.7 %	
Effective Intersection Capacity	2188 veh/h	
Control Delay (Total)	4.58 veh-h/h	5.50 pers-h/h
Control Delay (Average)	10.1 sec	10.0 sec
Control Delay (Worst Lane)	15.2 sec	
Control Delay (Worst Movement)	19.5 sec	19.5 sec
Geometric Delay (Average)	4.7 sec	
Stop-Line Delay (Average)	5.4 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS B	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	10.1 veh	
95% Back of Queue - Distance (Worst Lane)	254.8 ft	
Total Effective Stops	1326 veh/h	1591 pers/h
Effective Stop Rate	0.81 per veh	0.81 per pers
Proportion Queued	0.73	0.73
Performance Index	36.2	36.2
Travel Distance (Total)	596.8 veh-mi/h	716.1 pers-mi/h
Travel Distance (Average)	1927 ft	1917 ft
Travel Time (Total)	21.5 veh-h/h	25.8 pers-h/h
Travel Time (Average)	47.3 sec	47.1 sec
Travel Speed	27.8 mph	27.8 mph
Cost (Total)	351.60 \$/h	351.60 \$/h
Fuel Consumption (Total)	27.3 gal/h	
Carbon Dioxide (Total)	258.4 kg/h	
Hydrocarbons (Total)	0.427 kg/h	
Carbon Monoxide (Total)	18.93 kg/h	
NOx (Total)	0.588 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	785,067 veh/y	946,880 pers/y
Delay	2,199 veh-h/y	2,639 pers-h/y
Effective Stops	636,437 veh/y	763,724 pers/y
Travel Distance	286,449 veh-mi/y	343,739 pers-mi/y
Travel Time	10,319 veh-h/y	12,382 pers-h/y
Cost	168,770 \$/y	168,770 \$/y
Fuel Consumption	13,102 gal/y	
Carbon Dioxide	124,043 kg/y	
Hydrocarbons	205 kg/y	
Carbon Monoxide	9,084 kg/y	
NOx	282 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	7	2.0	0.208	16.5	LOS B	1.4	34.3	0.67	0.95	28.5
8T	T	112	2.0	0.211	9.2	LOS A	1.4	34.3	0.67	0.76	31.3
8R	R	7	2.0	0.208	10.3	LOS B	1.4	34.3	0.67	0.80	31.2
Approach		126	2.0	0.211	9.7	LOS B	1.4	34.3	0.67	0.77	31.1
East: SR 902											
1L	L	19	1.0	0.525	14.2	LOS B	4.5	113.1	0.57	0.84	29.6
6T	T	384	1.0	0.525	4.3	LOS A	4.5	113.1	0.57	0.48	29.1
6R	R	87	1.0	0.525	6.5	LOS A	4.5	113.1	0.57	0.62	29.2
Approach		490	1.0	0.526	5.1	LOS B	4.5	113.1	0.57	0.52	29.2
North: Craig Rd.											
7L	L	124	1.0	0.745	19.5	LOS B	10.1	254.8	0.90	1.09	24.2
4T	T	166	1.0	0.746	14.2	LOS B	10.1	254.8	0.90	1.03	27.8
4R	R	247	1.0	0.747	13.6	LOS B	10.1	254.8	0.90	1.05	25.6
Approach		537	1.0	0.747	15.2	LOS B	10.1	254.8	0.90	1.05	25.9
West: SR 902											
5L	L	87	1.0	0.667	15.2	LOS B	6.9	173.8	0.74	0.98	26.2
2T	T	384	1.0	0.669	8.3	LOS A	6.9	173.8	0.74	0.82	28.4
2R	R	12	1.0	0.679	10.9	LOS B	6.9	173.8	0.74	0.86	30.6
Approach		483	1.0	0.669	9.6	LOS B	6.9	173.8	0.74	0.85	28.0
All Vehicles		1636	1.1	0.747	10.1	LOS B	10.1	254.8	0.73	0.81	27.8

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

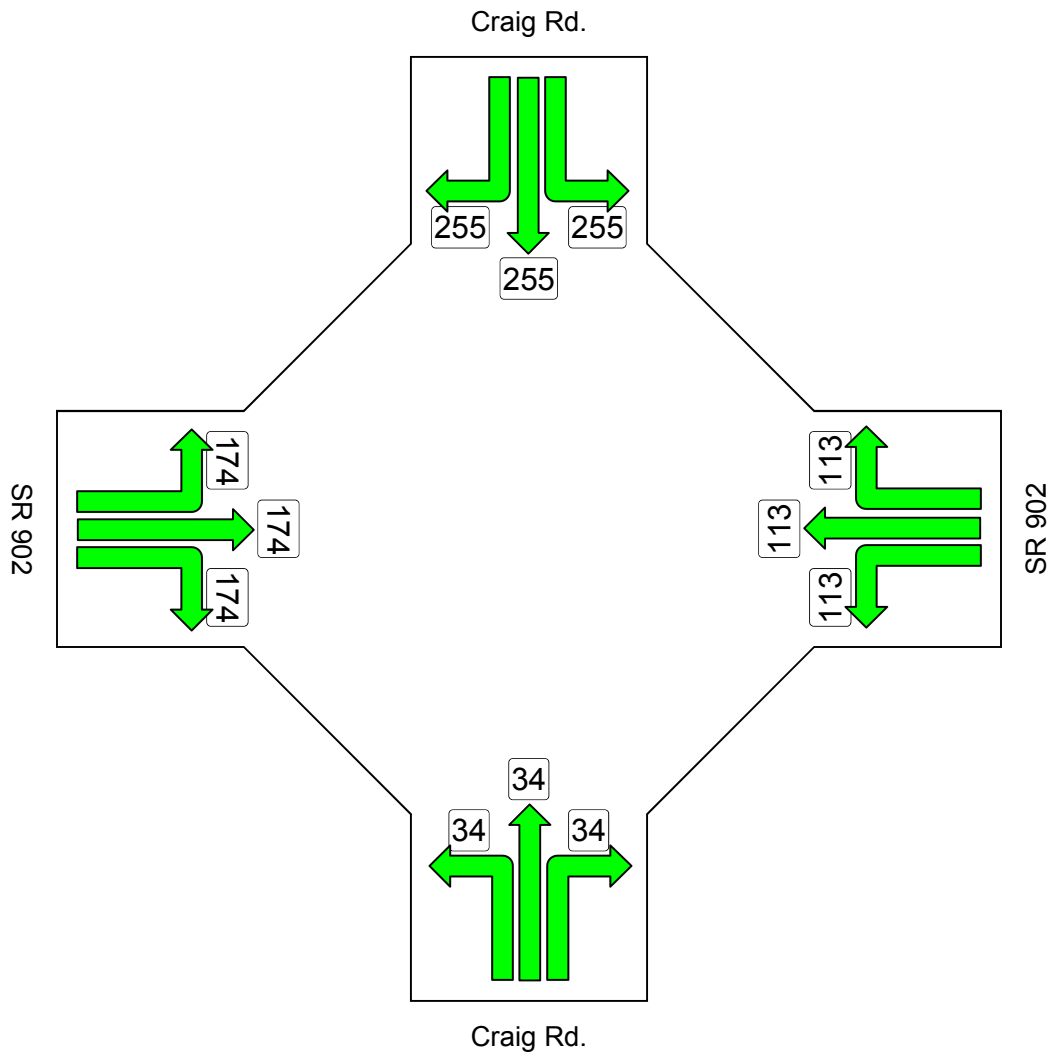
Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

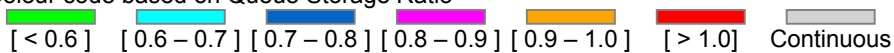
Craig Rd./Hwy. 902 (YEAR 2032 PM PEAK, Alt 3 Buildout)

West Plains Development

Roundabout



Colour code based on Queue Storage Ratio



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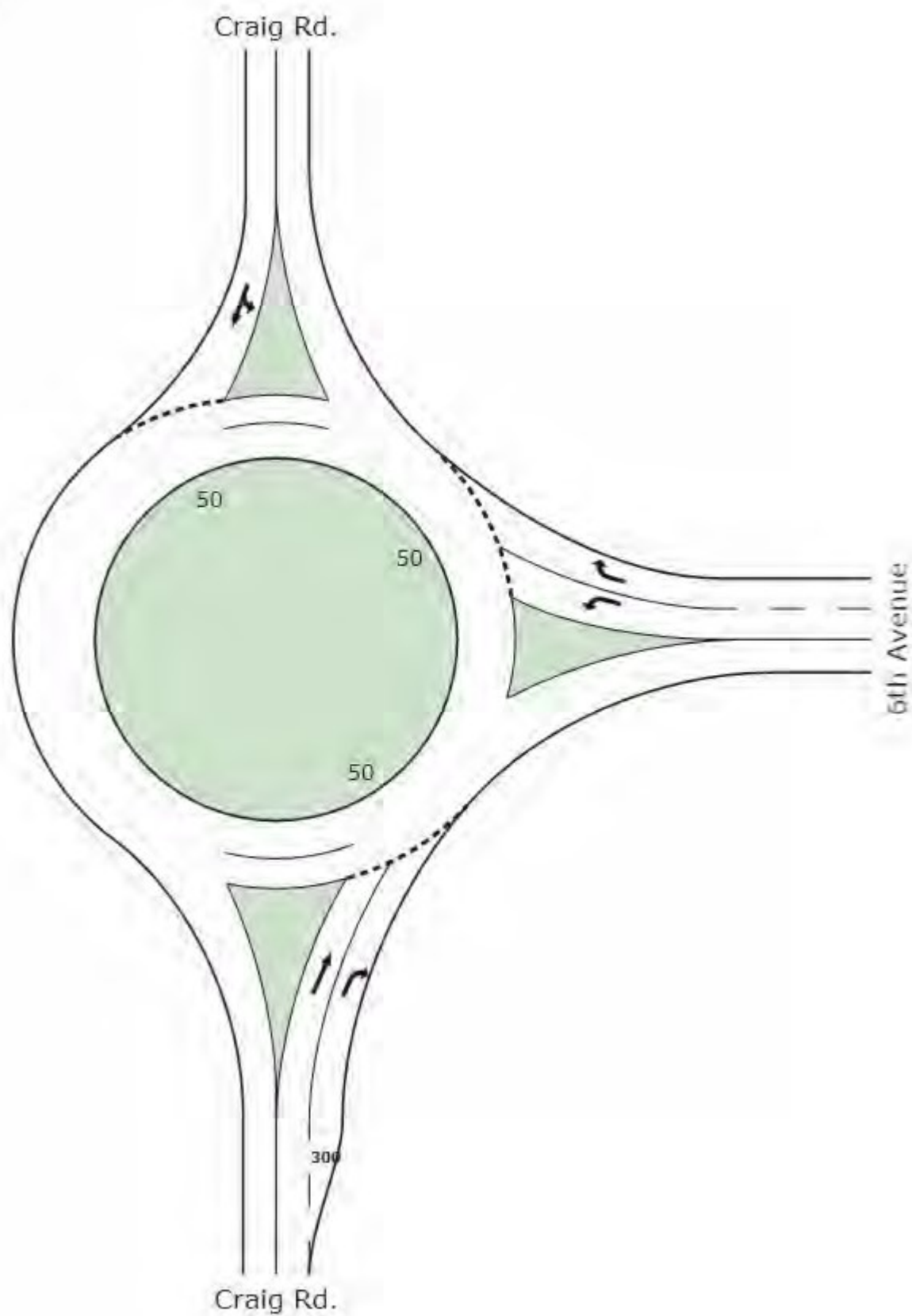
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SIDRA
INTERSECTION



INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./6th Ave. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2253 veh/h	2709 pers/h
Percent Heavy Vehicles	1.5 %	
Degree of Saturation	0.993	
Practical Spare Capacity	-14.6 %	
Effective Intersection Capacity	2263 veh/h	
Control Delay (Total)	12.80 veh-h/h	15.36 pers-h/h
Control Delay (Average)	20.5 sec	20.4 sec
Control Delay (Worst Lane)	39.9 sec	
Control Delay (Worst Movement)	42.8 sec	42.8 sec
Geometric Delay (Average)	8.0 sec	
Stop-Line Delay (Average)	12.5 sec	
Level of Service (Aver. Int. Delay)	LOS C	
Level of Service (Worst Movement)	LOS D	
Level of Service (Worst Lane)	LOS D	
95% Back of Queue - Vehicles (Worst Lane)	28.7 veh	
95% Back of Queue - Distance (Worst Lane)	723.5 ft	
Total Effective Stops	2192 veh/h	2630 pers/h
Effective Stop Rate	0.97 per veh	0.97 per pers
Proportion Queued	0.73	0.73
Performance Index	63.8	63.8
Travel Distance (Total)	855.3 veh-mi/h	1026.4 pers-mi/h
Travel Distance (Average)	2004 ft	2001 ft
Travel Time (Total)	34.9 veh-h/h	41.9 pers-h/h
Travel Time (Average)	55.8 sec	55.7 sec
Travel Speed	24.5 mph	24.5 mph
Cost (Total)	592.59 \$/h	592.59 \$/h
Fuel Consumption (Total)	47.8 gal/h	
Carbon Dioxide (Total)	452.8 kg/h	
Hydrocarbons (Total)	0.788 kg/h	
Carbon Monoxide (Total)	38.03 kg/h	
NOx (Total)	1.115 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,081,600 veh/y	1,300,320 pers/y
Delay	6,146 veh-h/y	7,375 pers-h/y
Effective Stops	1,051,988 veh/y	1,262,386 pers/y
Travel Distance	410,564 veh-mi/y	492,677 pers-mi/y
Travel Time	16,766 veh-h/y	20,120 pers-h/y
Cost	284,441 \$/y	284,441 \$/y
Fuel Consumption	22,951 gal/y	
Carbon Dioxide	217,327 kg/y	
Hydrocarbons	378 kg/y	
Carbon Monoxide	18,255 kg/y	
NOx	535 kg/y	

MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./6th Ave. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
8T	T	684	2.0	0.608	7.9	LOS A	6.7	169.2	0.53	0.58	31.1
8R	R	444	2.0	0.444	8.8	LOS A	3.8	96.6	0.44	0.62	31.0
Approach		1129	2.0	0.609	8.2	LOS A	6.7	169.2	0.50	0.60	31.1
East: 6th Avenue											
1L	L	364	1.0	0.606	22.9	LOS C	7.0	176.5	0.94	1.10	24.3
6R	R	87	1.0	0.288	18.4	LOS B	1.9	47.1	0.81	0.92	23.4
Approach		451	1.0	0.607	22.0	LOS C	7.0	176.5	0.91	1.07	24.1
North: Craig Rd.											
7L	L	124	1.0	0.996	42.8	LOS D	28.7	723.5	1.00	1.59	17.0
4T	T	549	1.0	0.993	39.2	LOS D	28.7	723.5	1.00	1.53	18.6
Approach		673	1.0	0.993	39.9	LOS D	28.7	723.5	1.00	1.54	18.2
All Vehicles		2253	1.5	0.993	20.5	LOS C	28.7	723.5	0.73	0.97	24.5

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

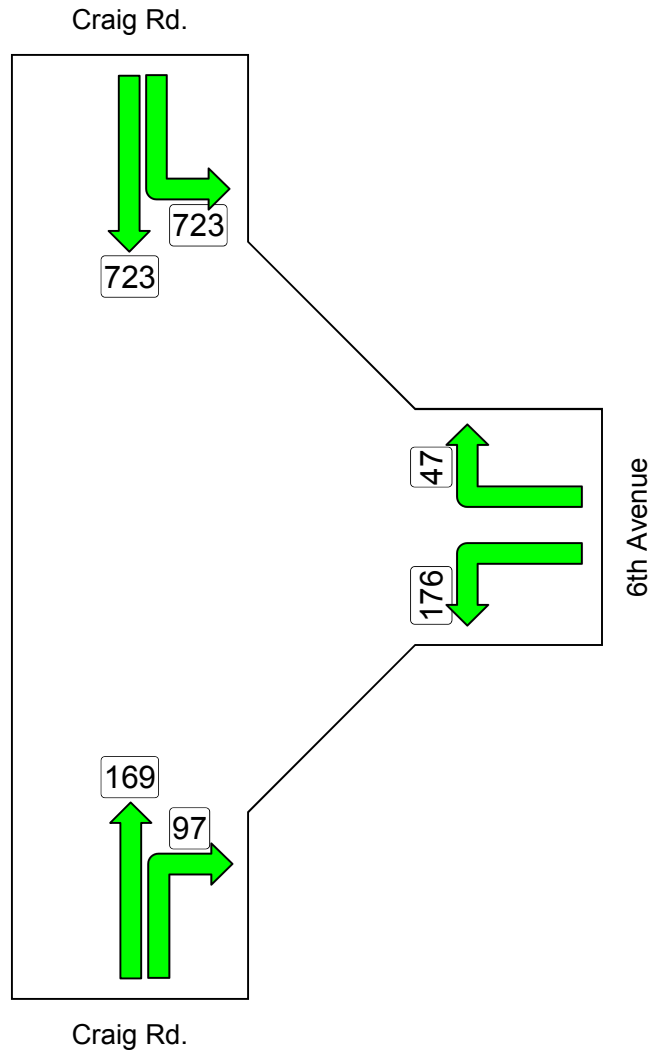
Roundabout Capacity Model: SIDRA Standard.

QUEUE DISTANCE

Site: Roundabout

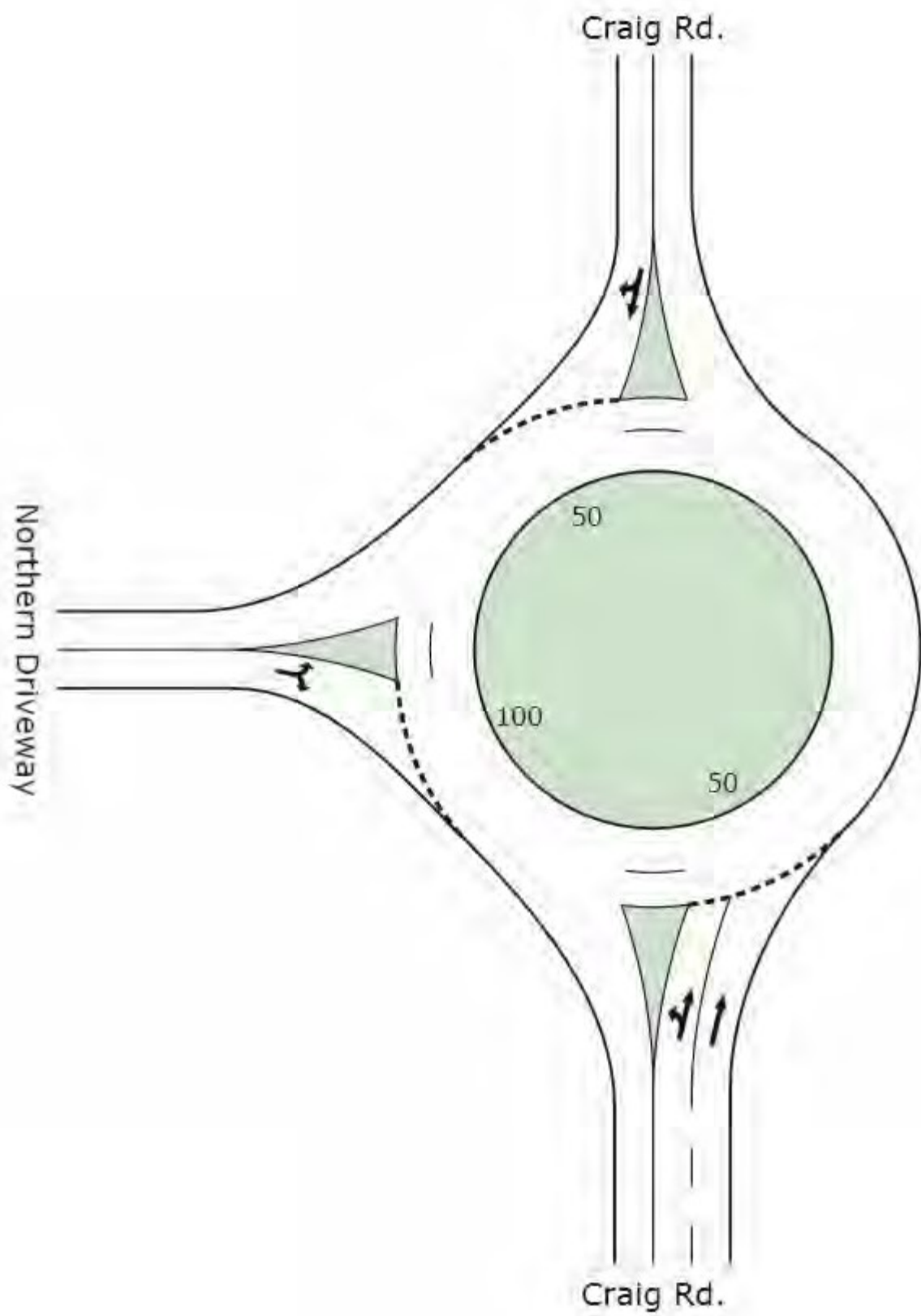
Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./6th Ave. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous



MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Dwy. North (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	40	2.0	0.856	18.7	LOS B	16.5	419.1	0.96	0.90	27.0
8T	T	896	2.0	0.853	13.2	LOS B	16.5	419.1	0.92	0.86	28.9
Approach		936	2.0	0.853	13.4	LOS B	16.5	419.1	0.92	0.87	28.8
North: Craig Rd.											
4T	T	707	1.0	0.728	6.5	LOS A	12.1	304.6	0.44	0.45	31.8
4R	R	202	2.0	0.727	8.0	LOS A	12.1	304.6	0.44	0.54	31.5
Approach		909	1.2	0.728	6.8	LOS A	12.1	304.6	0.44	0.47	31.8
West: Northern Driveway											
5L	L	226	2.0	0.514	20.6	LOS C	4.4	110.9	0.81	1.02	25.6
2R	R	51	2.0	0.516	14.7	LOS B	4.4	110.9	0.81	0.97	27.4
Approach		277	2.0	0.514	19.5	LOS C	4.4	110.9	0.81	1.01	25.9
All Vehicles		2122	1.7	0.853	11.4	LOS B	16.5	419.1	0.70	0.71	29.5

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (HCM).

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

INTERSECTION SUMMARY

Site: Roundabout

Craig Rd./Dwy. North (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	2122 veh/h	2546 pers/h
Percent Heavy Vehicles	1.7 %	
Degree of Saturation	0.853	
Practical Spare Capacity	-0.7 %	
Effective Intersection Capacity	2480 veh/h	
Control Delay (Total)	6.71 veh-h/h	8.06 pers-h/h
Control Delay (Average)	11.4 sec	11.4 sec
Control Delay (Worst Lane)	19.5 sec	
Control Delay (Worst Movement)	20.6 sec	20.6 sec
Geometric Delay (Average)	7.2 sec	
Stop-Line Delay (Average)	4.2 sec	
Level of Service (Aver. Int. Delay)	LOS B	
Level of Service (Worst Movement)	LOS C	
Level of Service (Worst Lane)	LOS B	
95% Back of Queue - Vehicles (Worst Lane)	16.5 veh	
95% Back of Queue - Distance (Worst Lane)	419.1 ft	
Total Effective Stops	1516 veh/h	1819 pers/h
Effective Stop Rate	0.71 per veh	0.71 per pers
Proportion Queued	0.70	0.70
Performance Index	47.2	47.2
Travel Distance (Total)	811.5 veh-mi/h	973.8 pers-mi/h
Travel Distance (Average)	2019 ft	2019 ft
Travel Time (Total)	27.5 veh-h/h	33.0 pers-h/h
Travel Time (Average)	46.6 sec	46.6 sec
Travel Speed	29.5 mph	29.5 mph
Cost (Total)	493.56 \$/h	493.56 \$/h
Fuel Consumption (Total)	42.6 gal/h	
Carbon Dioxide (Total)	403.2 kg/h	
Hydrocarbons (Total)	0.678 kg/h	
Carbon Monoxide (Total)	33.89 kg/h	
NOx (Total)	1.022 kg/h	

LOS (Aver. Int. Delay) for Vehicles is based on average delay for all vehicle movements. LOS Method: Delay (HCM).

LOS Method for individual vehicle movements and lanes: Delay (HCM).

Roundabout LOS Method: Same as Signalised Intersections.

Roundabout Capacity Model: SIDRA Standard.

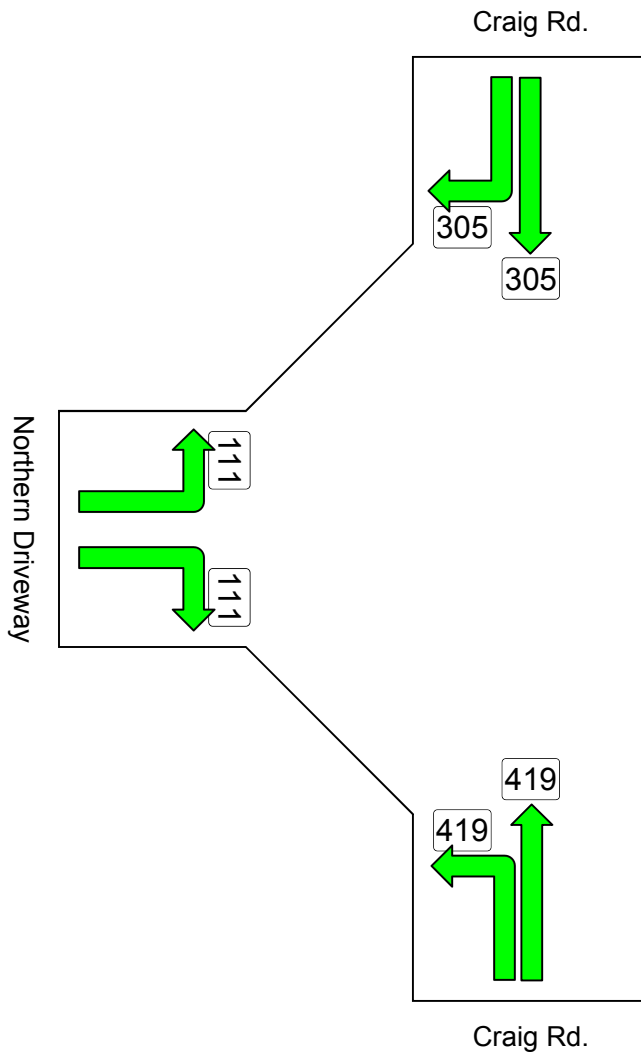
Intersection Performance - Annual Values		
Performance Measure	Vehicles	Persons
Demand Flows (Total)	1,018,458 veh/y	1,222,150 pers/y
Delay	3,222 veh-h/y	3,867 pers-h/y
Effective Stops	727,750 veh/y	873,300 pers/y
Travel Distance	389,520 veh-mi/y	467,424 pers-mi/y
Travel Time	13,193 veh-h/y	15,832 pers-h/y
Cost	236,911 \$/y	236,911 \$/y
Fuel Consumption	20,439 gal/y	
Carbon Dioxide	193,554 kg/y	
Hydrocarbons	326 kg/y	
Carbon Monoxide	16,267 kg/y	
NOx	490 kg/y	

QUEUE DISTANCE

Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Dwy. North (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous

Processed: Thursday, February 10, 2011 5:01:16 PM

SIDRA INTERSECTION 5.0.5.1510

Project: P:\S\SPTR00000001\0600INFO\Traffic\February-2011-TIA\Sidra\Craig-6th\2032 Alt3-Buildout-Craig-Northdwy.sip

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SIDRA
INTERSECTION

APPENDIX G

SIGNAL WARRANTS

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1A	2012 Background		East-bound	West-bound	Higher Minor	Major Approaches
	North-bound	South-bound				
PM Pk	104	128	1268	1079		
0.6 Midnight	8	10	97	83	10	180
0.37 1:00 AM	5	6	60	51	6	111
0.4 2:00 AM	5	7	65	55	7	120
0.48 3:00 AM	6	8	78	66	8	144
1.16 4:00 AM	15	19	188	160	19	347
3.69 5:00 AM	49	60	597	508	60	1105
4.38 6:00 AM	58	72	708	603	72	1311
5.58 7:00 AM	74	91	902	768	91	1670
5.38 8:00 AM	71	88	870	740	88	1611
4.94 9:00 AM	66	81	799	680	81	1479
5.5 10:00 AM	73	90	890	757	90	1646
7.02 11:00 AM	93	115	1135	966	115	2102
7.54 Noon	100	123	1219	1038	123	2257
7.53 1:00 PM	100	123	1218	1036	123	2254
8.09 2:00 PM	107	132	1308	1113	132	2422
8.05 3:00 PM	107	131	1302	1108	131	2410
7.84 4:00 PM	104	128	1268	1079	128	2347
6.27 5:00 PM	83	102	1014	863	102	1877
4.31 6:00 PM	57	70	697	593	70	1290
3.01 7:00 PM	40	49	487	414	49	901
2.86 8:00 PM	38	47	463	394	47	856
2.22 9:00 PM	29	36	359	306	36	665
1.68 10:00 PM	22	27	272	231	27	503
1.11 11:00 PM	15	18	180	153	18	332

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1B	2012 Background		East-bound	West-bound	Higher Minor	Major Approaches
	North-bound	South-bound				
PM Pk	104	128	1268	1079		
0.6 Midnight	8	10	97	83	10	180
0.37 1:00 AM	5	6	60	51	6	111
0.4 2:00 AM	5	7	65	55	7	120
0.48 3:00 AM	6	8	78	66	8	144
1.16 4:00 AM	15	19	188	160	19	347
3.69 5:00 AM	49	60	597	508	60	1105
4.38 6:00 AM	58	72	708	603	72	1311
5.58 7:00 AM	74	91	902	768	91	1670
5.38 8:00 AM	71	88	870	740	88	1611
4.94 9:00 AM	66	81	799	680	81	1479
5.5 10:00 AM	73	90	890	757	90	1646
7.02 11:00 AM	93	115	1135	966	115	2102
7.54 Noon	100	123	1219	1038	123	2257
7.53 1:00 PM	100	123	1218	1036	123	2254
8.09 2:00 PM	107	132	1308	1113	132	2422
8.05 3:00 PM	107	131	1302	1108	131	2410
7.84 4:00 PM	104	128	1268	1079	128	2347
6.27 5:00 PM	83	102	1014	863	102	1877
4.31 6:00 PM	57	70	697	593	70	1290
3.01 7:00 PM	40	49	487	414	49	901
2.86 8:00 PM	38	47	463	394	47	856
2.22 9:00 PM	29	36	359	306	36	665
1.68 10:00 PM	22	27	272	231	27	503
1.11 11:00 PM	15	18	180	153	18	332

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1A	2012 Background + Alternative 1, Phase 1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	308	300	1771	1538		
0.6 Midnight	24	23	136	118	24	253
0.37 1:00 AM	15	14	84	73	15	156
0.4 2:00 AM	16	15	90	78	16	169
0.48 3:00 AM	19	18	108	94	19	203
1.16 4:00 AM	46	44	262	228	46	490
3.69 5:00 AM	145	141	834	724	145	1557
4.38 6:00 AM	172	168	989	859	172	1849
5.58 7:00 AM	219	214	1260	1095	219	2355
5.38 8:00 AM	211	206	1215	1055	211	2271
4.94 9:00 AM	194	189	1116	969	194	2085
5.5 10:00 AM	216	210	1242	1079	216	2321
7.02 11:00 AM	276	269	1586	1377	276	2963
7.54 Noon	296	289	1703	1479	296	3182
7.53 1:00 PM	296	288	1701	1477	296	3178
8.09 2:00 PM	318	310	1827	1587	318	3415
8.05 3:00 PM	316	308	1818	1579	316	3398
7.84 4:00 PM	308	300	1771	1538	308	3309
6.27 5:00 PM	246	240	1416	1230	246	2646
4.31 6:00 PM	169	165	974	846	169	1819
3.01 7:00 PM	118	115	680	590	118	1270
2.86 8:00 PM	112	109	646	561	112	1207
2.22 9:00 PM	87	85	501	436	87	937
1.68 10:00 PM	66	64	380	330	66	709
1.11 11:00 PM	44	42	251	218	44	468

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1B	2012 Background + Alternative 1, Phase 1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	308	300	1771	1538		
0.6 Midnight	24	23	136	118	24	253
0.37 1:00 AM	15	14	84	73	15	156
0.4 2:00 AM	16	15	90	78	16	169
0.48 3:00 AM	19	18	108	94	19	203
1.16 4:00 AM	46	44	262	228	46	490
3.69 5:00 AM	145	141	834	724	145	1557
4.38 6:00 AM	172	168	989	859	172	1849
5.58 7:00 AM	219	214	1260	1095	219	2355
5.38 8:00 AM	211	206	1215	1055	211	2271
4.94 9:00 AM	194	189	1116	969	194	2085
5.5 10:00 AM	216	210	1242	1079	216	2321
7.02 11:00 AM	276	269	1586	1377	276	2963
7.54 Noon	296	289	1703	1479	296	3182
7.53 1:00 PM	296	288	1701	1477	296	3178
8.09 2:00 PM	318	310	1827	1587	318	3415
8.05 3:00 PM	316	308	1818	1579	316	3398
7.84 4:00 PM	308	300	1771	1538	308	3309
6.27 5:00 PM	246	240	1416	1230	246	2646
4.31 6:00 PM	169	165	974	846	169	1819
3.01 7:00 PM	118	115	680	590	118	1270
2.86 8:00 PM	112	109	646	561	112	1207
2.22 9:00 PM	87	85	501	436	87	937
1.68 10:00 PM	66	64	380	330	66	709
1.11 11:00 PM	44	42	251	218	44	468

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1A	2012 Background + Alternative 2, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	308	300	1771	1538		
0.6 Midnight	24	23	136	118	24	253
0.37 1:00 AM	15	14	84	73	15	156
0.4 2:00 AM	16	15	90	78	16	169
0.48 3:00 AM	19	18	108	94	19	203
1.16 4:00 AM	46	44	262	228	46	490
3.69 5:00 AM	145	141	834	724	145	1557
4.38 6:00 AM	172	168	989	859	172	1849
5.58 7:00 AM	219	214	1260	1095	219	2355
5.38 8:00 AM	211	206	1215	1055	211	2271
4.94 9:00 AM	194	189	1116	969	194	2085
5.5 10:00 AM	216	210	1242	1079	216	2321
7.02 11:00 AM	276	269	1586	1377	276	2963
7.54 Noon	296	289	1703	1479	296	3182
7.53 1:00 PM	296	288	1701	1477	296	3178
8.09 2:00 PM	318	310	1827	1587	318	3415
8.05 3:00 PM	316	308	1818	1579	316	3398
7.84 4:00 PM	308	300	1771	1538	308	3309
6.27 5:00 PM	246	240	1416	1230	246	2646
4.31 6:00 PM	169	165	974	846	169	1819
3.01 7:00 PM	118	115	680	590	118	1270
2.86 8:00 PM	112	109	646	561	112	1207
2.22 9:00 PM	87	85	501	436	87	937
1.68 10:00 PM	66	64	380	330	66	709
1.11 11:00 PM	44	42	251	218	44	468

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1B	2012 Background + Alternative 2, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	308	300	1771	1538		
0.6 Midnight	24	23	136	118	24	253
0.37 1:00 AM	15	14	84	73	15	156
0.4 2:00 AM	16	15	90	78	16	169
0.48 3:00 AM	19	18	108	94	19	203
1.16 4:00 AM	46	44	262	228	46	490
3.69 5:00 AM	145	141	834	724	145	1557
4.38 6:00 AM	172	168	989	859	172	1849
5.58 7:00 AM	219	214	1260	1095	219	2355
5.38 8:00 AM	211	206	1215	1055	211	2271
4.94 9:00 AM	194	189	1116	969	194	2085
5.5 10:00 AM	216	210	1242	1079	216	2321
7.02 11:00 AM	276	269	1586	1377	276	2963
7.54 Noon	296	289	1703	1479	296	3182
7.53 1:00 PM	296	288	1701	1477	296	3178
8.09 2:00 PM	318	310	1827	1587	318	3415
8.05 3:00 PM	316	308	1818	1579	316	3398
7.84 4:00 PM	308	300	1771	1538	308	3309
6.27 5:00 PM	246	240	1416	1230	246	2646
4.31 6:00 PM	169	165	974	846	169	1819
3.01 7:00 PM	118	115	680	590	118	1270
2.86 8:00 PM	112	109	646	561	112	1207
2.22 9:00 PM	87	85	501	436	87	937
1.68 10:00 PM	66	64	380	330	66	709
1.11 11:00 PM	44	42	251	218	44	468

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1A	2012 Background + Alternative 3, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	239	222	1680	1382		
0.6 Midnight	18	17	129	106	18	234
0.37 1:00 AM	11	10	79	65	11	145
0.4 2:00 AM	12	11	86	71	12	156
0.48 3:00 AM	15	14	103	85	15	187
1.16 4:00 AM	35	33	249	204	35	453
3.69 5:00 AM	112	104	791	650	112	1441
4.38 6:00 AM	134	124	939	772	134	1711
5.58 7:00 AM	170	158	1196	984	170	2179
5.38 8:00 AM	164	152	1153	948	164	2101
4.94 9:00 AM	151	140	1059	871	151	1929
5.5 10:00 AM	168	156	1179	970	168	2148
7.02 11:00 AM	214	199	1504	1237	214	2742
7.54 Noon	230	214	1616	1329	230	2945
7.53 1:00 PM	230	213	1614	1327	230	2941
8.09 2:00 PM	247	229	1734	1426	247	3160
8.05 3:00 PM	245	228	1725	1419	245	3144
7.84 4:00 PM	239	222	1680	1382	239	3062
6.27 5:00 PM	191	178	1344	1105	191	2449
4.31 6:00 PM	131	122	924	760	131	1683
3.01 7:00 PM	92	85	645	531	92	1176
2.86 8:00 PM	87	81	613	504	87	1117
2.22 9:00 PM	68	63	476	391	68	867
1.68 10:00 PM	51	48	360	296	51	656
1.11 11:00 PM	34	31	238	196	34	434

8 Hour-100%-Minimum Volume - Craig-Hwy.2

1B	2012 Background + Alternative 3, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	239	222	1680	1382		
0.6 Midnight	18	17	129	106	18	234
0.37 1:00 AM	11	10	79	65	11	145
0.4 2:00 AM	12	11	86	71	12	156
0.48 3:00 AM	15	14	103	85	15	187
1.16 4:00 AM	35	33	249	204	35	453
3.69 5:00 AM	112	104	791	650	112	1441
4.38 6:00 AM	134	124	939	772	134	1711
5.58 7:00 AM	170	158	1196	984	170	2179
5.38 8:00 AM	164	152	1153	948	164	2101
4.94 9:00 AM	151	140	1059	871	151	1929
5.5 10:00 AM	168	156	1179	970	168	2148
7.02 11:00 AM	214	199	1504	1237	214	2742
7.54 Noon	230	214	1616	1329	230	2945
7.53 1:00 PM	230	213	1614	1327	230	2941
8.09 2:00 PM	247	229	1734	1426	247	3160
8.05 3:00 PM	245	228	1725	1419	245	3144
7.84 4:00 PM	239	222	1680	1382	239	3062
6.27 5:00 PM	191	178	1344	1105	191	2449
4.31 6:00 PM	131	122	924	760	131	1683
3.01 7:00 PM	92	85	645	531	92	1176
2.86 8:00 PM	87	81	613	504	87	1117
2.22 9:00 PM	68	63	476	391	68	867
1.68 10:00 PM	51	48	360	296	51	656
1.11 11:00 PM	34	31	238	196	34	434

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1A	2012 Background + Alternative 1, Phase 1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	818	1421	1418		
0.6 Midnight	0	63	109	109	63	217
0.37 1:00 AM	0	39	67	67	39	134
0.4 2:00 AM	0	42	73	72	42	145
0.48 3:00 AM	0	50	87	87	50	174
1.16 4:00 AM	0	121	210	210	121	420
3.69 5:00 AM	0	385	669	667	385	1336
4.38 6:00 AM	0	457	794	792	457	1586
5.58 7:00 AM	0	582	1011	1009	582	2021
5.38 8:00 AM	0	561	975	973	561	1948
4.94 9:00 AM	0	515	895	893	515	1789
5.5 10:00 AM	0	574	997	995	574	1992
7.02 11:00 AM	0	732	1272	1270	732	2542
7.54 Noon	0	787	1367	1364	787	2730
7.53 1:00 PM	0	786	1365	1362	786	2727
8.09 2:00 PM	0	844	1466	1463	844	2930
8.05 3:00 PM	0	840	1459	1456	840	2915
7.84 4:00 PM	0	818	1421	1418	818	2839
6.27 5:00 PM	0	654	1136	1134	654	2270
4.31 6:00 PM	0	450	781	780	450	1561
3.01 7:00 PM	0	314	546	544	314	1090
2.86 8:00 PM	0	298	518	517	298	1036
2.22 9:00 PM	0	232	402	402	232	804
1.68 10:00 PM	0	175	305	304	175	608
1.11 11:00 PM	0	116	201	201	116	402

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1B	2012 Background + Alternative 1, Phase 1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	818	1421	1418		
0.6 Midnight	0	63	109	109	63	217
0.37 1:00 AM	0	39	67	67	39	134
0.4 2:00 AM	0	42	73	72	42	145
0.48 3:00 AM	0	50	87	87	50	174
1.16 4:00 AM	0	121	210	210	121	420
3.69 5:00 AM	0	385	669	667	385	1336
4.38 6:00 AM	0	457	794	792	457	1586
5.58 7:00 AM	0	582	1011	1009	582	2021
5.38 8:00 AM	0	561	975	973	561	1948
4.94 9:00 AM	0	515	895	893	515	1789
5.5 10:00 AM	0	574	997	995	574	1992
7.02 11:00 AM	0	732	1272	1270	732	2542
7.54 Noon	0	787	1367	1364	787	2730
7.53 1:00 PM	0	786	1365	1362	786	2727
8.09 2:00 PM	0	844	1466	1463	844	2930
8.05 3:00 PM	0	840	1459	1456	840	2915
7.84 4:00 PM	0	818	1421	1418	818	2839
6.27 5:00 PM	0	654	1136	1134	654	2270
4.31 6:00 PM	0	450	781	780	450	1561
3.01 7:00 PM	0	314	546	544	314	1090
2.86 8:00 PM	0	298	518	517	298	1036
2.22 9:00 PM	0	232	402	402	232	804
1.68 10:00 PM	0	175	305	304	175	608
1.11 11:00 PM	0	116	201	201	116	402

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1A	2012 Background + Alternative 2, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	818	1421	1418		
0.6 Midnight	0	63	109	109	63	217
0.37 1:00 AM	0	39	67	67	39	134
0.4 2:00 AM	0	42	73	72	42	145
0.48 3:00 AM	0	50	87	87	50	174
1.16 4:00 AM	0	121	210	210	121	420
3.69 5:00 AM	0	385	669	667	385	1336
4.38 6:00 AM	0	457	794	792	457	1586
5.58 7:00 AM	0	582	1011	1009	582	2021
5.38 8:00 AM	0	561	975	973	561	1948
4.94 9:00 AM	0	515	895	893	515	1789
5.5 10:00 AM	0	574	997	995	574	1992
7.02 11:00 AM	0	732	1272	1270	732	2542
7.54 Noon	0	787	1367	1364	787	2730
7.53 1:00 PM	0	786	1365	1362	786	2727
8.09 2:00 PM	0	844	1466	1463	844	2930
8.05 3:00 PM	0	840	1459	1456	840	2915
7.84 4:00 PM	0	818	1421	1418	818	2839
6.27 5:00 PM	0	654	1136	1134	654	2270
4.31 6:00 PM	0	450	781	780	450	1561
3.01 7:00 PM	0	314	546	544	314	1090
2.86 8:00 PM	0	298	518	517	298	1036
2.22 9:00 PM	0	232	402	402	232	804
1.68 10:00 PM	0	175	305	304	175	608
1.11 11:00 PM	0	116	201	201	116	402

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1B	2012 Background + Alternative 2, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	818	1421	1418		
0.6 Midnight	0	63	109	109	63	217
0.37 1:00 AM	0	39	67	67	39	134
0.4 2:00 AM	0	42	73	72	42	145
0.48 3:00 AM	0	50	87	87	50	174
1.16 4:00 AM	0	121	210	210	121	420
3.69 5:00 AM	0	385	669	667	385	1336
4.38 6:00 AM	0	457	794	792	457	1586
5.58 7:00 AM	0	582	1011	1009	582	2021
5.38 8:00 AM	0	561	975	973	561	1948
4.94 9:00 AM	0	515	895	893	515	1789
5.5 10:00 AM	0	574	997	995	574	1992
7.02 11:00 AM	0	732	1272	1270	732	2542
7.54 Noon	0	787	1367	1364	787	2730
7.53 1:00 PM	0	786	1365	1362	786	2727
8.09 2:00 PM	0	844	1466	1463	844	2930
8.05 3:00 PM	0	840	1459	1456	840	2915
7.84 4:00 PM	0	818	1421	1418	818	2839
6.27 5:00 PM	0	654	1136	1134	654	2270
4.31 6:00 PM	0	450	781	780	450	1561
3.01 7:00 PM	0	314	546	544	314	1090
2.86 8:00 PM	0	298	518	517	298	1036
2.22 9:00 PM	0	232	402	402	232	804
1.68 10:00 PM	0	175	305	304	175	608
1.11 11:00 PM	0	116	201	201	116	402

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1A	2012 Background + Alternative 3, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	701	1369	1317		
0.6 Midnight	0	54	105	101	54	206
0.37 1:00 AM	0	33	65	62	33	127
0.4 2:00 AM	0	36	70	67	36	137
0.48 3:00 AM	0	43	84	81	43	164
1.16 4:00 AM	0	104	203	195	104	397
3.69 5:00 AM	0	330	644	620	330	1264
4.38 6:00 AM	0	392	765	736	392	1501
5.58 7:00 AM	0	499	974	937	499	1912
5.38 8:00 AM	0	481	939	904	481	1843
4.94 9:00 AM	0	442	863	830	442	1692
5.5 10:00 AM	0	492	960	924	492	1884
7.02 11:00 AM	0	628	1226	1179	628	2405
7.54 Noon	0	674	1317	1267	674	2583
7.53 1:00 PM	0	673	1315	1265	673	2580
8.09 2:00 PM	0	723	1413	1359	723	2772
8.05 3:00 PM	0	720	1406	1352	720	2758
7.84 4:00 PM	0	701	1369	1317	701	2686
6.27 5:00 PM	0	561	1095	1053	561	2148
4.31 6:00 PM	0	385	753	724	385	1477
3.01 7:00 PM	0	269	526	506	269	1031
2.86 8:00 PM	0	256	499	480	256	980
2.22 9:00 PM	0	198	388	373	198	761
1.68 10:00 PM	0	150	293	282	150	576
1.11 11:00 PM	0	99	194	186	99	380

8 Hour-100%-Minimum Volume - Middle-Hwy.2

1B	2012 Background + Alternative 3, Buildout					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	0	701	1369	1317		
0.6 Midnight	0	54	105	101	54	206
0.37 1:00 AM	0	33	65	62	33	127
0.4 2:00 AM	0	36	70	67	36	137
0.48 3:00 AM	0	43	84	81	43	164
1.16 4:00 AM	0	104	203	195	104	397
3.69 5:00 AM	0	330	644	620	330	1264
4.38 6:00 AM	0	392	765	736	392	1501
5.58 7:00 AM	0	499	974	937	499	1912
5.38 8:00 AM	0	481	939	904	481	1843
4.94 9:00 AM	0	442	863	830	442	1692
5.5 10:00 AM	0	492	960	924	492	1884
7.02 11:00 AM	0	628	1226	1179	628	2405
7.54 Noon	0	674	1317	1267	674	2583
7.53 1:00 PM	0	673	1315	1265	673	2580
8.09 2:00 PM	0	723	1413	1359	723	2772
8.05 3:00 PM	0	720	1406	1352	720	2758
7.84 4:00 PM	0	701	1369	1317	701	2686
6.27 5:00 PM	0	561	1095	1053	561	2148
4.31 6:00 PM	0	385	753	724	385	1477
3.01 7:00 PM	0	269	526	506	269	1031
2.86 8:00 PM	0	256	499	480	256	980
2.22 9:00 PM	0	198	388	373	198	761
1.68 10:00 PM	0	150	293	282	150	576
1.11 11:00 PM	0	99	194	186	99	380

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1A	2012 Background + Alt1, Ph1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	118	453	363	391		
0.6 Midnight	9	35	28	30	35	58
0.37 1:00 AM	6	21	17	18	21	36
0.4 2:00 AM	6	23	19	20	23	38
0.48 3:00 AM	7	28	22	24	28	46
1.16 4:00 AM	17	67	54	58	67	112
3.69 5:00 AM	56	213	171	184	213	355
4.38 6:00 AM	66	253	203	218	253	421
5.58 7:00 AM	84	322	258	278	322	537
5.38 8:00 AM	81	311	249	268	311	517
4.94 9:00 AM	74	285	229	246	285	475
5.5 10:00 AM	83	318	255	274	318	529
7.02 11:00 AM	106	406	325	350	406	675
7.54 Noon	113	436	349	376	436	725
7.53 1:00 PM	113	435	349	376	435	724
8.09 2:00 PM	122	467	375	403	467	778
8.05 3:00 PM	121	465	373	401	465	774
7.84 4:00 PM	118	453	363	391	453	754
6.27 5:00 PM	94	362	290	313	362	603
4.31 6:00 PM	65	249	200	215	249	415
3.01 7:00 PM	45	174	139	150	174	289
2.86 8:00 PM	43	165	132	143	165	275
2.22 9:00 PM	33	128	103	111	128	214
1.68 10:00 PM	25	97	78	84	97	162
1.11 11:00 PM	17	64	51	55	64	107

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1B	2012 Background + Alt1, Ph1					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	118	453	363	391		
0.6 Midnight	9	35	28	30	35	58
0.37 1:00 AM	6	21	17	18	21	36
0.4 2:00 AM	6	23	19	20	23	38
0.48 3:00 AM	7	28	22	24	28	46
1.16 4:00 AM	17	67	54	58	67	112
3.69 5:00 AM	56	213	171	184	213	355
4.38 6:00 AM	66	253	203	218	253	421
5.58 7:00 AM	84	322	258	278	322	537
5.38 8:00 AM	81	311	249	268	311	517
4.94 9:00 AM	74	285	229	246	285	475
5.5 10:00 AM	83	318	255	274	318	529
7.02 11:00 AM	106	406	325	350	406	675
7.54 Noon	113	436	349	376	436	725
7.53 1:00 PM	113	435	349	376	435	724
8.09 2:00 PM	122	467	375	403	467	778
8.05 3:00 PM	121	465	373	401	465	774
7.84 4:00 PM	118	453	363	391	453	754
6.27 5:00 PM	94	362	290	313	362	603
4.31 6:00 PM	65	249	200	215	249	415
3.01 7:00 PM	45	174	139	150	174	289
2.86 8:00 PM	43	165	132	143	165	275
2.22 9:00 PM	33	128	103	111	128	214
1.68 10:00 PM	25	97	78	84	97	162
1.11 11:00 PM	17	64	51	55	64	107

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1A	2015 Background + Alt1, Ph2					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	136	494	371	411		
0.6 Midnight	10	38	28	31	38	60
0.37 1:00 AM	6	23	18	19	23	37
0.4 2:00 AM	7	25	19	21	25	40
0.48 3:00 AM	8	30	23	25	30	48
1.16 4:00 AM	20	73	55	61	73	116
3.69 5:00 AM	64	233	175	193	233	368
4.38 6:00 AM	76	276	207	230	276	437
5.58 7:00 AM	97	352	264	293	352	557
5.38 8:00 AM	93	339	255	282	339	537
4.94 9:00 AM	86	311	234	259	311	493
5.5 10:00 AM	95	347	260	288	347	549
7.02 11:00 AM	122	442	332	368	442	700
7.54 Noon	131	475	357	395	475	752
7.53 1:00 PM	131	474	356	395	474	751
8.09 2:00 PM	140	510	383	424	510	807
8.05 3:00 PM	140	507	381	422	507	803
7.84 4:00 PM	136	494	371	411	494	782
6.27 5:00 PM	109	395	297	329	395	625
4.31 6:00 PM	75	272	204	226	272	430
3.01 7:00 PM	52	190	142	158	190	300
2.86 8:00 PM	50	180	135	150	180	285
2.22 9:00 PM	39	140	105	116	140	221
1.68 10:00 PM	29	106	80	88	106	168
1.11 11:00 PM	19	70	53	58	70	111

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1B	2015 Background + Alt1, Ph2					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	136	494	371	411		
0.6 Midnight	10	38	28	31	38	60
0.37 1:00 AM	6	23	18	19	23	37
0.4 2:00 AM	7	25	19	21	25	40
0.48 3:00 AM	8	30	23	25	30	48
1.16 4:00 AM	20	73	55	61	73	116
3.69 5:00 AM	64	233	175	193	233	368
4.38 6:00 AM	76	276	207	230	276	437
5.58 7:00 AM	97	352	264	293	352	557
5.38 8:00 AM	93	339	255	282	339	537
4.94 9:00 AM	86	311	234	259	311	493
5.5 10:00 AM	95	347	260	288	347	549
7.02 11:00 AM	122	442	332	368	442	700
7.54 Noon	131	475	357	395	475	752
7.53 1:00 PM	131	474	356	395	474	751
8.09 2:00 PM	140	510	383	424	510	807
8.05 3:00 PM	140	507	381	422	507	803
7.84 4:00 PM	136	494	371	411	494	782
6.27 5:00 PM	109	395	297	329	395	625
4.31 6:00 PM	75	272	204	226	272	430
3.01 7:00 PM	52	190	142	158	190	300
2.86 8:00 PM	50	180	135	150	180	285
2.22 9:00 PM	39	140	105	116	140	221
1.68 10:00 PM	29	106	80	88	106	168
1.11 11:00 PM	19	70	53	58	70	111

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1A	2019 Background + Alt1, Ph3					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	150	531	376	428		
0.6 Midnight	11	41	29	33	41	62
0.37 1:00 AM	7	25	18	20	25	38
0.4 2:00 AM	8	27	19	22	27	41
0.48 3:00 AM	9	33	23	26	33	49
1.16 4:00 AM	22	79	56	63	79	119
3.69 5:00 AM	71	250	177	201	250	378
4.38 6:00 AM	84	297	210	239	297	449
5.58 7:00 AM	107	378	268	305	378	572
5.38 8:00 AM	103	364	258	294	364	552
4.94 9:00 AM	95	335	237	270	335	507
5.5 10:00 AM	105	373	264	300	373	564
7.02 11:00 AM	134	475	337	383	475	720
7.54 Noon	144	511	362	412	511	773
7.53 1:00 PM	144	510	361	411	510	772
8.09 2:00 PM	155	548	388	442	548	830
8.05 3:00 PM	154	545	386	439	545	826
7.84 4:00 PM	150	531	376	428	531	804
6.27 5:00 PM	120	425	301	342	425	643
4.31 6:00 PM	82	292	207	235	292	442
3.01 7:00 PM	58	204	144	164	204	309
2.86 8:00 PM	55	194	137	156	194	293
2.22 9:00 PM	42	150	106	121	150	228
1.68 10:00 PM	32	114	81	92	114	172
1.11 11:00 PM	21	75	53	61	75	114

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1B	2019 Background + Alt1, Ph3					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	150	531	376	428		
0.6 Midnight	11	41	29	33	41	62
0.37 1:00 AM	7	25	18	20	25	38
0.4 2:00 AM	8	27	19	22	27	41
0.48 3:00 AM	9	33	23	26	33	49
1.16 4:00 AM	22	79	56	63	79	119
3.69 5:00 AM	71	250	177	201	250	378
4.38 6:00 AM	84	297	210	239	297	449
5.58 7:00 AM	107	378	268	305	378	572
5.38 8:00 AM	103	364	258	294	364	552
4.94 9:00 AM	95	335	237	270	335	507
5.5 10:00 AM	105	373	264	300	373	564
7.02 11:00 AM	134	475	337	383	475	720
7.54 Noon	144	511	362	412	511	773
7.53 1:00 PM	144	510	361	411	510	772
8.09 2:00 PM	155	548	388	442	548	830
8.05 3:00 PM	154	545	386	439	545	826
7.84 4:00 PM	150	531	376	428	531	804
6.27 5:00 PM	120	425	301	342	425	643
4.31 6:00 PM	82	292	207	235	292	442
3.01 7:00 PM	58	204	144	164	204	309
2.86 8:00 PM	55	194	137	156	194	293
2.22 9:00 PM	42	150	106	121	150	228
1.68 10:00 PM	32	114	81	92	114	172
1.11 11:00 PM	21	75	53	61	75	114

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1A	2012 Background + Alt2, Build					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	118	453	363	391		
0.6 Midnight	9	35	28	30	35	58
0.37 1:00 AM	6	21	17	18	21	36
0.4 2:00 AM	6	23	19	20	23	38
0.48 3:00 AM	7	28	22	24	28	46
1.16 4:00 AM	17	67	54	58	67	112
3.69 5:00 AM	56	213	171	184	213	355
4.38 6:00 AM	66	253	203	218	253	421
5.58 7:00 AM	84	322	258	278	322	537
5.38 8:00 AM	81	311	249	268	311	517
4.94 9:00 AM	74	285	229	246	285	475
5.5 10:00 AM	83	318	255	274	318	529
7.02 11:00 AM	106	406	325	350	406	675
7.54 Noon	113	436	349	376	436	725
7.53 1:00 PM	113	435	349	376	435	724
8.09 2:00 PM	122	467	375	403	467	778
8.05 3:00 PM	121	465	373	401	465	774
7.84 4:00 PM	118	453	363	391	453	754
6.27 5:00 PM	94	362	290	313	362	603
4.31 6:00 PM	65	249	200	215	249	415
3.01 7:00 PM	45	174	139	150	174	289
2.86 8:00 PM	43	165	132	143	165	275
2.22 9:00 PM	33	128	103	111	128	214
1.68 10:00 PM	25	97	78	84	97	162
1.11 11:00 PM	17	64	51	55	64	107

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

1B	2012 Background + Alt2, Build					
	North-bound	South-bound	East-bound	West-bound	Higher Minor	Major Approaches
PM Pk	118	453	363	391		
0.6 Midnight	9	35	28	30	35	58
0.37 1:00 AM	6	21	17	18	21	36
0.4 2:00 AM	6	23	19	20	23	38
0.48 3:00 AM	7	28	22	24	28	46
1.16 4:00 AM	17	67	54	58	67	112
3.69 5:00 AM	56	213	171	184	213	355
4.38 6:00 AM	66	253	203	218	253	421
5.58 7:00 AM	84	322	258	278	322	537
5.38 8:00 AM	81	311	249	268	311	517
4.94 9:00 AM	74	285	229	246	285	475
5.5 10:00 AM	83	318	255	274	318	529
7.02 11:00 AM	106	406	325	350	406	675
7.54 Noon	113	436	349	376	436	725
7.53 1:00 PM	113	435	349	376	435	724
8.09 2:00 PM	122	467	375	403	467	778
8.05 3:00 PM	121	465	373	401	465	774
7.84 4:00 PM	118	453	363	391	453	754
6.27 5:00 PM	94	362	290	313	362	603
4.31 6:00 PM	65	249	200	215	249	415
3.01 7:00 PM	45	174	139	150	174	289
2.86 8:00 PM	43	165	132	143	165	275
2.22 9:00 PM	33	128	103	111	128	214
1.68 10:00 PM	25	97	78	84	97	162
1.11 11:00 PM	17	64	51	55	64	107

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

	1A	2012 Background + Alt3, Buildout				
		North-bound	South-bound	East-bound	West-bound	Higher Minor Major Approaches
	PM Pk	97	413	356	367	
0.6	Midnight	7	32	27	28	32 55
0.37	1:00 AM	5	19	17	17	19 34
0.4	2:00 AM	5	21	18	19	21 37
0.48	3:00 AM	6	25	22	22	25 44
1.16	4:00 AM	14	61	53	54	61 107
3.69	5:00 AM	46	194	168	173	194 340
4.38	6:00 AM	54	231	199	205	231 404
5.58	7:00 AM	69	294	253	261	294 515
5.38	8:00 AM	67	283	244	252	283 496
4.94	9:00 AM	61	260	224	231	260 456
5.5	10:00 AM	68	290	250	257	290 507
7.02	11:00 AM	87	370	319	329	370 647
7.54	Noon	93	397	342	353	397 695
7.53	1:00 PM	93	397	342	352	397 694
8.09	2:00 PM	100	426	367	379	426 746
8.05	3:00 PM	100	424	366	377	424 742
7.84	4:00 PM	97	413	356	367	413 723
6.27	5:00 PM	78	330	285	294	330 578
4.31	6:00 PM	53	227	196	202	227 397
3.01	7:00 PM	37	159	137	141	159 278
2.86	8:00 PM	35	151	130	134	151 264
2.22	9:00 PM	27	117	101	104	117 205
1.68	10:00 PM	21	89	76	79	89 155
1.11	11:00 PM	14	58	50	52	58 102

8 Hour-100%-Minimum Volume - SR-902-Hwy.2

	1B	2012 Background + Alt3, Buildout				
		North-bound	South-bound	East-bound	West-bound	Higher Minor Major Approaches
	PM Pk	97	413	356	367	
0.6	Midnight	7	32	27	28	32 55
0.37	1:00 AM	5	19	17	17	19 34
0.4	2:00 AM	5	21	18	19	21 37
0.48	3:00 AM	6	25	22	22	25 44
1.16	4:00 AM	14	61	53	54	61 107
3.69	5:00 AM	46	194	168	173	194 340
4.38	6:00 AM	54	231	199	205	231 404
5.58	7:00 AM	69	294	253	261	294 515
5.38	8:00 AM	67	283	244	252	283 496
4.94	9:00 AM	61	260	224	231	260 456
5.5	10:00 AM	68	290	250	257	290 507
7.02	11:00 AM	87	370	319	329	370 647
7.54	Noon	93	397	342	353	397 695
7.53	1:00 PM	93	397	342	352	397 694
8.09	2:00 PM	100	426	367	379	426 746
8.05	3:00 PM	100	424	366	377	424 742
7.84	4:00 PM	97	413	356	367	413 723
6.27	5:00 PM	78	330	285	294	330 578
4.31	6:00 PM	53	227	196	202	227 397
3.01	7:00 PM	37	159	137	141	159 278
2.86	8:00 PM	35	151	130	134	151 264
2.22	9:00 PM	27	117	101	104	117 205
1.68	10:00 PM	21	89	76	79	89 155
1.11	11:00 PM	14	58	50	52	58 102

ADDENDUM TO TRAFFIC IMPACT ANALYSIS

**Addendum to
TRAFFIC IMPACT ANALYSIS**

**SPOKANE TRIBE
WEST PLAINS DEVELOPMENT**

Spokane County, Washington

July 18, 2011

Prepared by:
David Evans and Associates, Inc.
908 North Howard Street Suite 300
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DAVID EVANS
AND ASSOCIATES INC.

DEA Project No.: SPTR0000-0001

This report has been prepared by the staff of David Evans and Associates, Inc. under the direction of the undersigned professional engineer whose seal and signature appears hereon.



Kevin J. Picanco, P.E.



Background/Introduction

This document serves as an addendum to the TIA dated April 28, 2011 prepared in support of the Draft EIS prepared by AES, Inc. for the Spokane Tribe's proposed West Plains Development. This addendum does not revise or supersede the fundamental assumptions used in the TIA related to the site development, trip generation, distribution and assignment or the overall operational analysis results.

This addendum focuses on the following items:

1. Suggested changes by WSDOT and Spokane County to site access locations and intersection control along the HWY 2 project site frontage.
2. Roadway connectivity
3. Bike, pedestrian and transit facilities
4. Cumulative (2032) Condition Corridor Impacts
5. Alternatives mitigations for the Hayford/HWY 2 intersection
6. Revised Analysis/Mitigation at HWY 2/Fairchild AFB Intersection
7. Approach to Mitigation (timing/phasing of mitigation improvements and proportional share)

HWY 2 Site Access

The TIA examined three site development alternatives all with the same proposed site access locations along HWY 2 (see Figures 2A-2C of the TIA). These site plans proposed one full movement access at about the midpoint of the project site frontage along HWY 2 about 1/3 mile west of Craig Rd. Additionally, two right-in/right-out (RI/RO) access were proposed; one west of the primary access and one east of the primary access.

The full movement main access was analyzed with both roundabout and signalized intersection control. The analysis indicated that a roundabout would likely operate better under most analysis scenarios, provide greater capacity and have less of an impact on HWY 2 corridor operations.

WSDOT staff has reviewed the operational analysis and also independently developed a VISSIM model to compare roundabouts to signalized intersection control at the Main Site Access(Middle Dwy)/HWY 2 intersection as well as the HWY 2/Craig intersection.

Additionally, WSDOT and Spokane County staff developed a schematic alternative plan for site access locations and control for the project's HWY 2 frontage. The schematic plan is included as Attachment A. This document will refer to the revised access as the 'Two Roundabout Access' scheme. It suggests having two full movement accesses on the HWY 2 site frontage using roundabout intersection control, along with a roundabout at the HWY 2/Craig intersection. The three roundabouts would be more or less equally spaced just less than a ¼ mile apart. The westerly access would be positioned near the westerly property of the Spokane Tribe site providing access to the overall site as well the existing Spoko Fuel facility. The middle roundabout would be located somewhat east of the previously proposed main access.

It is DEA's opinion that this access scheme would function well and disperse traffic more evenly to the access points compared to the original access scheme and have less impact to HWY 2 corridor traffic flow and operations.

This alternative access scheme would require some minor revisions to the location and layout of the commercial/retail pads along the HWY 2 frontage as well as to on-site the circulation road on southerly portion of the site. However, the core of the development (casino/hotel/entertainment facility) and



overall site plan would not be significantly altered and the proposed size and type of land uses (and therefore trip generation) would remain the same.

The revised access scheme was analyzed for all site plan Alternatives 1-3 and Phasing of Alternative 1 consistent with the approach and assumptions in the TIA. Global trip distribution assumptions were not altered. Trip assignment to HWY 2 was adjusted to account for the change in access scheme but the total entering/exiting traffic to/from HWY 2 related to the subject site development remains consistent with the TIA. Volume assumptions are included as an attachment.

For 2032 Cumulative conditions a fourth, southerly leg of the westerly roundabout intersection was added and some traffic generated southbound left turn volumes were shifted to the southbound through movement utilizing the southerly leg of the roundabout.

The analysis indicates that both roundabout access intersections will function at acceptable levels of service for all analysis scenarios. The LOS results are summarized in Attachment B and analysis output reports are included in Attachment C.

Additionally, the HWY 2/Craig intersection was reanalyzed under 2032 Cumulative Alt. 1 conditions; the TIA indicated a LOS F for this location and analysis scenario. With the revised access scheme and inclusion of the southerly 4th leg at the westerly access to provide a connection and alternative route to 21st Ave., the project related trips at HWY 2/Craig are reduced. Furthermore, modifications were made to the assumed roundabout geometry at HWY 2/Craig to include dual left turn movements for the NB and SB approaches. With these revisions, the analysis indicates an acceptable LOS of LOS with an average delay of 54.4 secs. Analysis output reports and geometry figures are attached.

Roadway Connectivity

Reasonable local connectivity and connectivity to adjacent arterial roadways can be achieved with the internal roadway network proposed and originally proposed access location as well as the recently proposed Two Roundabout Access scheme. Access and connectivity for the site south of HWY 2 across from the subject site can be achieved through the addition of a 4th leg of the middle roundabout access to the Spokane Tribe site.

A southerly leg of the westerly roundabout intersection could ultimately extend south to connect to the future of 21st Ave. extension which will serve as an alternative east/west regional route and relieve traffic congestion on the HWY 2 corridor.

The roundabout site access located at the westerly boundary of the Spokane Tribe could provide access to a future North-South road located along the westerly Spokane Tribe property line; this road would provide access to the area and sites west of the Spokane Tribe site as well as connectivity to a future extension of 6th Ave.

Cumulative (2032) Condition Corridor Impacts

The West Plains-Spokane International Transportation study (WP-SIA, SRTC May, 2011) reviewed corridor congestion impacts for a study area that includes the study area of the Spokane Tribe TIA as well as areas outside of the Spokane Tribe TIA study area. The travel demand modeling completed for this study contemplated and included development of the Spokane Tribe's subject parcel therefore the volumes associated with proposed project and thpg eir presence and impact on the regional roadway network are reflected in the study. Various project alternatives were developed to address future corridor capacity deficiencies.

The WP-SIA study included a menu of improvements many of which are well outside the study area of the Spokane Tribe TIA and some alternatives were deemed undesirable upon full evaluation and



consideration. Certain preferred improvement alternatives could be construed as having some relationship to the increase in traffic associated with the Spokane Tribe's projects. These include the following alternatives listed in the study:

1. Alt. 2a – New Minor Arterial (21st/18th Ave.)
2. Alt. 7 – New Urban Arterial 6th, 12th Aves.

Note, while other alternatives were considered in the WP-SIA Study, they were either deemed not preferred alternatives (ie- Alternative 3 – Widen US-2) or are well outside the Spokane Tribe study area or have little to no relationship to the Spokane Tribe project (ie- Alt 8 – New Geiger Interchange).

Bike, Pedestrian and Transit Facilities

Bike, pedestrian and transit facilities and issues are discussed in the TIA in the Executive Summary as well as Recommendations sections under a subsection titled 'General Recommendations Applying to All Alternatives' as well as in sections 3.2, 3.3 and 6.2 of the report.

To expand and clarify the discussion included in the report, it is recommended that the project work with the Spokane Transit Authority (STA) to identify a feasible location for a transit stop internal to the Spokane Tribe site most likely along the east-west circulation drive located in the southern quarter of the site. As mentioned in the TIA the Spokane Tribe should work to implement the Commute Trips Reduction (CTR) programs already in place in the Spokane Region.

The project should construct bike and pedestrian facilities along site frontages in accordance with the respective roadway standards and guidelines of WSDOT and the City of Airway Heights. The project should also include or accommodate a proposed shared use path connecting Airway Heights to Fairchild Air Force Base as proposed in the 'Smart Routes' plan.

Furthermore, sidewalks and pathways should be planned and constructed on the site to connect site development to transit stops and public path and bikeways to encourage and facilitate use of transit and non-motorized travel modes.

Hayford/HWY 2 Mitigation

All scenarios analyzed in the TIA (three site alternative, phasing of Alternative, 2032 Cumulative) indicated that the Hayford/HWY 2 intersection did not meet the minimum LOS standards. See the LOS summary tables in the Executive Summary of the TIA. Several mitigation improvements were analyzed and proposed for the various analysis scenarios. Some of these mitigations would require widening of HWY 2, Hayford Rd. or both which in some cases would require the acquisition of additional R/W. Furthermore, the addition of travel lanes to HWY 2 is not supported by the City of Airway Heights or consistent with the local agencies vision for the corridor.

Another potential approach is to improve operations at the intersection by improving the surrounding transportation network and providing alternative routes that relieve traffic along the HWY 2 corridor in general and the HWY 2/Hayford Rd. intersection specifically. Such improvements were identified in the recently completed West Plains – Spokane International Airport Study (WP-SIA Study) completed by the Spokane Regional Transportation Council (SRTC) and dated May 11, 2011. The study provided a menu of improvement options around the West Plains area. See the report and specifically Section 5: Recommendations of the report for additional information. The improvement that is most likely to relieve traffic along the HWY 2 corridor and the HWY 2/Hayford intersection is Alternative 2A which calls for extension and development of a new east-west 3-lane arterial alignment along the 21st Ave./18th Ave. alignment. The modeling and analysis work completed by SRTC indicated that this improvement had beneficial impacts on the HWY 2 corridor by offloading a significant amount of through traffic which will improve operations at the HWY 2/Hayford intersection.



In lieu of the various mitigations for the HWY 2/Hayford intersection proposed in the TIA it is recommended that the Spokane Tribe commit to contributing a proportional share to construction of this future facility at such time it is programmed for construction. The proportional share contribution should be based on the proportion of Spokane Tribe site traffic expected to use the facility compared to the facility capacity.

Revised Analysis/Mitigation at HWY 2/Fairchild AFB Intersection – 2032 Cumulative Conditions

The analysis and recommended mitigation for the HWY 2/Fairchild AFB intersection has been revised for all 2032 Cumulative analysis scenarios. The recommended mitigation calls for modification of the northbound approach to include a 2nd NB right turn lane along with associated modifications to the traffic signal system. The analysis results for the three alternatives with mitigation are as follows:

1. Alternative 1: LOS D (51.6 secs delay)
2. Alternative 2: LOS D (44.8 secs delay)
3. Alternative 3: LOS D (42.7 secs delay)

SYNCRHO analysis output reports are included in the attachment.

Approach to Traffic Mitigation

The TIA identified mitigations for intersections and roadway facilities that did not meet the prescribed minimum LOS criteria. For off-site locations, the TIA recommended proportional share contributions that the project should make toward the indentified mitigation. Both WSDOT and Spokane County staff have expressed concern regarding proportional share contributions because there unlikely to be available funding sources to pay for the balance of the project costs beyond the Spokane Tribe's contribution.

In lieu of a proportional share contribution the Spokane Tribe is proposed to fully fund and/or construct certain improvements at the time they deemed necessary. In general the strategy is to construct key mitigations that are most closely related to the impacts caused by the Spokane Tribe project and that will provide an immediate transportation benefit and added capacity to serve the subject project as well benefit regional traffic. By constructing the improvements instead of providing partial funding for some future project or improvement, immediate transportation benefit is provided. Furthermore, the recommended mitigations discussed will provide a viable and immediately available alternative route to Spokane Tribe site along Craig Rd. to SR 902 and I-90 which may serve to relieve traffic along HWY 2.

The proposed mitigations by Site Plan Alternative and Project phase are summarized below.

Alternative 1

2012 (Phase 1) Mitigations:

- HWY 2 - Craig Rd. to Westerly Project Site Property Line: Construct a roundabout at the Craig Rd. intersection and two site access intersection with roundabout intersection control generally at the locations identified in Attachment A. Construct frontage improvements along the northerly side of HWY 2 including curbing, drainage improvements, sidewalks or paths as applicable. (Note the proportional share responsibility for the Craig Rd. intersection was calculated as 34.2% in the TIA)

Resulting LOS & Delay (sec):

HWY 2 / Craig: A/7.8

HWY 2 / East Site Access: B/15.2



HWY 2 / West Site Access: B/11.0

- Craig Rd. - HWY 2 to 6th Ave.: Widen Craig Rd. and provide site access intersection improvements as assumed and identified in the TIA. Construction frontage improvements along the Spokane Tribe site frontage. Widen road to accommodate a three lane roadway section and bike lanes; approximately 45-50ft depending on the ultimate design level determination of appropriate lane widths. Construct site access driveways as indicated in the site plan and such that no access aligns with 12th Avenue.
- Craig Rd/SR 902: Construct or fully fund construction of either a traffic signal and related intersection improvements or a roundabout. (Note the proportional share responsibility for the was calculated as 23.7% in the TIA)
Resulting LOS & Delay (sec): B/15.6 / A/8.6 (roundabout)
- HWY 2/Hayford Rd.: Commit to funding a proportional share (based on project and phase generated traffic) to improvements to the 21st Ave./18th Ave. corridor at the time of construction of said improvements (See further discussion of HWY2/Hayford mitigation in the previous section).
- 6th Street: In the event that the 6th Street extension (near and east of Craig R.) is not completed prior to project implementation, the Tribe shall fully fund development of the unfinished portion of the 6th Street extension from approximately South Aspen Street to Craig Road. The City shall enter into an agreement with the Tribe to reimburse the Tribe for cost of development of the 6th Street extension through development of local traffic impact fee assessment areas.
- 12th Avenue: The Tribe shall fully fund the posting of signage for the eastbound traffic on 12th Avenue and Craig Road stating “Local Access Only” or provide other similar means of discouraging the use of 12th Ave. by Spokane Tribe site traffic. 12th Avenue shall be considered within the future traffic impact analysis described under Traffic Mitigation Measure B. If the results of the updated TIA determine that the traffic mitigation identified for 12th Avenue should be adjusted due to changes in future traffic background conditions, the recommendations shall be subject to review and approval by the City prior to any modifications to the traffic mitigation plan.

By fully funding HWY 2/Craig and Craig/SR 902 improvements the Spokane Tribe project is contributing substantially beyond the impact created by the project. The amount beyond the project’s proportional responsibility should be credited towards future off-site mitigations identified in future phases.

Additionally, the City of Airway Heights has established a traffic mitigation fee to fund improvements at the HWY 2/Craig intersection. Funds collected to date should be used to reimburse the Spokane Tribe for its design and construction expenses related to this intersection. Furthermore, it is recommended that the City of Airway Heights collect late comers traffic impact fees for this intersection as reimbursement to the Spokane Tribe for funding and construction beyond their proportional responsibility.

2015 (Phase 2) Mitigations:

- Hwy 2 / Craig: Improvements constructed as Phase 1 mitigation.
Resulting LOS & Delay (sec): B/12.4
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.



Project Proportional Share: 29.8% Funding or proportional share credit identified in Phase 1 mitigations applied to this project.

- HWY 2/Hayford Rd.: Commit to funding a proportional share (based on project and phase generated traffic) to improvements to the 21st Ave./18th Ave. corridor at the time of construction of said improvements (See further discussion of HWY2/Hayford mitigation in the previous section).
- Craig / SR 902: Improvements constructed as Phase 1 mitigation
- Hwy 2 / Access Intersections: Improvements constructed as Phase 1 mitigation
Resulting LOS & Delay (sec):
HWY 2 / East Site Access: C/32.0
HWY 2 / West Site Access: B/15.4

2019 (Phase 3) Mitigations:

- Hwy 2 / Craig: Improvements constructed as Phase 1 mitigation.
Resulting LOS & Delay (sec): D/47.4
- Hwy 2 / Lundstrom: Restripe and widen approaches to accommodate exclusive NB and SB right turn lanes.
Project Proportional Share: 29.4% Funding or proportional share credit identified in Phase 1 mitigations applied to this project.
- Hwy 2 / Garfield: Optimize signal timing. Funding or proportional share credit identified in Phase 1 mitigations applied to this project.
Project Proportional Share: 23.7%
- HWY 2/Hayford Rd.: Commit to funding a proportional share (based on project and phase generated traffic) to improvements to the 21st Ave./18th Ave. corridor at the time of construction of said improvements (See further discussion of HWY2/Hayford mitigation in the previous section).
- Craig / SR 902: Improvements constructed as Phase 1 mitigation.
Resulting LOS & Delay (sec): B/17.6 / B/10.4 (roundabout)
- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 38.0%
Resulting LOS & Delay (sec): D/28.8
- Hwy 2 / Access Intersections: Improvements constructed as Phase 1 mitigation
Resulting LOS & Delay (sec):
HWY 2 / East Site Access: D/35.6
HWY 2 / West Site Access: D/54.6

Alternative 2

See Alternative 1 – Phase 1 recommendations. See Attachment B for resulting LOS for the Two Roundabout Access Scheme

Alternative 3

Recommended improvements are summarized below:

- HWY 2 - Craig Rd. to Westerly Project Site Property Line: Construct a roundabout at the Craig Rd. intersection and two site access intersection with roundabout intersection control generally at the locations identified in Attachment A. Construct frontage improvements along the northerly side of HWY 2 including curbing, drainage improvements, sidewalks or paths as applicable.



(Note the proportional share responsibility for the Craig Rd. intersection was calculated as 34.2% in the TIA)

Resulting LOS & Delay (sec):

HWY 2 / Craig: A/7.1

HWY 2 / East Site Access: B/13.4

HWY 2 / West Site Access: B/10.1

- Craig Rd. - HWY 2 to 6th Ave.: Widen Craig Rd. and provide site access intersection improvements as assumed and identified in the TIA. Construction frontage improvements along the Spokane Tribe site frontage. Widen road to accommodate a three lane roadway section and bike lanes; approximately 45-50ft depending on the ultimate design level determination of appropriate lane widths. Construct site access driveways as indicated in the site plan and such that no access aligns with 12th Avenue.
- Craig Rd/SR 902: Construct or fully fund construction of either a traffic signal and related intersection improvements or a roundabout. (Note the proportional share responsibility for the was calculated as 23.7% in the TIA)
Resulting LOS & Delay (sec): B/15.1 / A/8.2
- HWY 2/Hayford Rd.: Commit to funding a proportional share (based on project and phase generated traffic) to improvements to the 21st Ave./18th Ave. corridor at the time of construction of said improvements (See further discussion of HWY2/Hayford mitigation in the previous section).
- 6th Street: In the event that the 6th Street extension (near and east of Craig R.) is not completed prior to project implementation, the Tribe shall fully fund development of the unfinished portion of the 6th Street extension from approximately South Aspen Street to Craig Road. The City shall enter into an agreement with the Tribe to reimburse the Tribe for cost of development of the 6th Street extension through development of local traffic impact fee assessment areas.
- 12th Avenue: The Tribe shall fully fund the posting of signage for the eastbound traffic on 12th Avenue and Craig Road stating “Local Access Only” or provide other similar means of discouraging the use of 12th Ave. by Spokane Tribe site traffic. 12th Avenue shall be considered within the future traffic impact analysis described under Traffic Mitigation Measure B. If the results of the updated TIA determine that the traffic mitigation identified for 12th Avenue should be adjusted due to changes in future traffic background conditions, the recommendations shall be subject to review and approval by the City prior to any modifications to the traffic mitigation plan.

2032 Cumulative Mitigation Improvements

The improvements identified below in addition to the improvements identified above are required to mitigate 2032 Cumulative With Project conditions. Prior to buildout of the Spokane Tribe site it is recommended that the TIA be updated based on the traffic conditions present at that time and the subject intersections reevaluated to determine if mitigations are necessary and to recalculate the proportional share contributions. Any remaining credits or overage from previously constructed or funded mitigations shall be applied to the proportional share amount identified below.

2032 Alternative 1 Mitigations (in addition to Alt. 1 Ph. 3 2019 mitigations above):

In lieu of constructing the mitigations identified in the TIA at the Lundstrom, Lawson, Garfield intersections along HWY 2 is recommend that the project contribute a proportional share to improvements to the 21st Ave. alternative route which will relieve traffic from the HWY 2 corridor and likely eliminate the need for improvements to the Lundstrom, Lawson and Garfield intersections.



- Hwy 2 / Fairchild AFB: Modify signal timing. Add a 2nd NB right turn lane.
Project Proportional Share: 11.6%
Resulting LOS & Delay (sec): D/51.6
- Craig Rd./Sixth Ave.: Consider installation of a roundabout in lieu of mitigation identified for 2019 condition.
Project Proportional Share: 33.5%
Resulting LOS & Delay (sec): C/20.5
- Craig / North Driveway.: Consider adding a 2nd NB thru lane. If this improvement is chosen it is recommended that the 2nd NB thru lane be continuous from Highway 2 to 6th Ave. Alternatively, consider installation of a roundabout which would also achieve a satisfactory level of service.
Project Proportional Share: 100%
Resulting LOS & Delay (sec): E.37.3 / B/11.4 (roundabout)
- HWY 2/West Site Access: Add a 4th, southerly leg to the intersection to extend and connect to 21st Ave.
Resulting LOS & Delay (sec): D/53.2
- HWY 2/Craig Rd.: Modify northbound and southbound approaches to provide dual left turn capability.
Resulting LOS & Delay (sec): D/54.4

2032 Alternative 2 Mitigations (in addition to Alt. 2 2012 mitigations above):

In lieu of constructing the mitigations identified in the TIA at the Lundstrom, Lawson, Garfield intersections along HWY 2 is recommend that the project contribute a proportional share to improvements to the 21st Ave. alternative route which will relieve traffic from the HWY 2 corridor and likely eliminate the need for improvements to the Lundstrom, Lawson and Garfield intersections.

- Craig / Sixth Ave.: Widen the intersection approach to provide and exclusive NB right turn lane.
Project Proportional Share: 25.6%
- Hwy 2 / Fairchild AFB: Modify signal timing. Add a 2nd NB right turn lane.
Project Proportional Share: 11.6%
Resulting LOS & Delay (sec): D/44.8
- HWY 2/West Site Access: Add a 4th, southerly leg to the intersection to extend and connect to 21st Ave.
Resulting LOS & Delay (sec): D/37.9

2032 Alternative 3 Mitigations (in addition to Alt. 3 mitigations above):

In lieu of constructing the mitigations identified in the TIA at the Lundstrom, Lawson, Garfield intersections along HWY 2 is recommend that the project contribute a proportional share to improvements to the 21st Ave. alternative route which will relieve traffic from the HWY 2 corridor and likely eliminate the need for improvements to the Lundstrom, Lawson and Garfield intersections.

- Hwy 2 / Fairchild AFB: Modify signal timing. Add a 2nd NB right turn lane.
Project Proportional Share: 11.6%
Resulting LOS & Delay (sec): D/42.7
- HWY 2/West Site Access: Add a 4th, southerly leg to the intersection to extend and connect to 21st Ave.
Resulting LOS & Delay (sec): D/33.9



Attachment A: Two Roundabout Site Access Scheme





Attachment B: Two Roundabout Access Scheme LOS/Delay Summary Table

Two Roundabout Access Scheme - Level of Service (LOS)

Scenario	2012 Alt. 1, PH 1		2015 Alt. 1, PH 2		2019 Alt. 1, PH 3 (Buildout)		2012 Alt. 2, Buildout		2012 Alt. 3, Buildout		2032 Alt. 1, Buildout		2032 Alt. 2, Buildout		2032 Alt. 3, Buildout	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Intersection																
West Access/Hwy. 2	11.0	B	15.4	B	35.6	D	11.0	B	10.1	B	53.2	D	37.9	D	33.9	C
East Access/Hwy. 2	15.2	B	32.0	C	54.6	D	15.2	B	13.4	B	47.5	D	19.4	B	16.5	B



Attachment C: Operational Analysis Output Reports, Traffic Volumes

Year 2032 + Project Traffic Volumes							
SPK Draft EIS	2012 Alt. 1, PH 1	2015 Alt. 1, PH 2	2019 Alt. 1, PH 3	2012 Alt. 2, BO	2012 Alt. 3, BO	2032 Alt. 1, BO	2032 A
West Entrance/21st at Hwy. 2							
EBL	95	110	125	95	86	132	1
EBT	1326	1489	1759	1326	1302	2111	20
WBT	1311	1525	1840	1311	1256	2108	19
WBR	278	328	377	278	248	392	2
SBL	169	201	236	169	159	242	1
SBR	171	192	217	171	161	231	1
Middle Dwy. at Hwy. 2							
EBL	223	256	292	223	200	308	2
EBT	1272	1434	1703	1272	1261	2095	20
WBT	1418	1653	1972	1418	1363	2313	2
WBR	417	492	565	417	373	588	4
SBL	506	603	707	506	478	725	5
SBR	171	192	217	171	161	231	1

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

7/13/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗↘
Volume (vph)	778	60	621	843	439	1243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	0.88
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)	3471	1553	3467	1881	1805	2842
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	2842
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1081	83	862	1171	610	1726
RTOR Reduction (vph)	0	41	0	0	0	0
Lane Group Flow (vph)	1081	42	862	1171	610	1726
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	36.0	36.0	27.0	69.0	36.0	115.0
Effective Green, g (s)	36.0	36.0	27.0	69.0	36.0	115.0
Actuated g/C Ratio	0.31	0.31	0.23	0.60	0.31	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1087	486	814	1129	565	2842
v/s Ratio Prot	0.31		0.25	c0.62	c0.34	
v/s Ratio Perm		0.03				0.61
v/c Ratio	0.99	0.09	1.06	1.04	1.08	0.61
Uniform Delay, d1	39.4	27.9	44.0	23.0	39.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	25.8	0.1	48.3	36.9	61.2	1.0
Delay (s)	65.2	28.0	92.3	59.9	100.7	1.0
Level of Service	E	C	F	E	F	A
Approach Delay (s)	62.5			73.7	27.0	
Approach LOS	E			E	C	
Intersection Summary						
HCM Average Control Delay			51.6		HCM Level of Service	D
HCM Volume to Capacity ratio			1.05			
Actuated Cycle Length (s)			115.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			77.0%		ICU Level of Service	D
Analysis Period (min)			15			
Description: Add 2nd Nbound left turn lane, Optimize						
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

7/13/2011

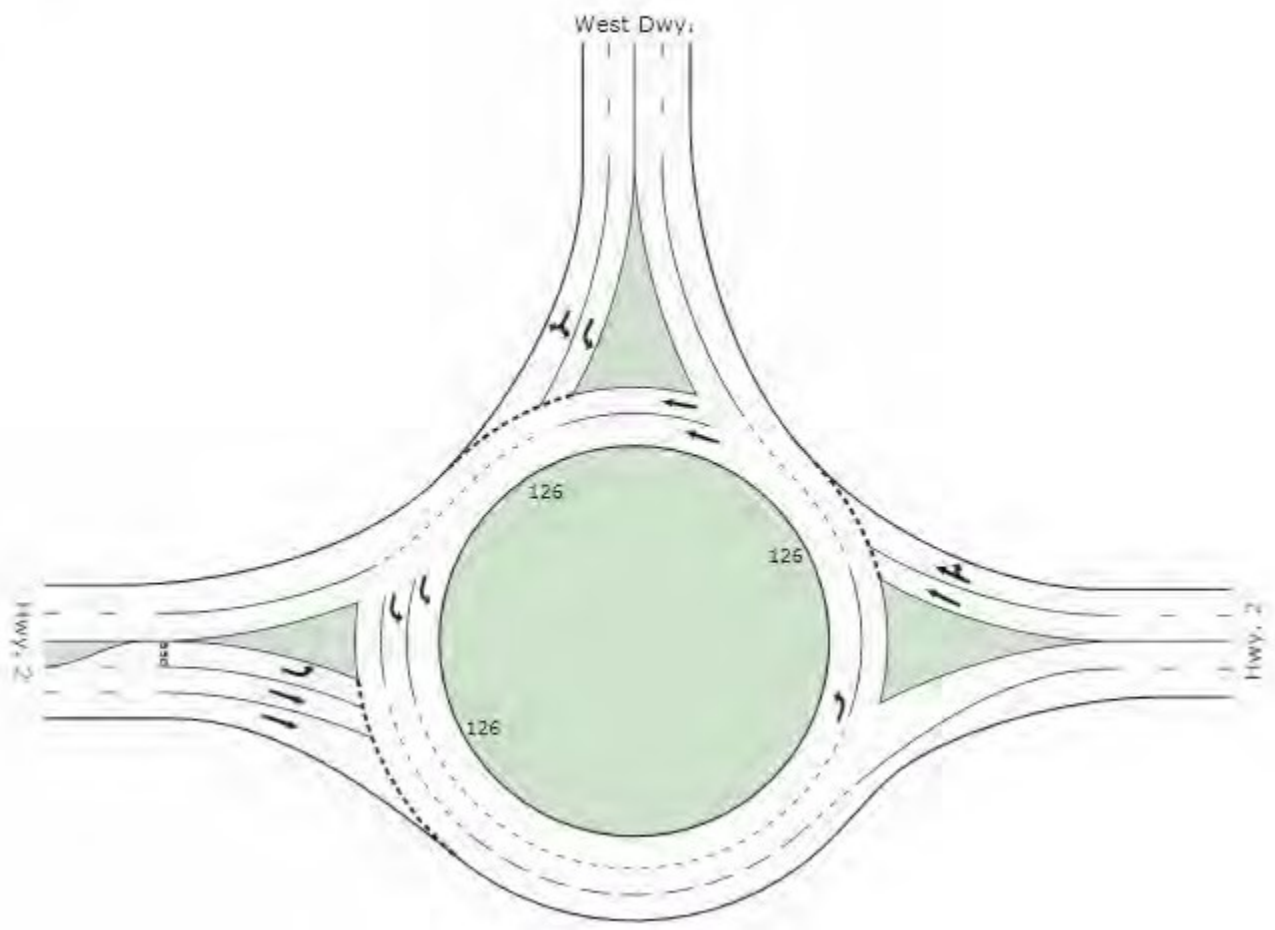
	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗↘
Volume (vph)	734	60	591	798	439	1214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3471	1553	3467	1881	1805	2842
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	2842
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	1019	83	821	1108	610	1686
RTOR Reduction (vph)	0	37	0	0	0	0
Lane Group Flow (vph)	1019	46	821	1108	610	1686
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot		Free	
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	41.6	41.6	31.6	79.2	31.6	120.8
Effective Green, g (s)	41.6	41.6	31.6	79.2	31.6	120.8
Actuated g/C Ratio	0.34	0.34	0.26	0.66	0.26	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1195	535	907	1233	472	2842
v/s Ratio Prot	0.29		0.24	c0.59	c0.34	
v/s Ratio Perm		0.03				0.59
v/c Ratio	0.85	0.09	0.91	0.90	1.29	0.59
Uniform Delay, d1	36.8	26.7	43.2	17.4	44.6	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.1	12.3	8.9	146.7	0.9
Delay (s)	42.8	26.8	55.5	26.4	191.3	0.9
Level of Service	D	C	E	C	F	A
Approach Delay (s)	41.6			38.8	51.5	
Approach LOS	D			D	D	
Intersection Summary						
HCM Average Control Delay			44.8		HCM Level of Service	D
HCM Volume to Capacity ratio			1.01			
Actuated Cycle Length (s)			120.8		Sum of lost time (s)	10.0
Intersection Capacity Utilization			74.8%		ICU Level of Service	D
Analysis Period (min)			15			
Description: Add 2nd Nbound right turn lane						
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

11: Hwy. 2 & Fairchild AFB

7/13/2011

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘↙	↑	↘	↗↘
Volume (vph)	715	60	584	787	439	1201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	4.0	4.0
Lane Util. Factor	0.95	1.00	0.97	1.00	1.00	0.88
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)	3471	1553	3467	1881	1805	2842
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3471	1553	3467	1881	1805	2842
Peak-hour factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72
Adj. Flow (vph)	993	83	811	1093	610	1668
RTOR Reduction (vph)	0	38	0	0	0	0
Lane Group Flow (vph)	993	45	811	1093	610	1668
Heavy Vehicles (%)	4%	4%	1%	1%	0%	0%
Turn Type	Perm		Prot			Free
Protected Phases	6		5	2	4	
Permitted Phases		6				Free
Actuated Green, G (s)	40.1	40.1	31.4	77.5	32.6	120.1
Effective Green, g (s)	40.1	40.1	31.4	77.5	32.6	120.1
Actuated g/C Ratio	0.33	0.33	0.26	0.65	0.27	1.00
Clearance Time (s)	6.0	6.0	6.0	6.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1159	519	906	1214	490	2842
v/s Ratio Prot	0.29		0.23	c0.58	c0.34	
v/s Ratio Perm		0.03				0.59
v/c Ratio	0.86	0.09	0.90	0.90	1.24	0.59
Uniform Delay, d1	37.3	27.4	42.8	18.0	43.8	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	0.1	11.3	9.3	126.5	0.9
Delay (s)	43.7	27.5	54.0	27.3	170.2	0.9
Level of Service	D	C	D	C	F	A
Approach Delay (s)	42.5			38.7	46.2	
Approach LOS	D			D	D	
Intersection Summary						
HCM Average Control Delay			42.7		HCM Level of Service	D
HCM Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			120.1		Sum of lost time (s)	10.0
Intersection Capacity Utilization			74.1%		ICU Level of Service	D
Analysis Period (min)			15			
Description: Add 2nd NBound right turn lane						
c Critical Lane Group						



MOVEMENT SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1425	1.0	0.660	11.3	LOS B	6.4	160.1	0.48	0.39	24.8
6R	R	302	1.0	0.660	11.0	LOS B	6.4	160.1	0.47	0.48	25.0
Approach		1727	1.0	0.660	11.2	LOS B	6.4	160.1	0.48	0.41	24.8
North: West Dwy.											
7L	L	184	1.0	0.367	14.1	LOS B	1.9	49.0	0.80	0.97	22.1
4R	R	186	1.0	0.367	12.0	LOS B	1.9	49.0	0.80	0.91	24.3
Approach		370	1.0	0.367	13.1	LOS B	1.9	49.0	0.80	0.94	23.1
West: Hwy. 2											
5L	L	103	1.0	0.148	6.8	LOS A	0.6	15.3	0.38	0.68	24.8
2T	T	1441	1.0	0.601	10.4	LOS B	4.7	117.7	0.53	0.49	25.9
Approach		1545	1.0	0.601	10.2	LOS B	4.7	117.7	0.52	0.51	25.8
All Vehicles		3641	1.0	0.660	11.0	LOS B	6.4	160.1	0.53	0.50	25.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:47:19 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout\Alt1-PH1.sip

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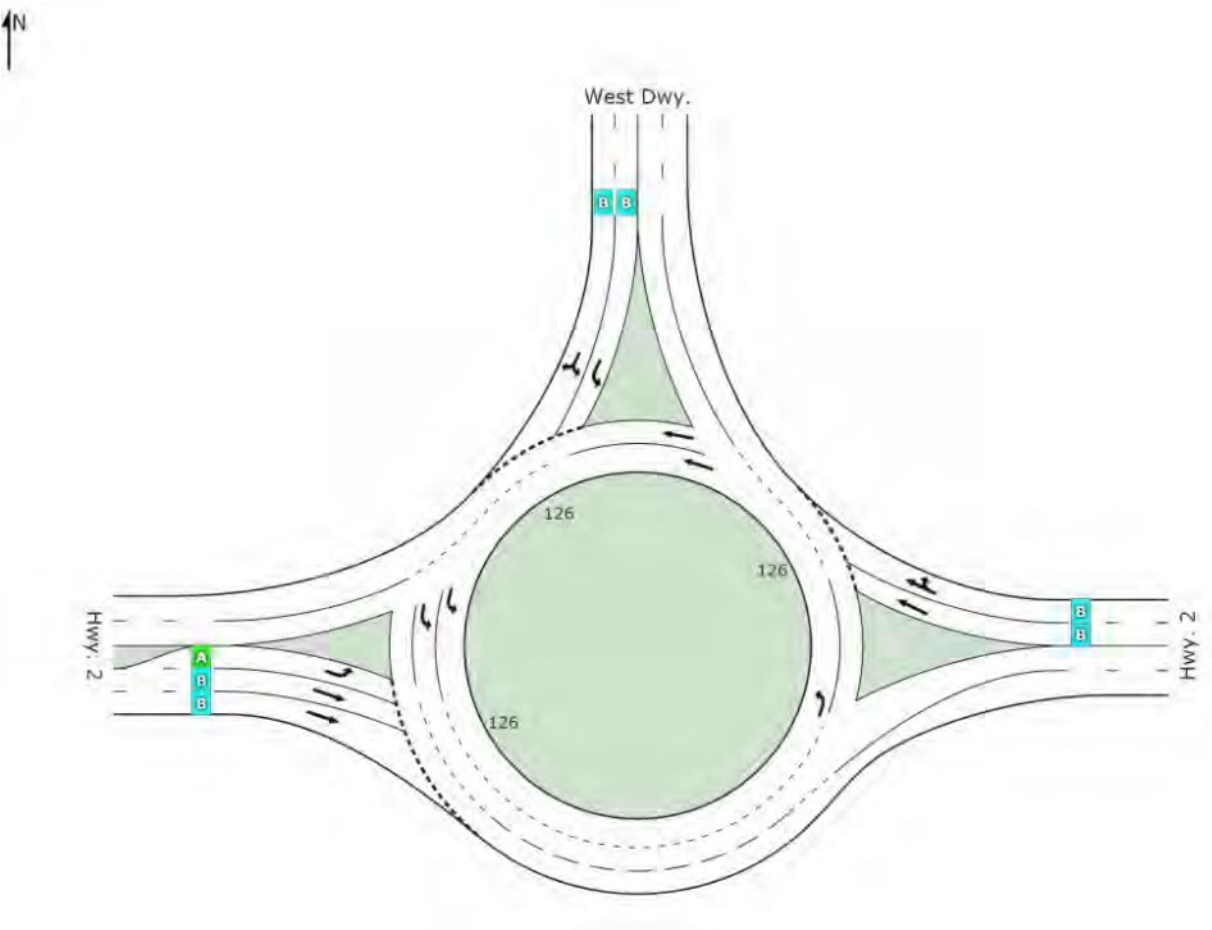
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	B	B	B

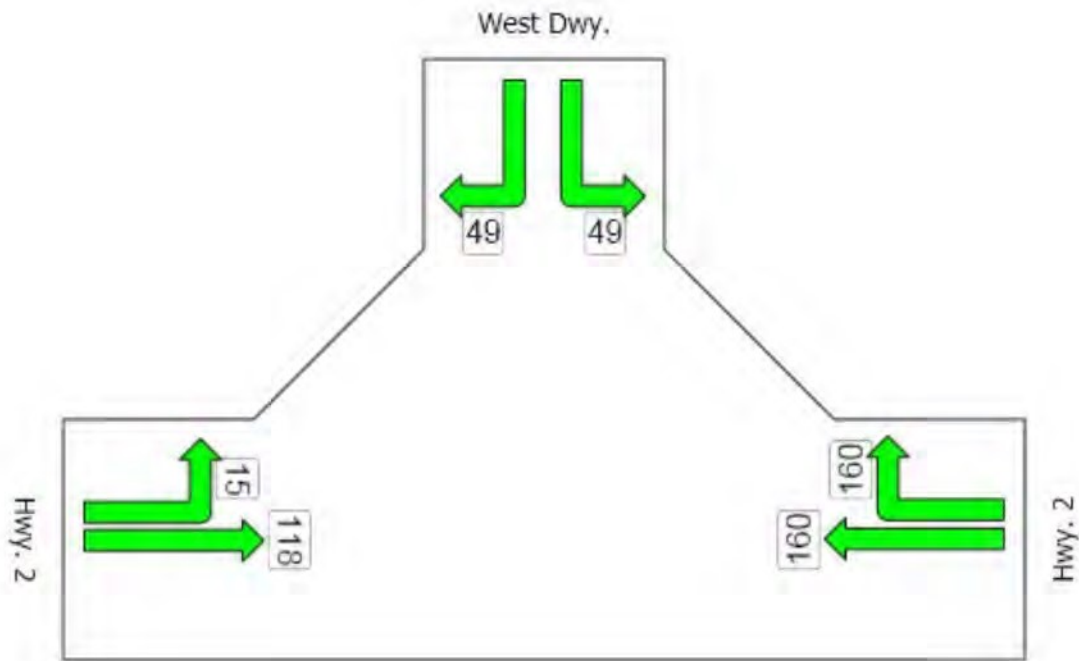
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

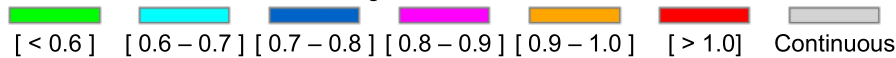
Largest 95% Back of Queue for any lane used by movement (feet)

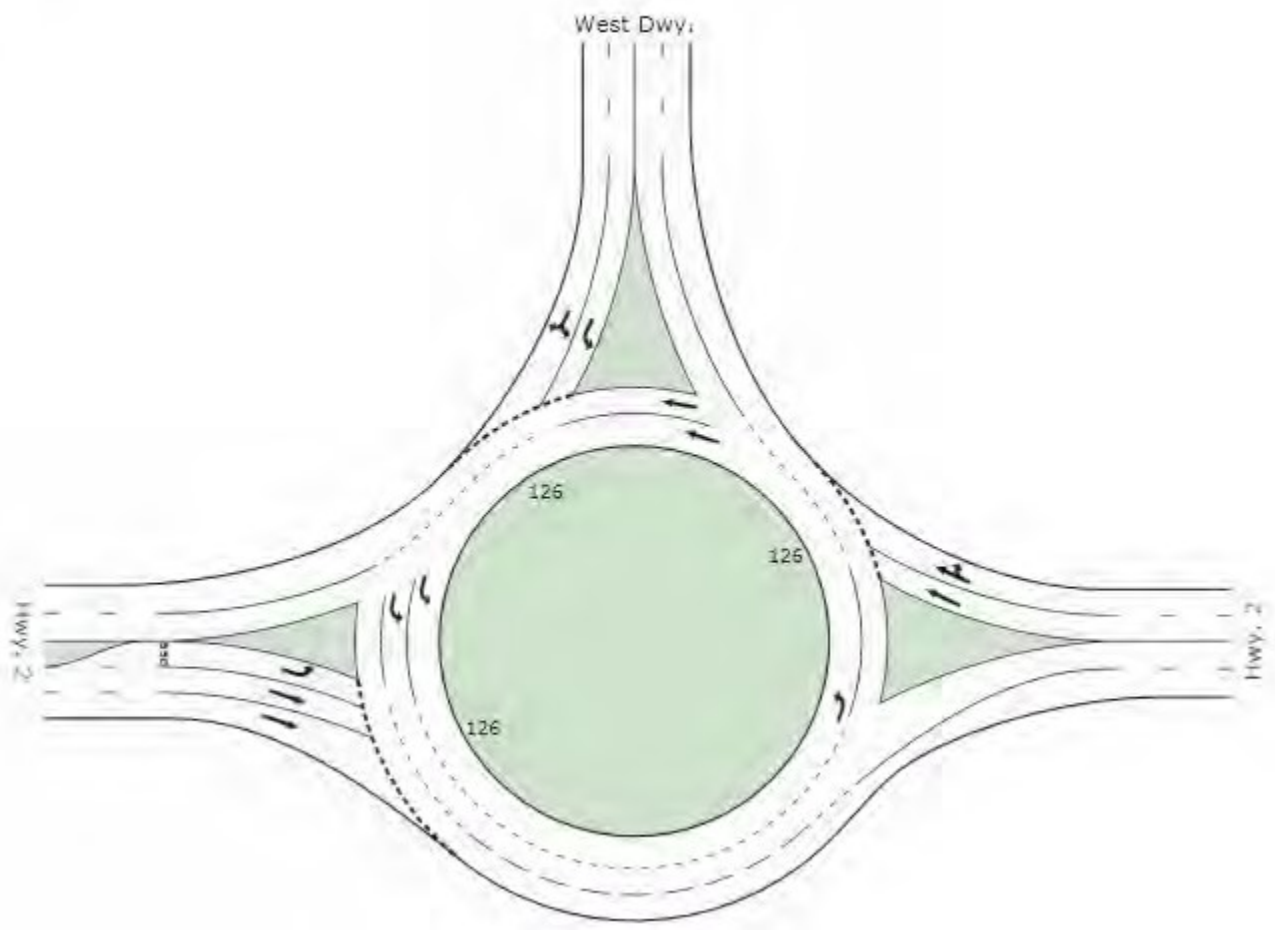
West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	160	49	118	160

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1658	1.0	0.781	15.9	LOS B	9.7	244.3	0.66	0.47	22.6
6R	R	357	1.0	0.781	15.5	LOS B	9.7	244.3	0.65	0.53	23.1
Approach		2014	1.0	0.781	15.8	LOS B	9.7	244.3	0.66	0.48	22.7
North: West Dwy.											
7L	L	218	1.0	0.551	24.9	LOS C	3.5	88.6	0.89	1.06	19.0
4R	R	209	1.0	0.551	20.7	LOS C	3.5	88.6	0.90	1.04	20.9
Approach		427	1.0	0.551	22.9	LOS C	3.5	88.6	0.89	1.05	19.8
West: Hwy. 2											
5L	L	120	1.0	0.178	7.4	LOS A	0.7	18.9	0.42	0.70	24.5
2T	T	1618	1.0	0.698	13.4	LOS B	6.6	166.9	0.66	0.60	24.5
Approach		1738	1.0	0.698	13.0	LOS B	6.6	166.9	0.64	0.60	24.5
All Vehicles		4179	1.0	0.781	15.4	LOS B	9.7	244.3	0.68	0.59	23.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:52:14 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout\Alt1-PH2.sip

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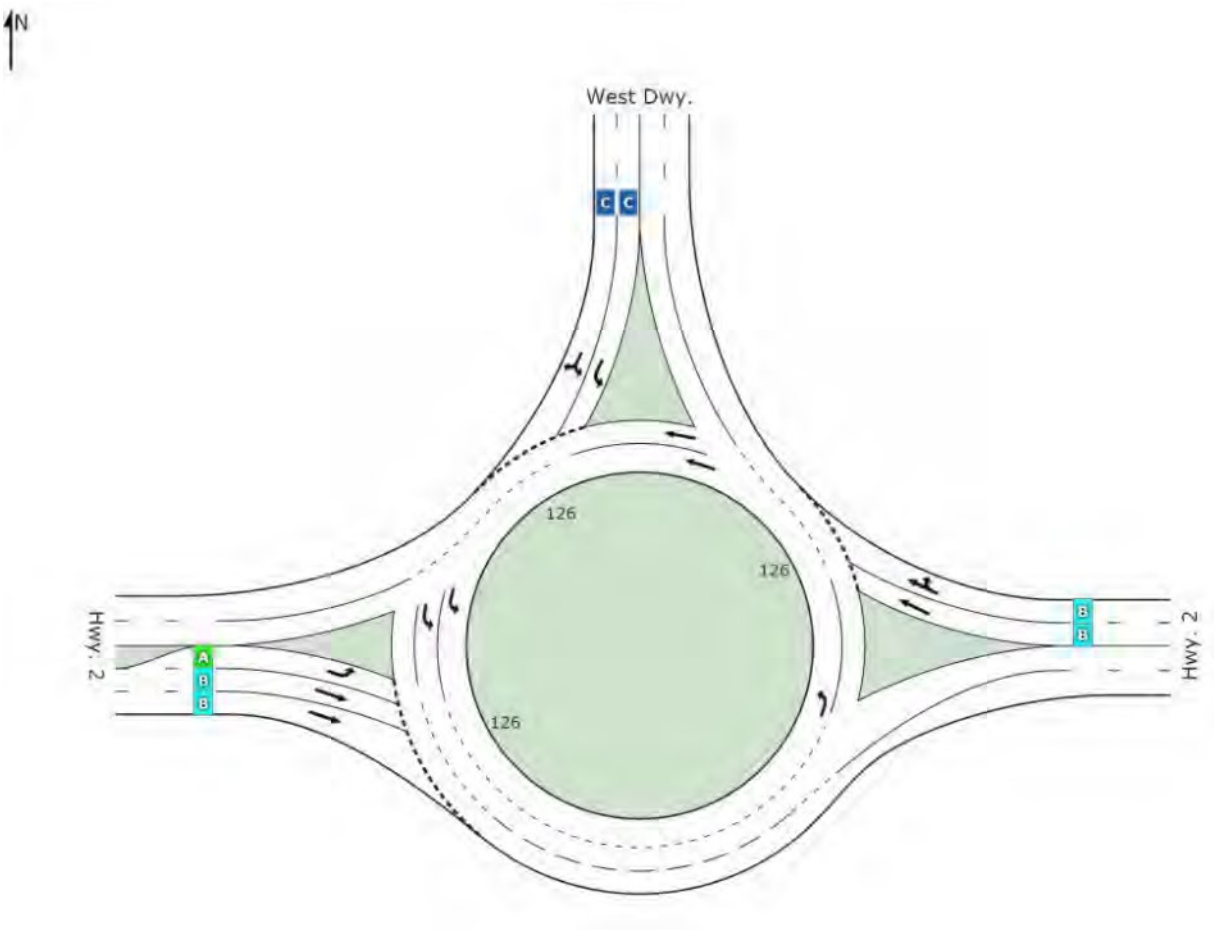
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	C	B	B

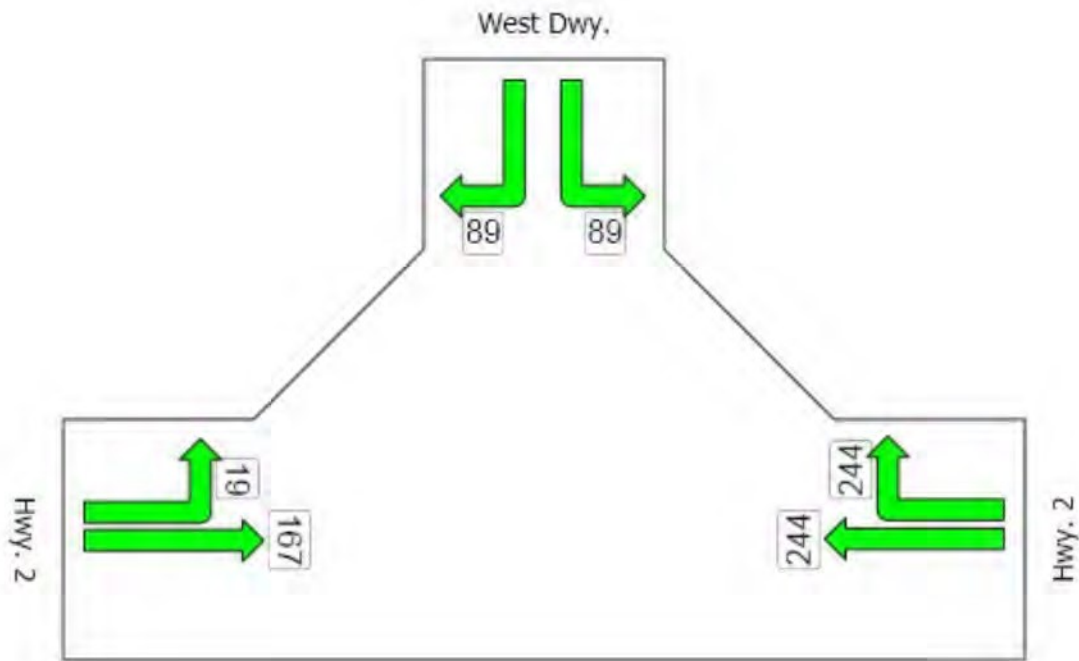
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

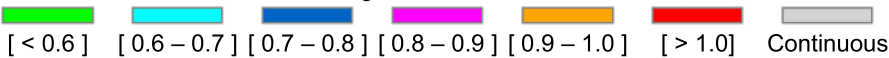
Largest 95% Back of Queue for any lane used by movement (feet)

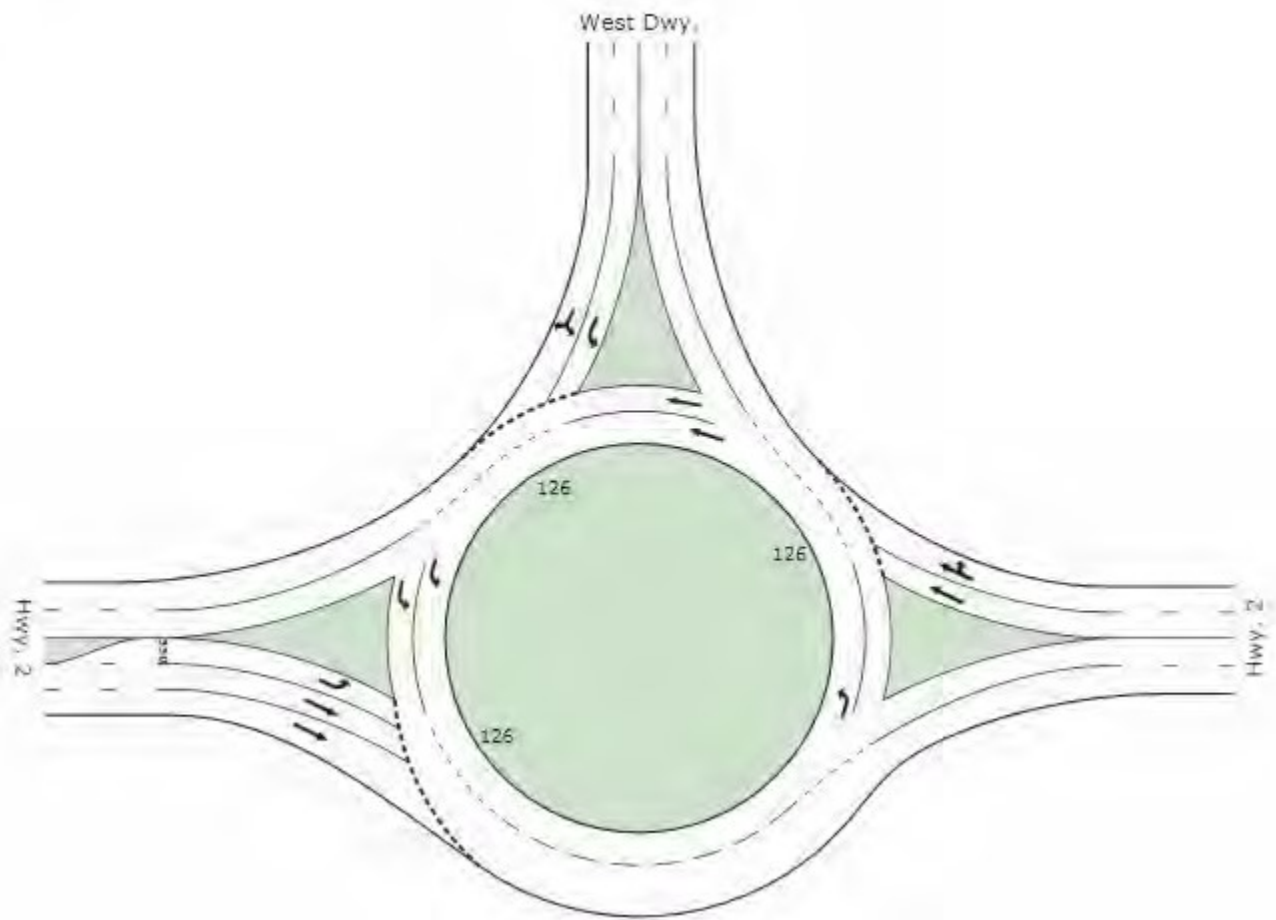
West Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	244	89	167	244

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	2000	1.0	0.948	32.6	LOS C	27.0	680.9	1.00	0.74	17.2
6R	R	410	1.0	0.948	31.8	LOS C	26.9	678.2	1.00	0.72	18.0
Approach		2410	1.0	0.948	32.4	LOS C	27.0	680.9	1.00	0.74	17.4
North: West Dwy.											
7L	L	257	1.0	1.103	143.6	LOS F	18.7	471.1	1.00	1.71	7.4
4R	R	236	1.0	1.103	128.7	LOS F	18.7	471.1	1.00	1.83	7.7
Approach		492	1.0	1.103	136.5	LOS F	18.7	471.1	1.00	1.77	7.5
West: Hwy. 2											
5L	L	136	1.0	0.162	5.9	LOS A	0.9	21.5	0.47	0.68	25.2
2T	T	1912	1.0	0.769	15.6	LOS B	10.1	255.8	0.82	0.69	23.5
Approach		2048	1.0	0.769	15.0	LOS B	10.1	255.8	0.80	0.69	23.6
All Vehicles		4950	1.0	1.103	35.6	LOS D	27.0	680.9	0.92	0.82	16.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:58:03 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout\Alt1-PH3.sip

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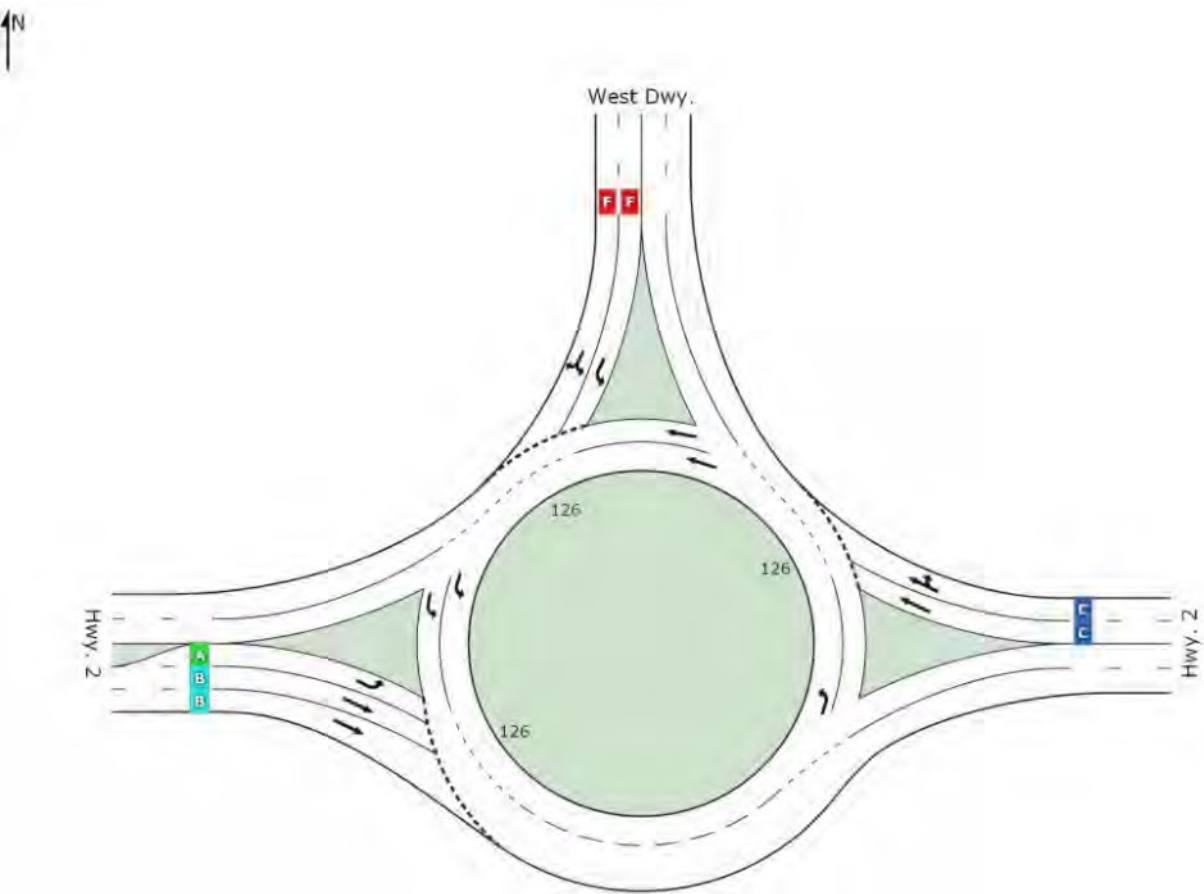
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	C	F	B	D

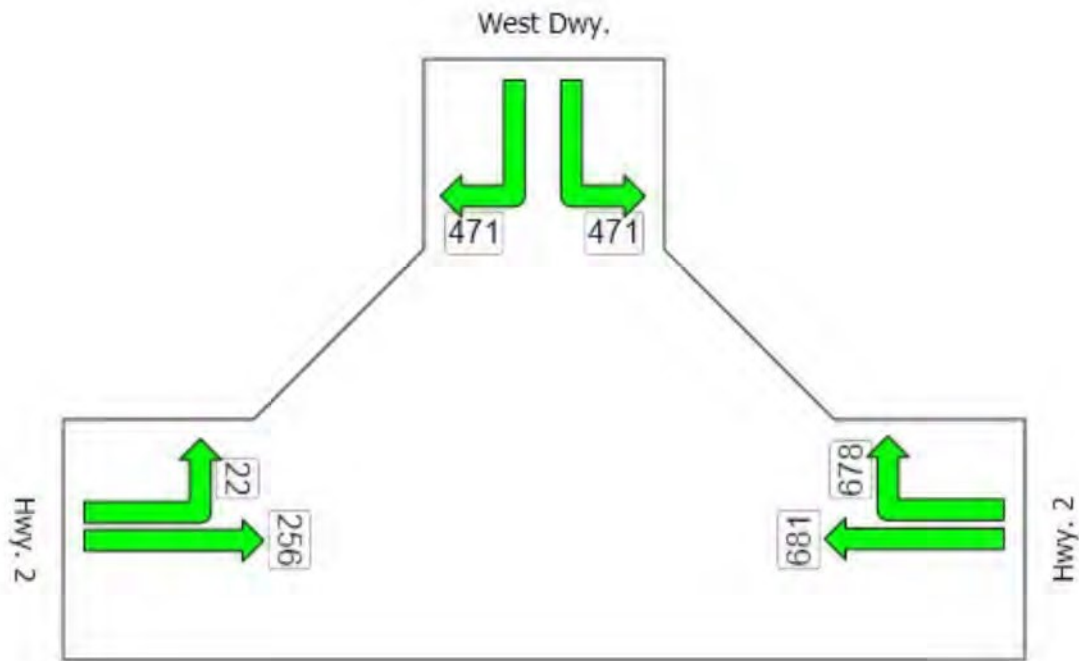
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

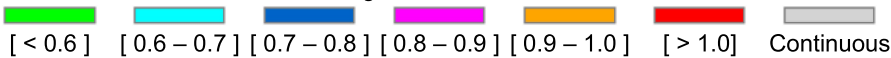
Largest 95% Back of Queue for any lane used by movement (feet)

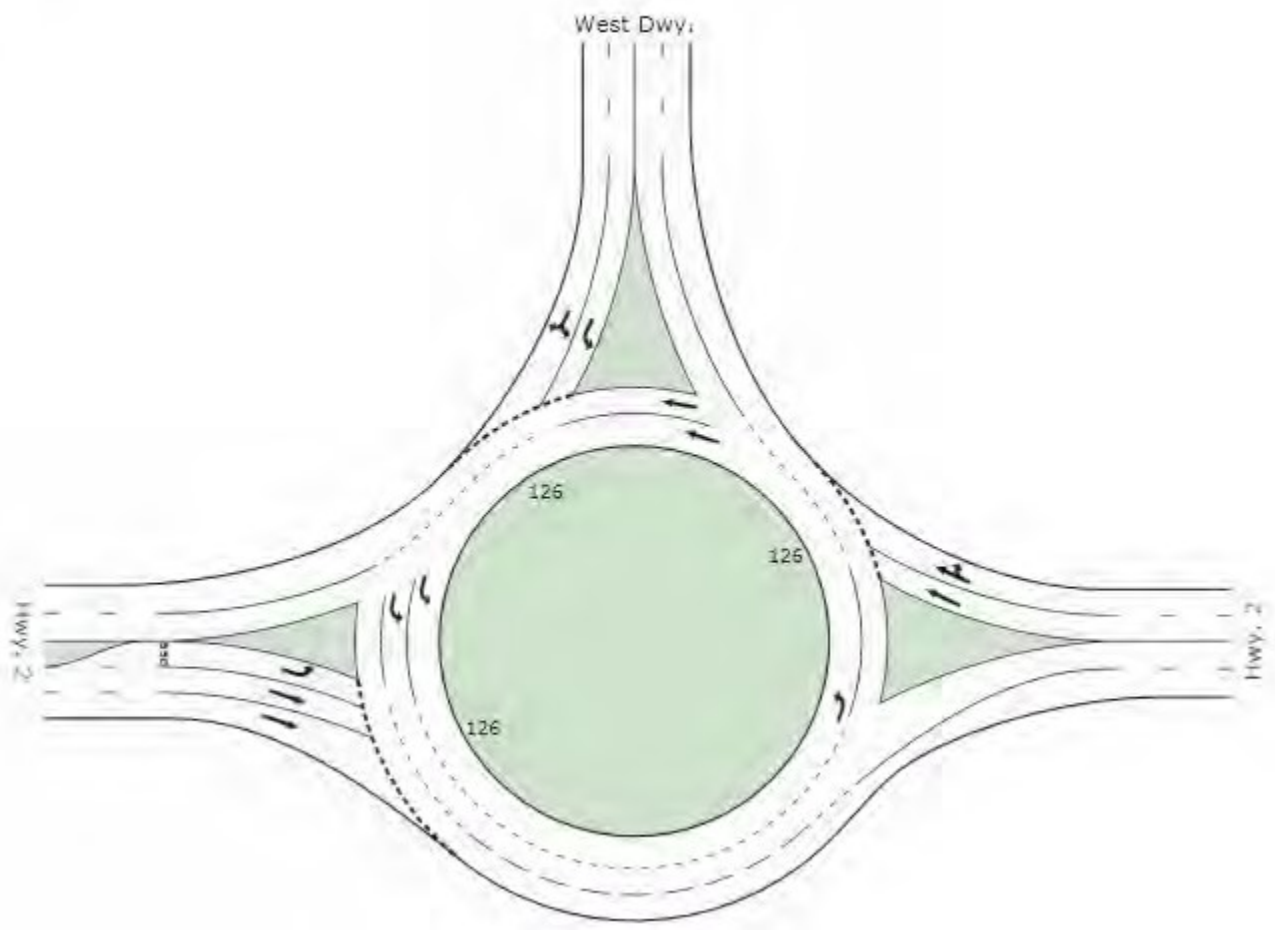
West Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	681	471	256	681

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1425	1.0	0.660	11.3	LOS B	6.4	160.1	0.48	0.39	24.8
6R	R	302	1.0	0.660	11.0	LOS B	6.4	160.1	0.47	0.48	25.0
Approach		1727	1.0	0.660	11.2	LOS B	6.4	160.1	0.48	0.41	24.8
North: West Dwy.											
7L	L	184	1.0	0.367	14.1	LOS B	1.9	49.0	0.80	0.97	22.1
4R	R	186	1.0	0.367	12.0	LOS B	1.9	49.0	0.80	0.91	24.3
Approach		370	1.0	0.367	13.1	LOS B	1.9	49.0	0.80	0.94	23.1
West: Hwy. 2											
5L	L	103	1.0	0.148	6.8	LOS A	0.6	15.3	0.38	0.68	24.8
2T	T	1441	1.0	0.601	10.4	LOS B	4.7	117.7	0.53	0.49	25.9
Approach		1545	1.0	0.601	10.2	LOS B	4.7	117.7	0.52	0.51	25.8
All Vehicles		3641	1.0	0.660	11.0	LOS B	6.4	160.1	0.53	0.50	25.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 8:00:07 AM

SIDRA INTERSECTION 5.1.3.1990

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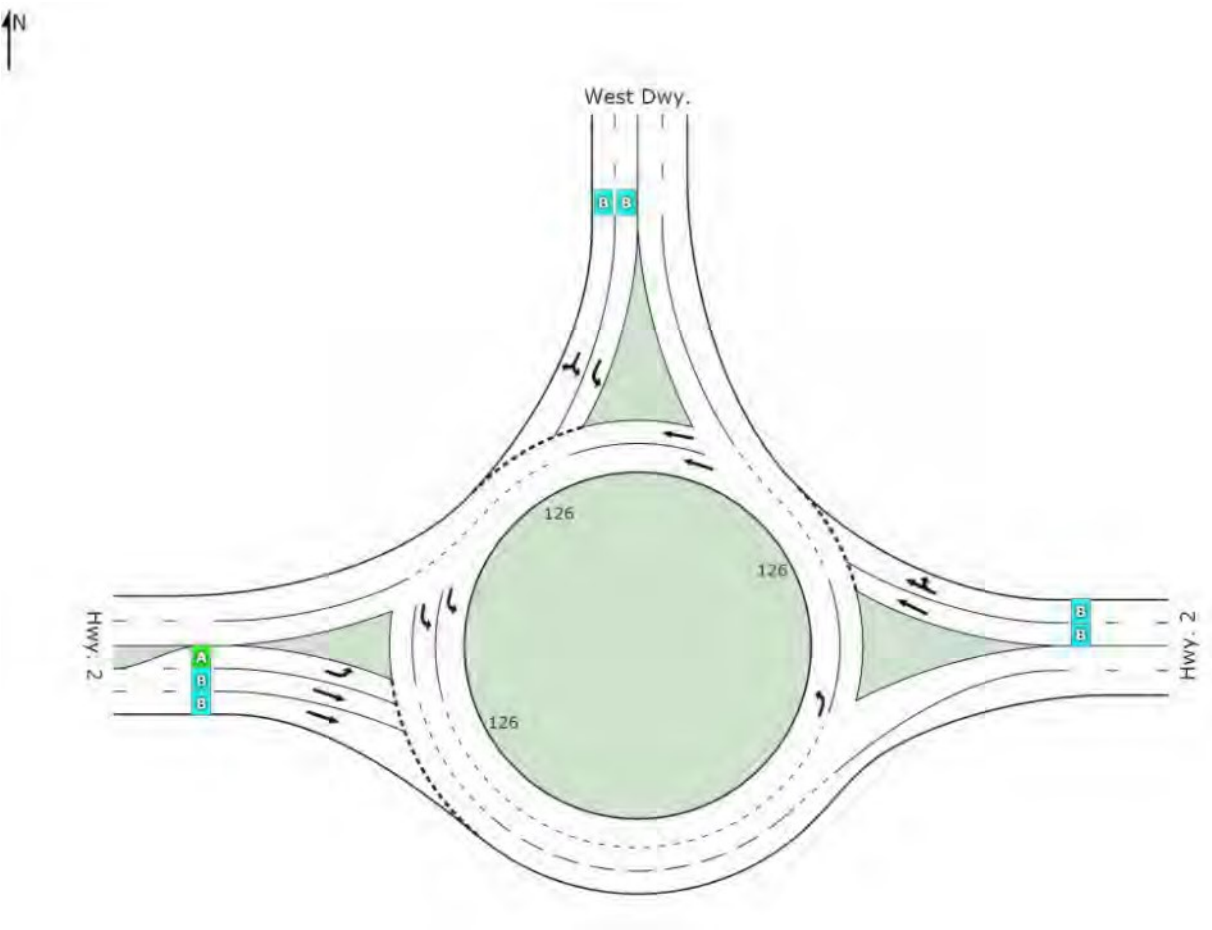
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	B	B	B

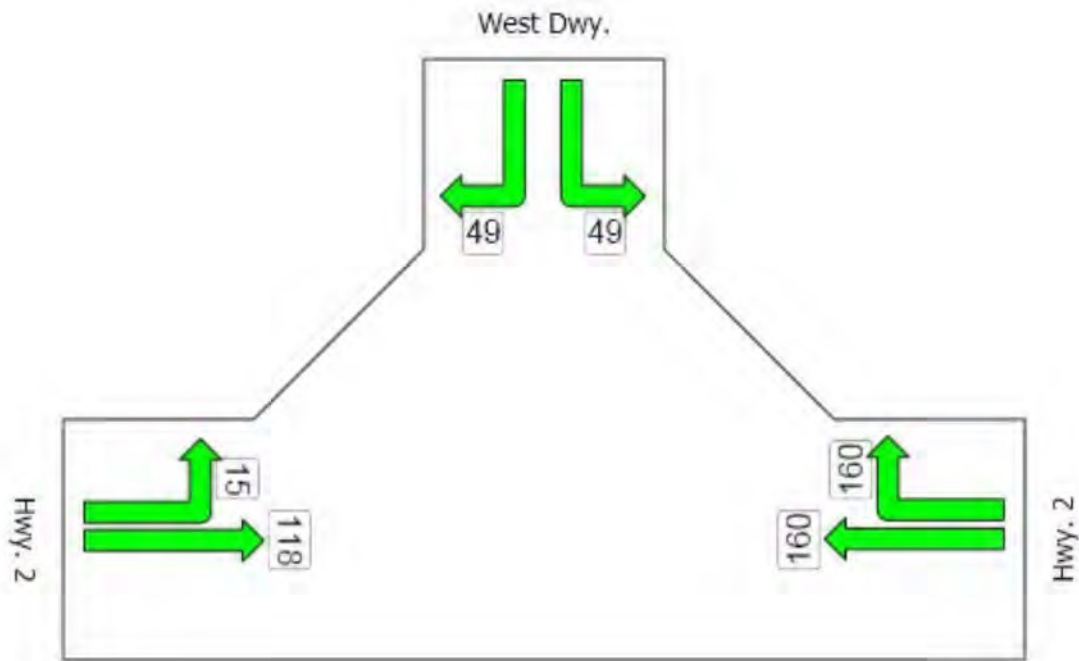
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

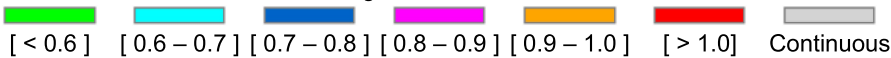
Largest 95% Back of Queue for any lane used by movement (feet)

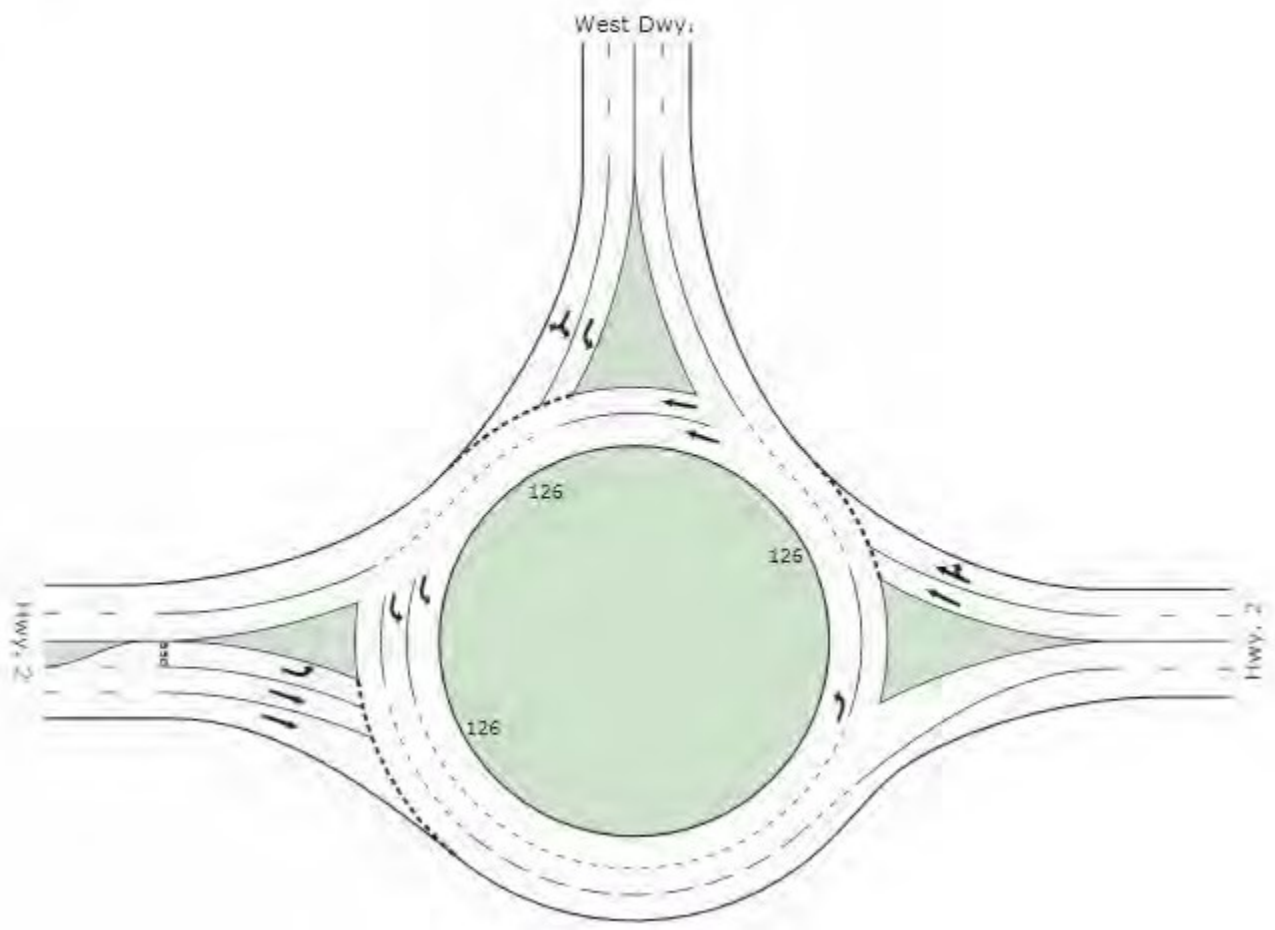
West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	160	49	118	160

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1365	1.0	0.618	10.1	LOS B	5.5	139.4	0.42	0.37	25.4
6R	R	270	1.0	0.618	9.9	LOS A	5.5	139.4	0.41	0.47	25.5
Approach		1635	1.0	0.618	10.1	LOS B	5.5	139.4	0.42	0.38	25.4
North: West Dwy.											
7L	L	173	1.0	0.323	12.3	LOS B	1.6	40.5	0.77	0.94	22.7
4R	R	175	1.0	0.323	10.6	LOS B	1.6	40.5	0.77	0.87	25.0
Approach		348	1.0	0.323	11.5	LOS B	1.6	40.5	0.77	0.91	23.7
West: Hwy. 2											
5L	L	93	1.0	0.132	6.5	LOS A	0.5	13.5	0.36	0.67	24.9
2T	T	1415	1.0	0.584	10.0	LOS A	4.4	111.8	0.51	0.48	26.1
Approach		1509	1.0	0.584	9.8	LOS A	4.4	111.8	0.50	0.49	26.0
All Vehicles		3491	1.0	0.618	10.1	LOS B	5.5	139.4	0.49	0.48	25.5

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 8:04:20 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout\Alt3-Buildout.sip

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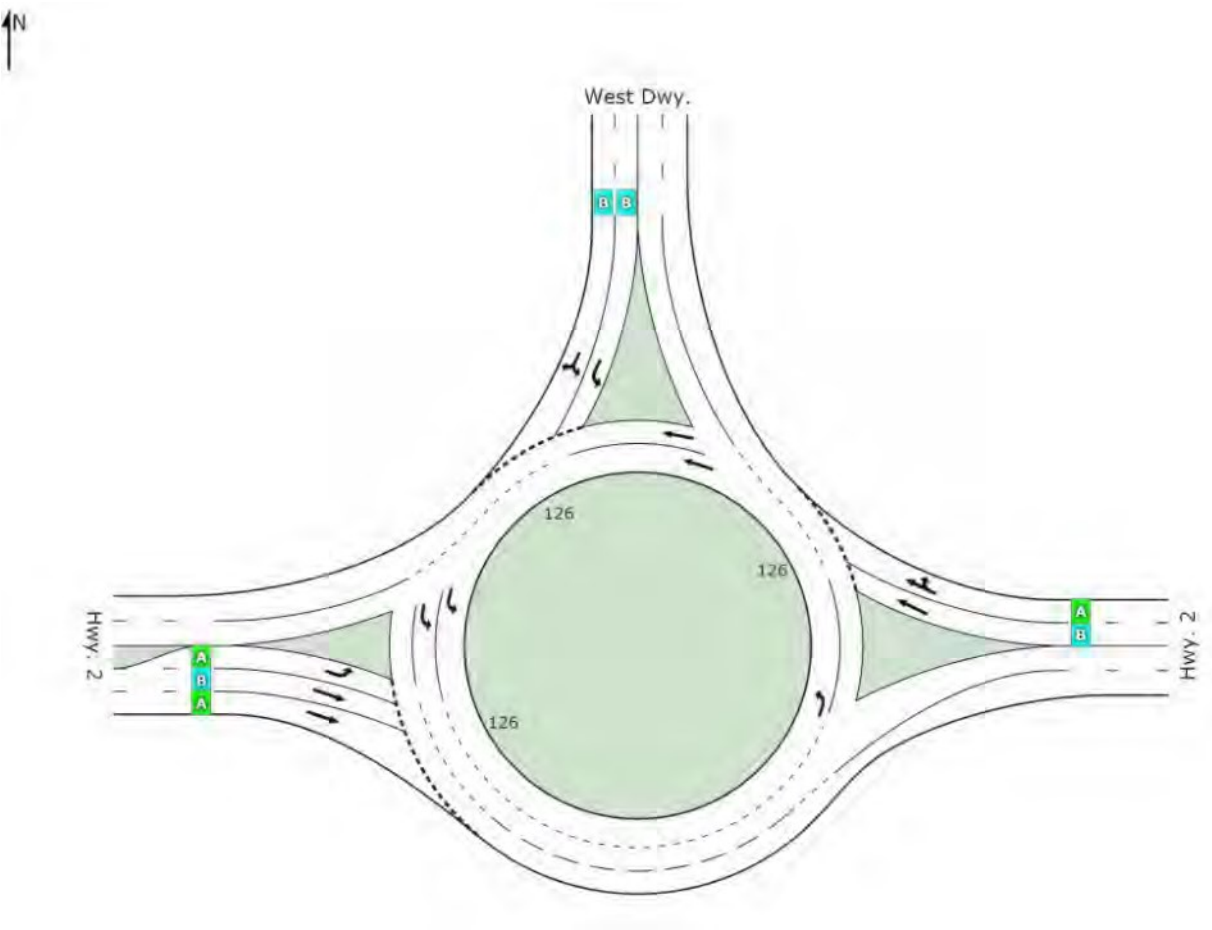
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	B	A	B

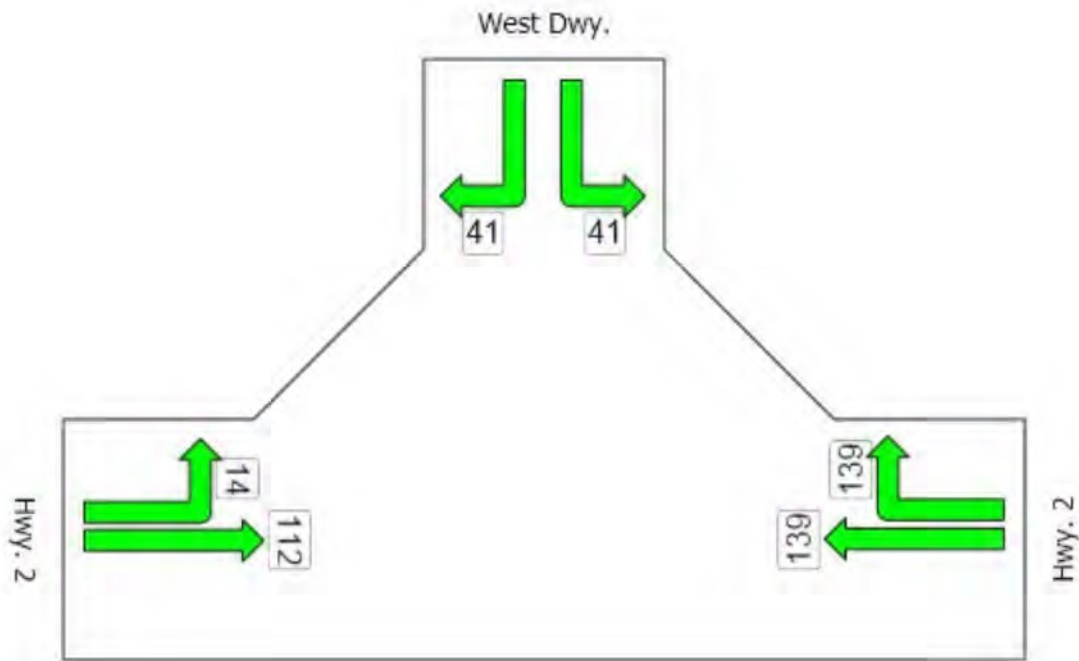
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

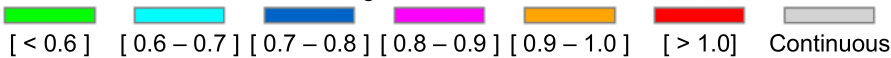
Largest 95% Back of Queue for any lane used by movement (feet)

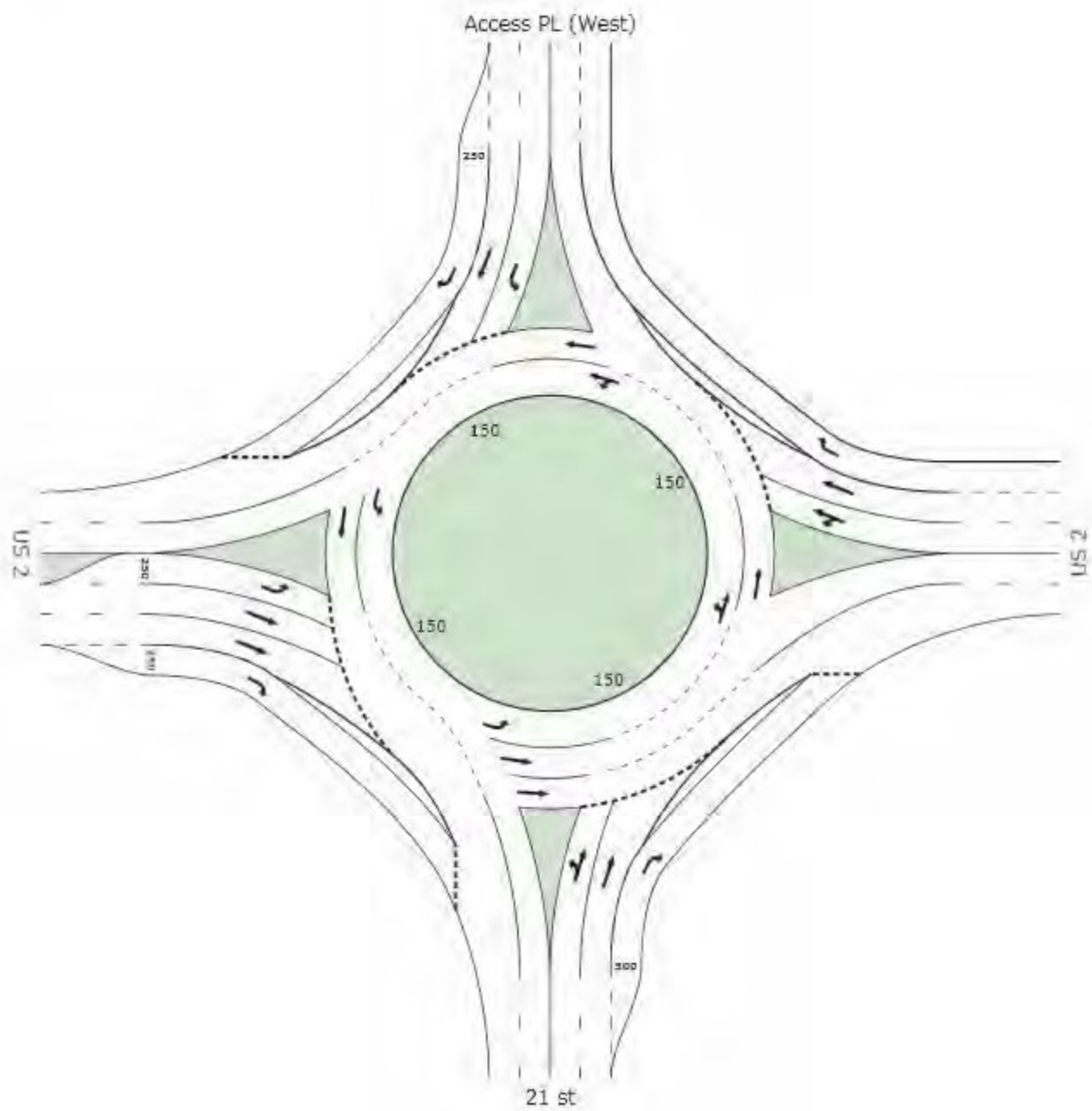
West Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	139	41	112	139

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Access W-2032 Alt.1

West RB
2032 Alt.1
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: 21 st											
3L	L	11	1.0	0.803	69.6	LOS E	5.6	139.9	0.98	1.23	13.9
8T	T	368	1.0	0.803	61.0	LOS E	7.3	183.9	0.99	1.26	12.7
8R	R	11	1.0	0.039	14.1	LOS B	0.2	6.2	0.98	0.87	23.9
Approach		389	1.0	0.803	60.0	LOS E	7.3	183.9	0.99	1.25	12.9
East: US 2											
1L	L	11	1.0	1.077	71.6	LOS E	42.2	1063.8	1.00	2.29	12.2
6T	T	2219	1.0	1.077	70.4	LOS E	45.3	1142.3	1.00	2.31	13.8
6R	R	265	1.0	0.165	0.0	X	X	X	X	0.35	32.0
Approach		2495	1.0	1.077	62.9	LOS E	45.3	1142.3	0.89	2.10	14.5
North: Access PL (West)											
7L	L	137	1.0	0.328	14.4	LOS B	2.1	53.5	0.97	1.00	20.8
4T	T	474	1.0	1.039	83.1	LOS F	21.5	542.5	1.00	1.99	10.3
4R	R	243	1.0	0.532	19.1	LOS B	4.2	106.2	1.00	1.09	22.5
Approach		854	1.0	1.039	53.9	LOS D	21.5	542.5	1.00	1.57	13.9
West: US 2											
5L	L	139	1.0	0.159	5.7	LOS A	0.7	17.5	0.54	0.80	30.0
2T	T	2222	1.0	0.991	43.9	LOS D	25.8	650.0	1.00	1.37	17.5
2R	R	11	1.0	0.008	2.9	LOS A	0.0	1.1	0.49	0.55	36.7
Approach		2372	1.0	0.991	41.5	LOS D	25.8	650.0	0.97	1.34	18.0
All Vehicles		6109	1.0	1.077	53.2	LOS D	45.3	1142.3	0.94	1.68	15.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:31:06 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout

\US2_Access_3Rbs.sip

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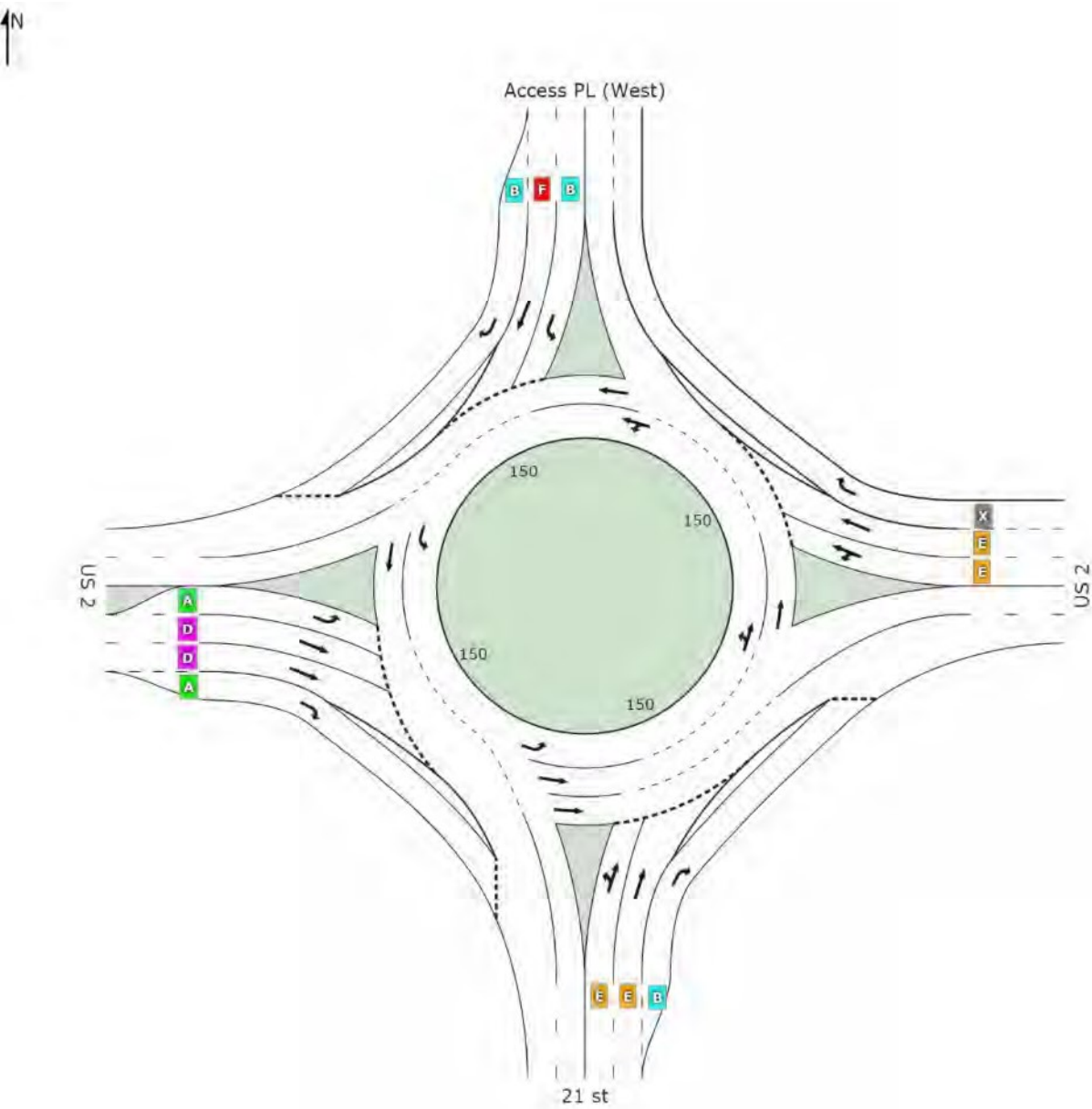
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Access W-2032 Alt.1

West RB
2032 Alt.1
Roundabout



	South	East	North	West	Intersection
LOS	E	E	D	D	D

X: Not applicable for Continuous lane.

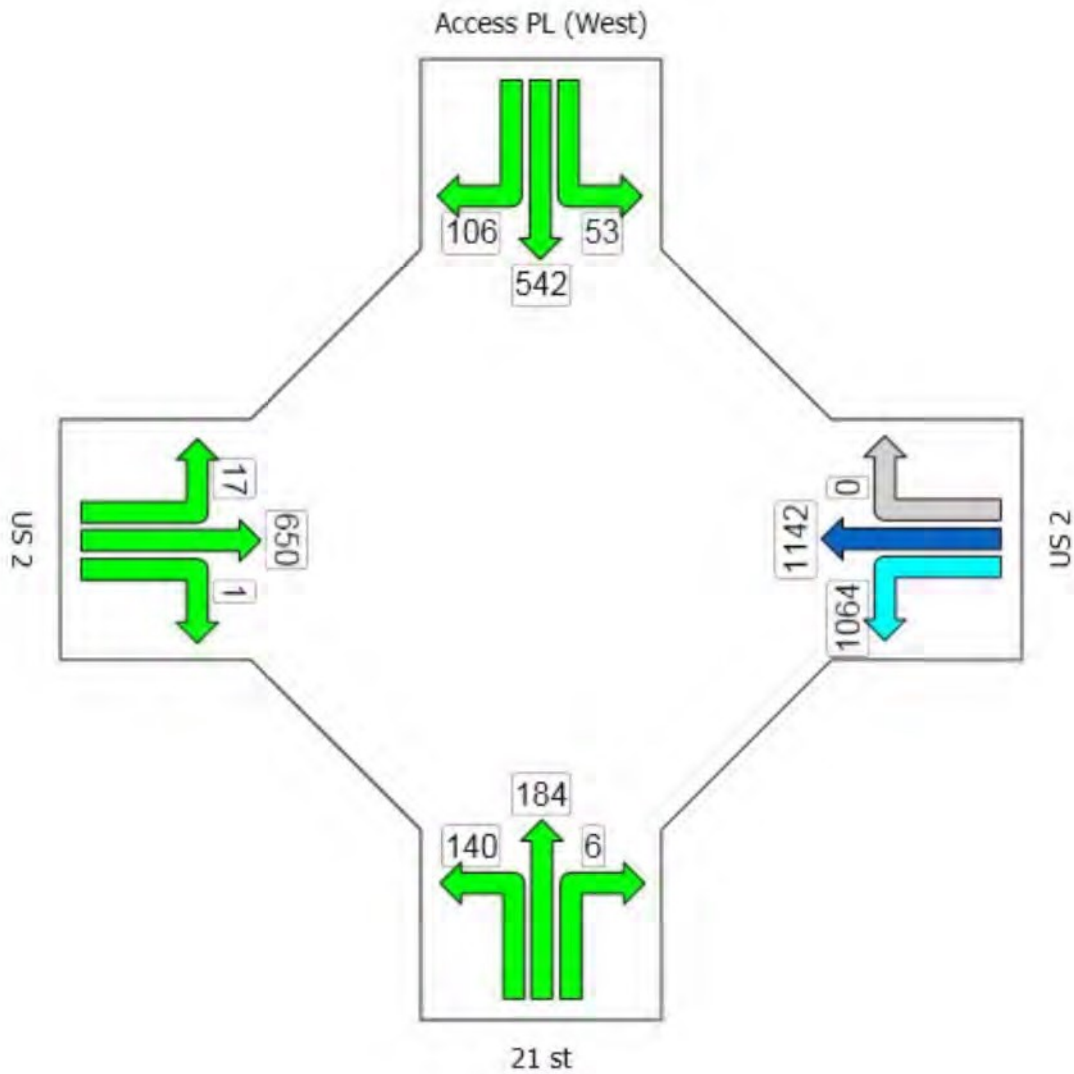
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Access W-2032 Alt.1

Largest 95% Back of Queue for any lane used by movement (feet)

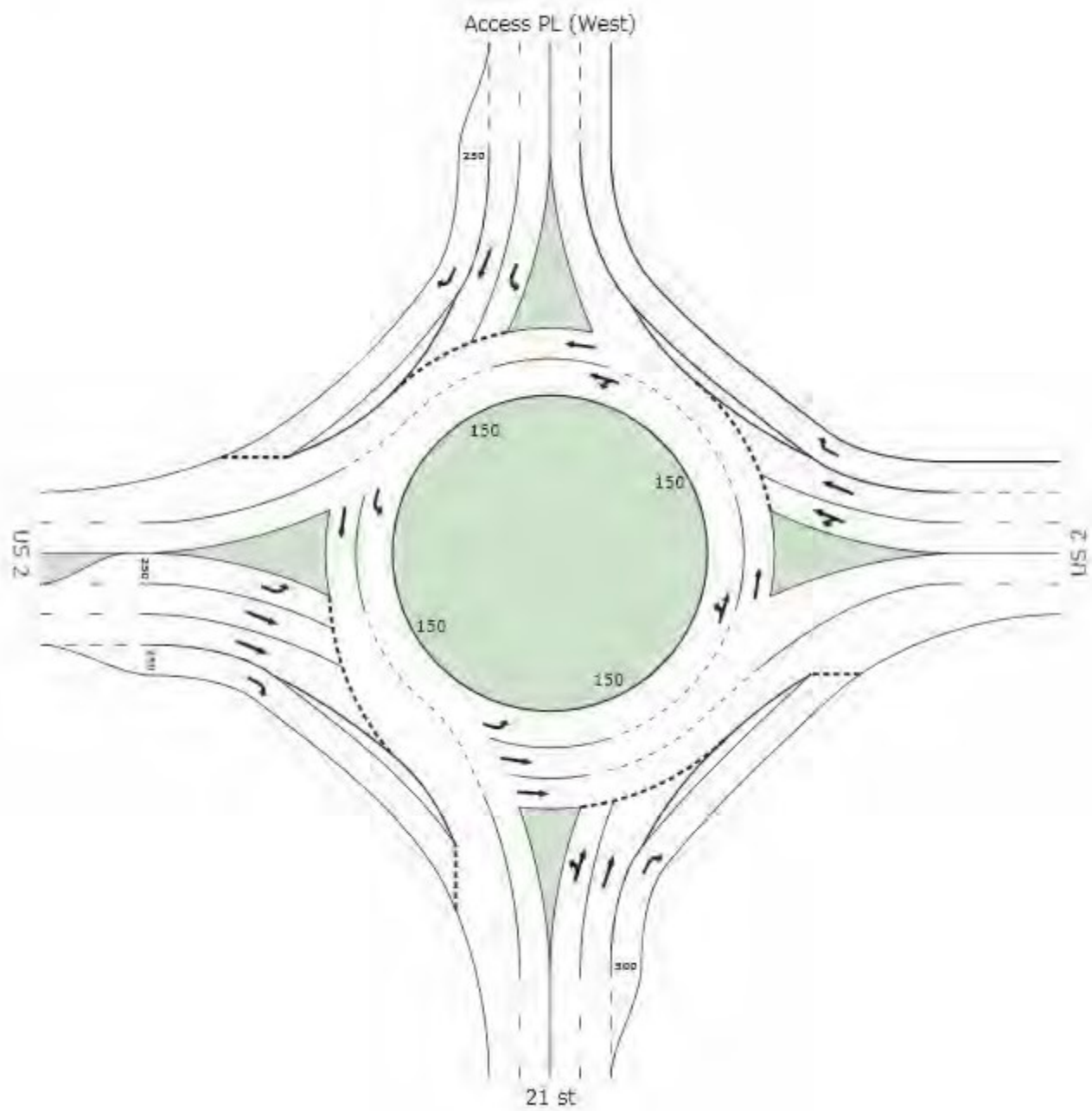
West RB
2032 Alt.1
Roundabout



	South	East	North	West	Intersection
Queue Distance	184	1142	542	650	1142

Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous



MOVEMENT SUMMARY

Site: Access W-2032 Alt.2

West RB
2032 Alt.1
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: 21 st											
3L	L	11	1.0	0.687	46.9	LOS D	4.2	105.4	0.95	1.14	17.0
8T	T	368	1.0	0.687	40.6	LOS D	5.3	133.3	0.98	1.14	16.0
8R	R	11	1.0	0.034	12.0	LOS B	0.2	5.1	0.95	0.84	24.8
Approach		389	1.0	0.687	40.0	LOS D	5.3	133.3	0.98	1.13	16.2
East: US 2											
1L	L	11	1.0	0.967	41.3	LOS D	19.4	487.7	1.00	1.39	16.4
6T	T	2020	1.0	0.967	40.1	LOS D	20.0	504.5	1.00	1.37	18.6
6R	R	162	1.0	0.101	0.0	X	X	X	X	0.35	32.0
Approach		2193	1.0	0.967	37.1	LOS D	20.0	504.5	0.93	1.29	19.1
North: Access PL (West)											
7L	L	66	1.0	0.147	10.1	LOS B	1.0	24.2	0.96	0.95	22.1
4T	T	474	1.0	1.008	73.4	LOS E	18.5	467.1	1.00	1.85	11.2
4R	R	195	1.0	0.413	15.0	LOS B	3.0	76.4	1.00	1.04	23.9
Approach		735	1.0	1.008	52.2	LOS D	18.5	467.1	1.00	1.55	14.1
West: US 2											
5L	L	107	1.0	0.121	5.2	LOS A	0.5	13.3	0.51	0.77	30.3
2T	T	2177	1.0	0.951	35.2	LOS D	20.2	510.1	1.00	1.19	19.8
2R	R	11	1.0	0.008	2.9	LOS A	0.0	1.1	0.50	0.55	36.6
Approach		2295	1.0	0.951	33.6	LOS C	20.2	510.1	0.98	1.17	20.2
All Vehicles		5612	1.0	1.008	37.9	LOS D	20.2	510.1	0.96	1.27	18.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:33:11 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout

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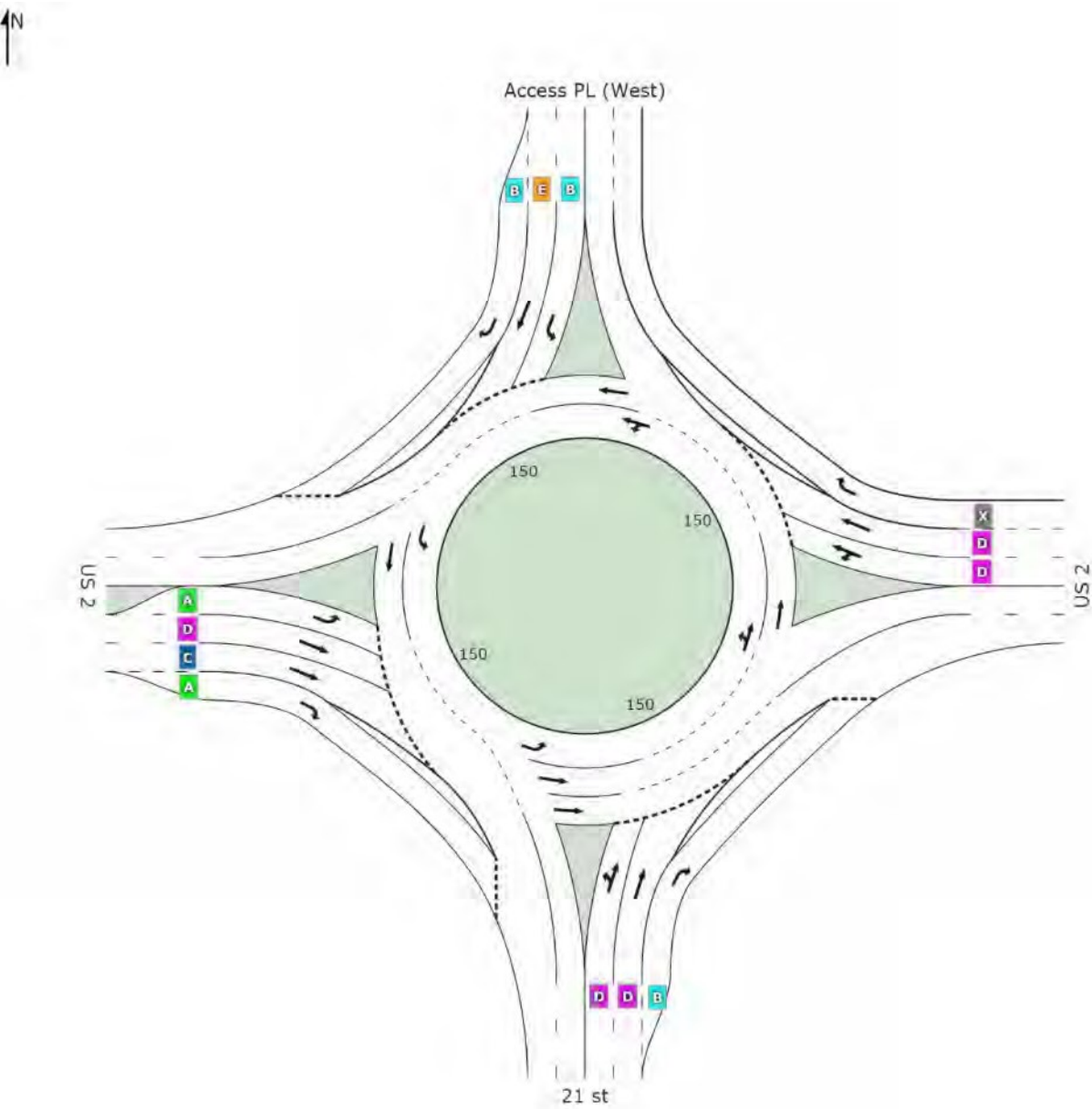
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Access W-2032 Alt.2

West RB
2032 Alt.1
Roundabout



	South	East	North	West	Intersection
LOS	D	D	D	C	D

X: Not applicable for Continuous lane.

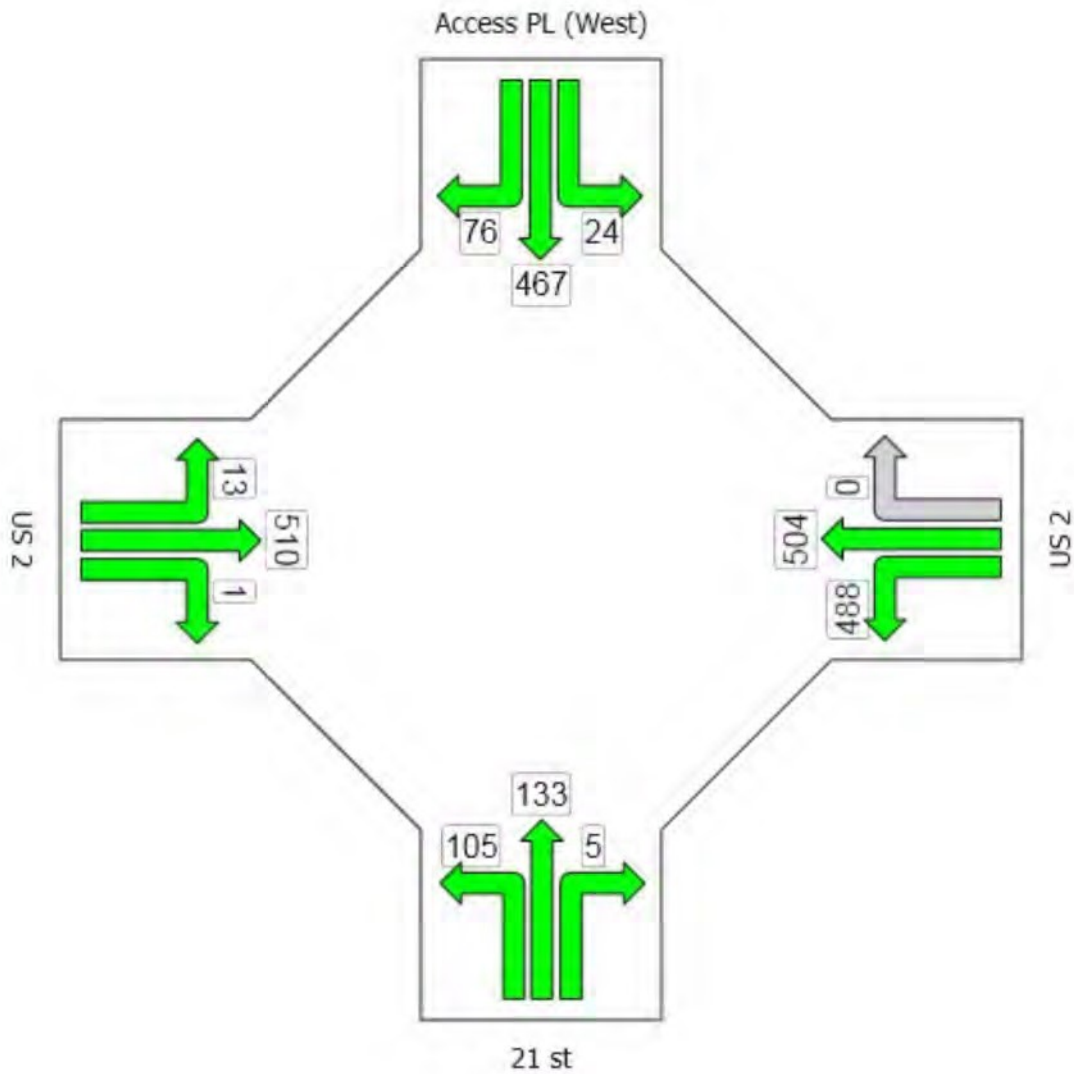
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Access W-2032 Alt.2

Largest 95% Back of Queue for any lane used by movement (feet)

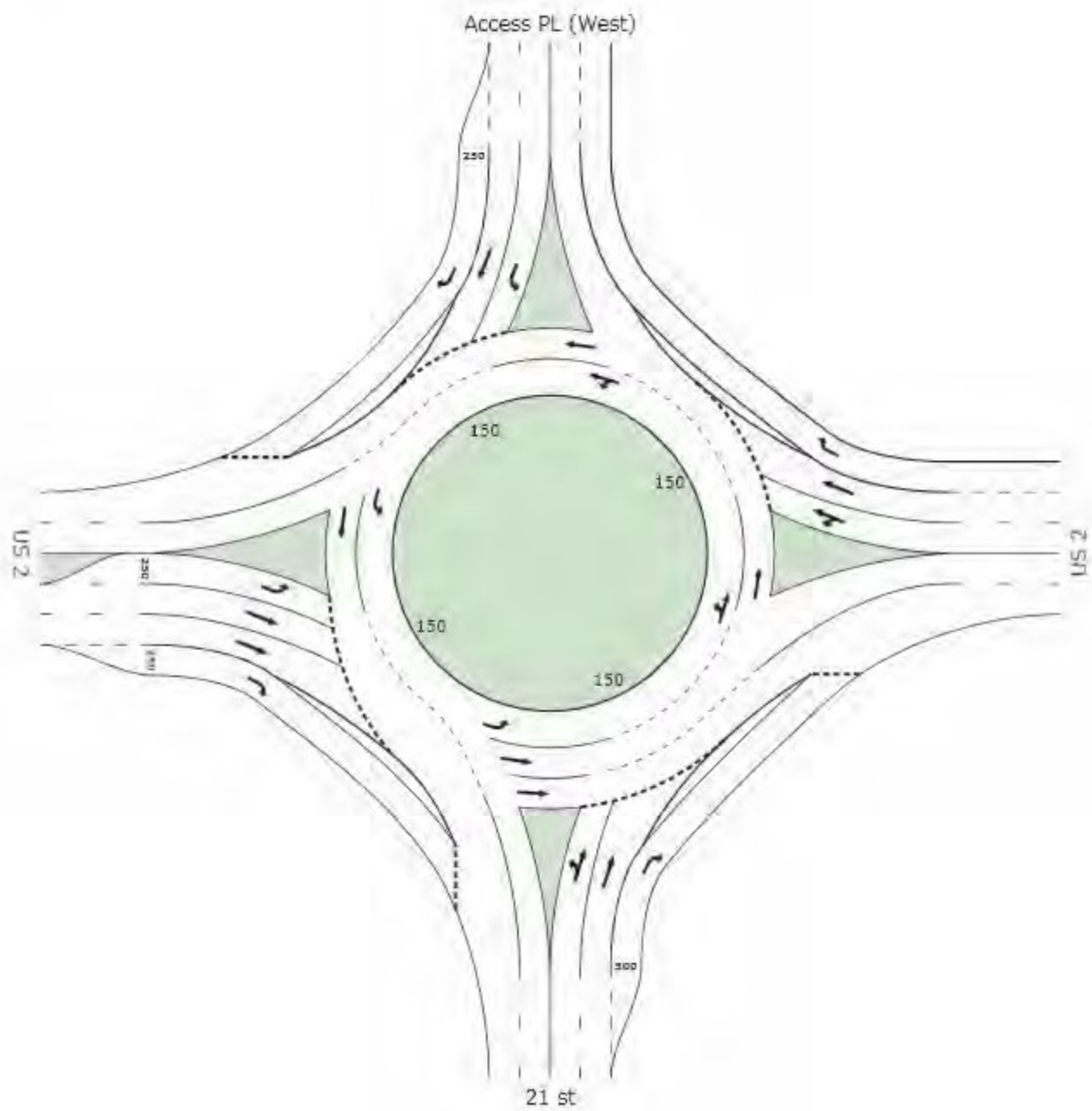
West RB
2032 Alt.1
Roundabout



	South	East	North	West	Intersection
Queue Distance	133	504	467	510	510

Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous



MOVEMENT SUMMARY

Site: Access W-2032 Alt.3

West RB
2032 Alt.3
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: 21 st											
3L	L	11	1.0	0.662	43.1	LOS D	4.0	99.8	0.95	1.12	17.6
8T	T	368	1.0	0.662	37.3	LOS D	5.0	125.1	0.98	1.12	16.7
8R	R	11	1.0	0.032	11.6	LOS B	0.2	4.9	0.94	0.84	25.0
Approach		389	1.0	0.662	36.8	LOS D	5.0	125.1	0.98	1.11	16.9
East: US 2											
1L	L	11	1.0	0.935	35.2	LOS D	15.6	393.5	1.00	1.26	17.5
6T	T	1962	1.0	0.935	34.1	LOS C	16.0	404.3	1.00	1.24	20.0
6R	R	131	1.0	0.081	0.0	X	X	X	X	0.35	32.0
Approach		2103	1.0	0.935	32.0	LOS C	16.0	404.3	0.94	1.18	20.4
North: Access PL (West)											
7L	L	56	1.0	0.120	9.4	LOS A	0.8	19.2	0.94	0.93	22.3
4T	T	474	1.0	0.965	61.4	LOS E	15.0	377.9	1.00	1.66	12.4
4R	R	184	1.0	0.374	13.5	LOS B	2.7	67.0	1.00	1.02	24.4
Approach		714	1.0	0.965	45.0	LOS D	15.0	377.9	0.99	1.44	15.2
West: US 2											
5L	L	98	1.0	0.111	5.1	LOS A	0.5	12.1	0.51	0.77	30.3
2T	T	2153	1.0	0.939	33.0	LOS C	18.8	474.0	1.00	1.16	20.5
2R	R	11	1.0	0.008	3.0	LOS A	0.0	1.1	0.51	0.55	36.6
Approach		2261	1.0	0.939	31.6	LOS C	18.8	474.0	0.98	1.14	20.9
All Vehicles		5467	1.0	0.965	33.9	LOS C	18.8	474.0	0.96	1.19	19.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:35:03 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-West Roundabout

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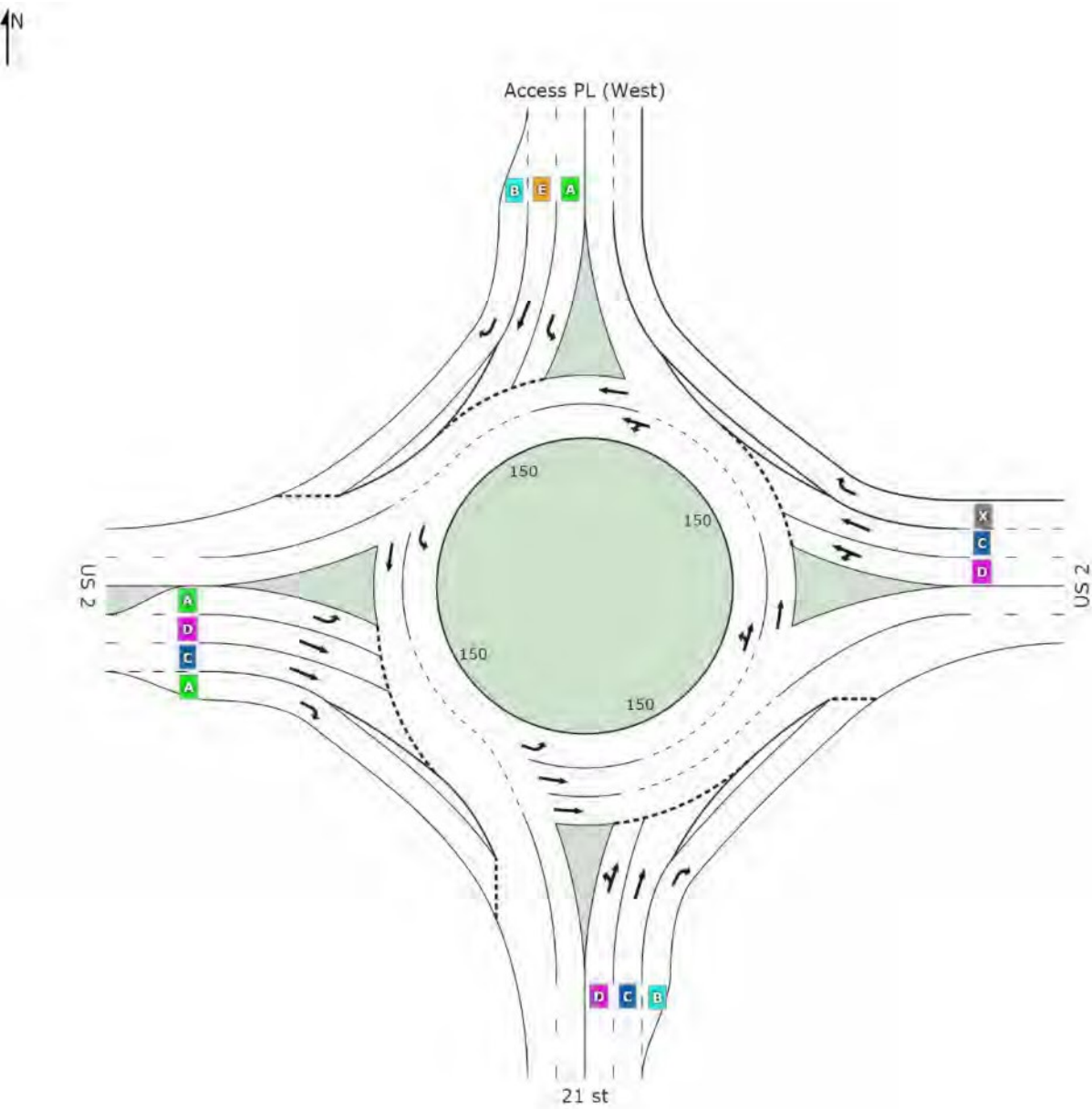
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Access W-2032 Alt.3

West RB
2032 Alt.3
Roundabout



	South	East	North	West	Intersection
LOS	D	C	D	C	C

X: Not applicable for Continuous lane.

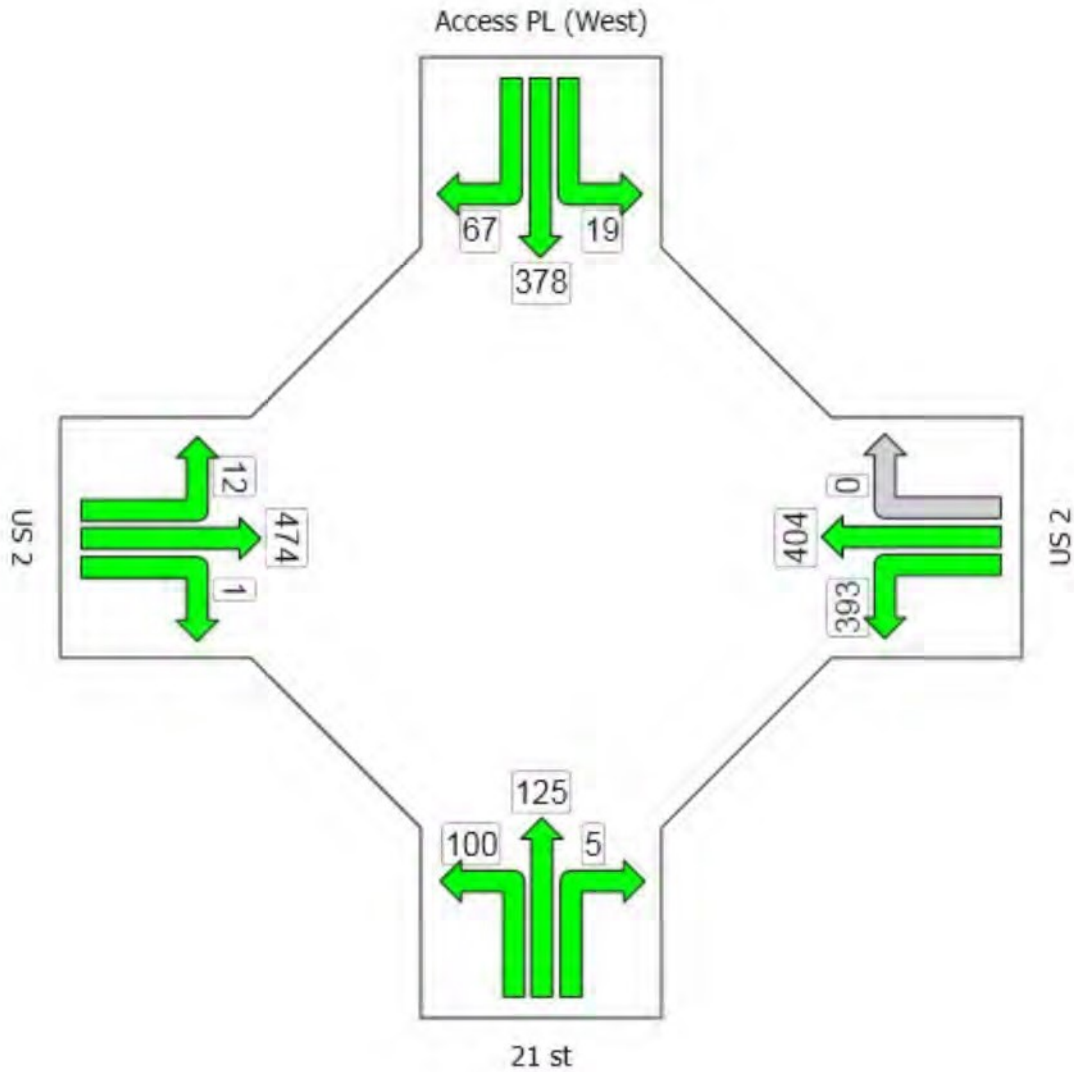
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Access W-2032 Alt.3

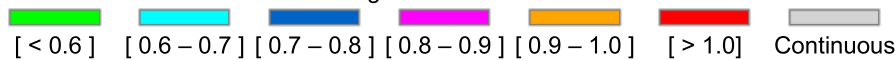
Largest 95% Back of Queue for any lane used by movement (feet)

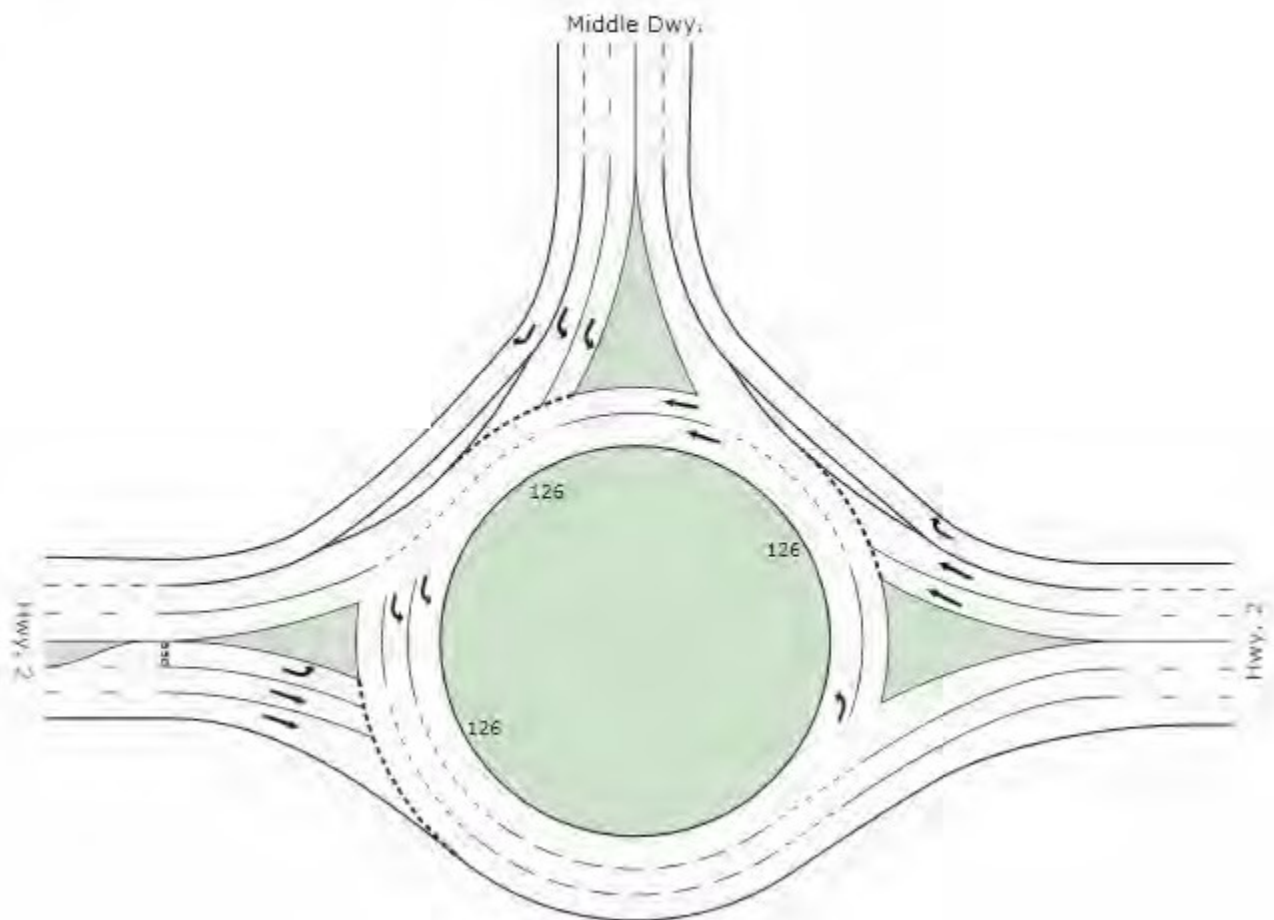
West RB
2032 Alt.3
Roundabout



	South	East	North	West	Intersection
Queue Distance	125	404	378	474	474

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1541	1.0	0.700	14.0	LOS B	7.6	190.7	0.74	0.66	23.5
6R	R	453	1.0	0.283	0.0	X	X	X	X	0.37	31.7
Approach		1995	1.0	0.700	10.9	LOS B	7.6	190.7	0.57	0.59	25.1
North: Middle Dwy.											
7L	L	550	1.0	0.654	26.6	LOS C	4.4	110.2	0.90	1.09	18.5
4R	R	186	1.0	0.116	0.0	X	X	X	X	0.37	31.7
Approach		736	1.0	0.654	19.9	LOS B	4.4	110.2	0.67	0.91	20.5
West: Hwy. 2											
5L	L	242	1.0	0.388	11.3	LOS B	1.8	45.4	0.63	0.89	23.0
2T	T	1383	1.0	0.767	19.6	LOS B	7.1	179.5	0.83	0.99	21.9
Approach		1625	1.0	0.767	18.4	LOS B	7.1	179.5	0.80	0.97	22.1
All Vehicles		4355	1.0	0.767	15.2	LOS B	7.6	190.7	0.67	0.79	22.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:11:19 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600\INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\Alt1-PH1.sip

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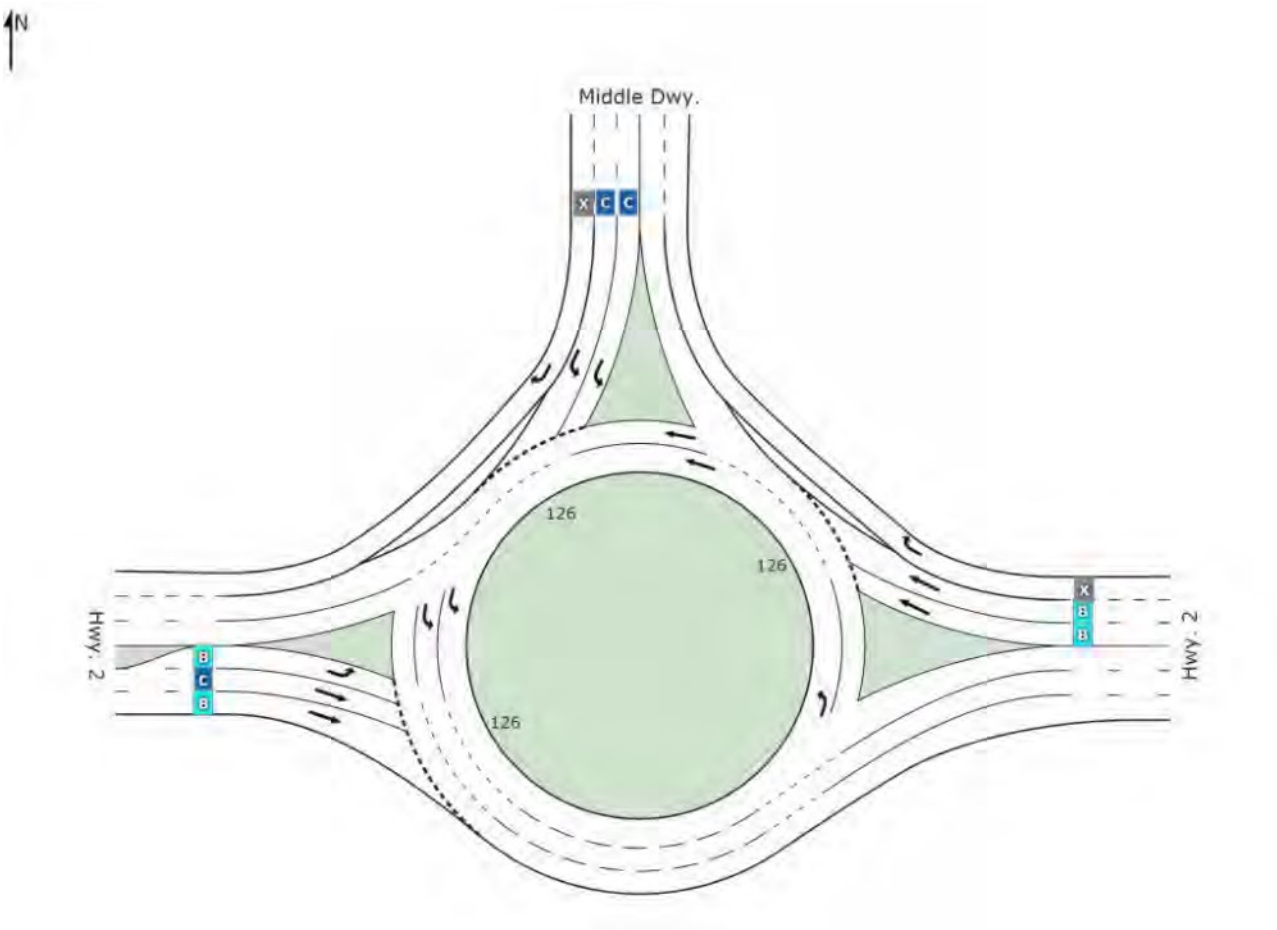
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	B	B	B

X: Not applicable for Continuous lane.

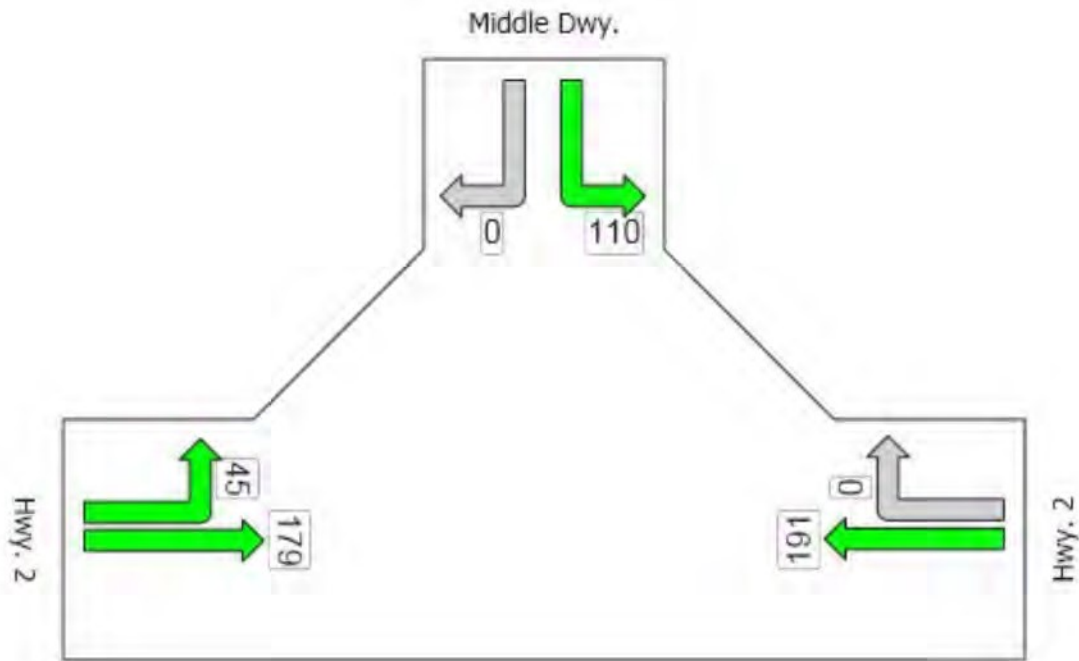
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

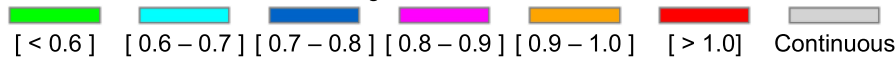
Largest 95% Back of Queue for any lane used by movement (feet)

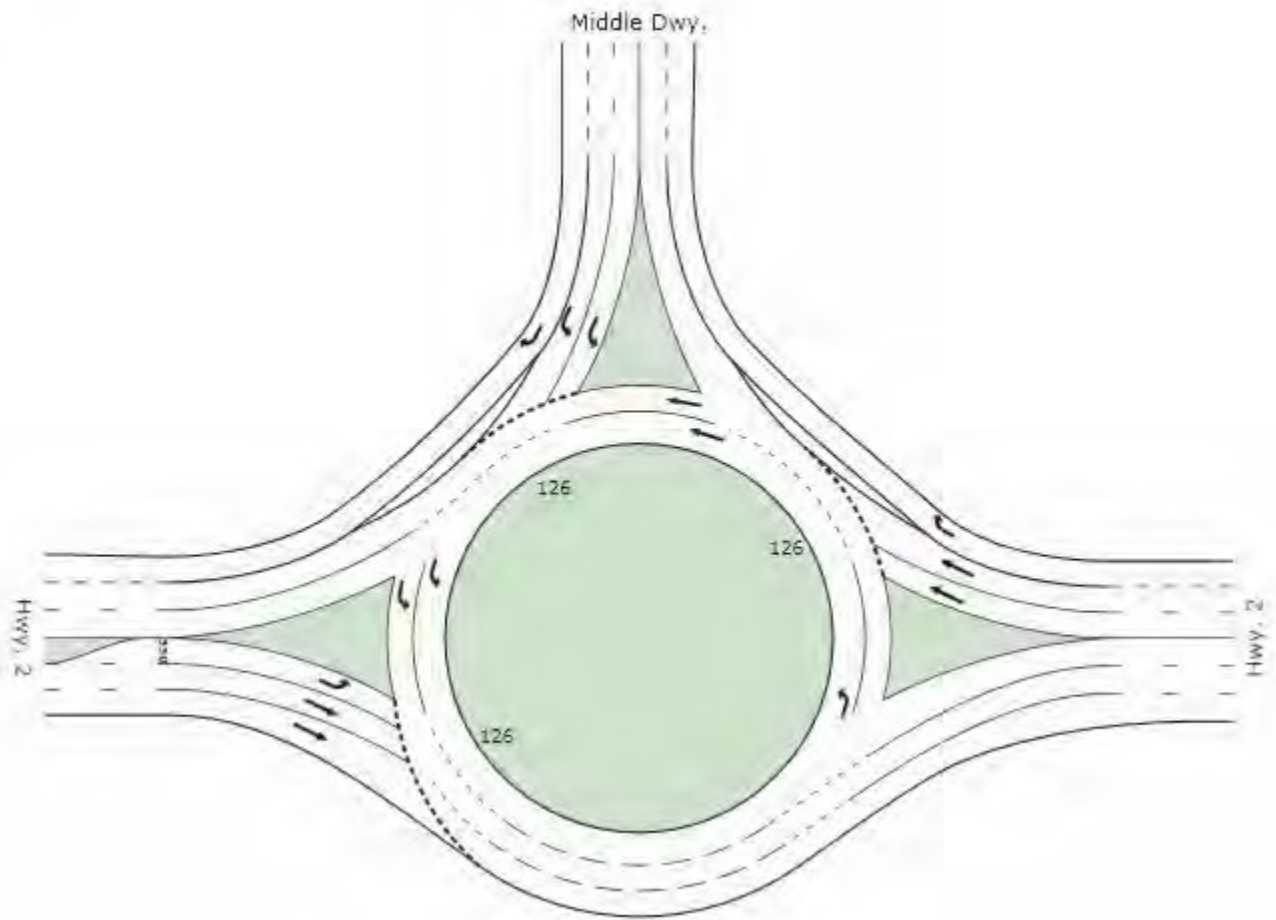
Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.1,PH.1)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	191	110	179	191

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1797	1.0	0.847	23.0	LOS C	14.6	368.3	0.97	0.93	20.0
6R	R	535	1.0	0.333	0.1	X	X	X	X	0.37	31.7
Approach		2332	1.0	0.847	17.8	LOS B	14.6	368.3	0.74	0.80	22.0
North: Middle Dwy.											
7L	L	655	1.0	1.110	123.5	LOS F	21.8	549.5	1.00	1.93	8.3
4R	R	209	1.0	0.130	0.0	X	X	X	X	0.37	31.7
Approach		864	1.0	1.110	93.7	LOS F	21.8	549.5	0.76	1.55	9.9
West: Hwy. 2											
5L	L	278	1.0	0.391	10.2	LOS B	2.2	55.3	0.71	0.90	23.4
2T	T	1559	1.0	0.826	23.1	LOS C	10.5	264.4	0.95	1.13	20.7
Approach		1837	1.0	0.826	21.1	LOS C	10.5	264.4	0.91	1.09	21.1
All Vehicles		5033	1.0	1.110	32.0	LOS C	21.8	549.5	0.81	1.04	17.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:13:42 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600\INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\Alt1-PH2.sip

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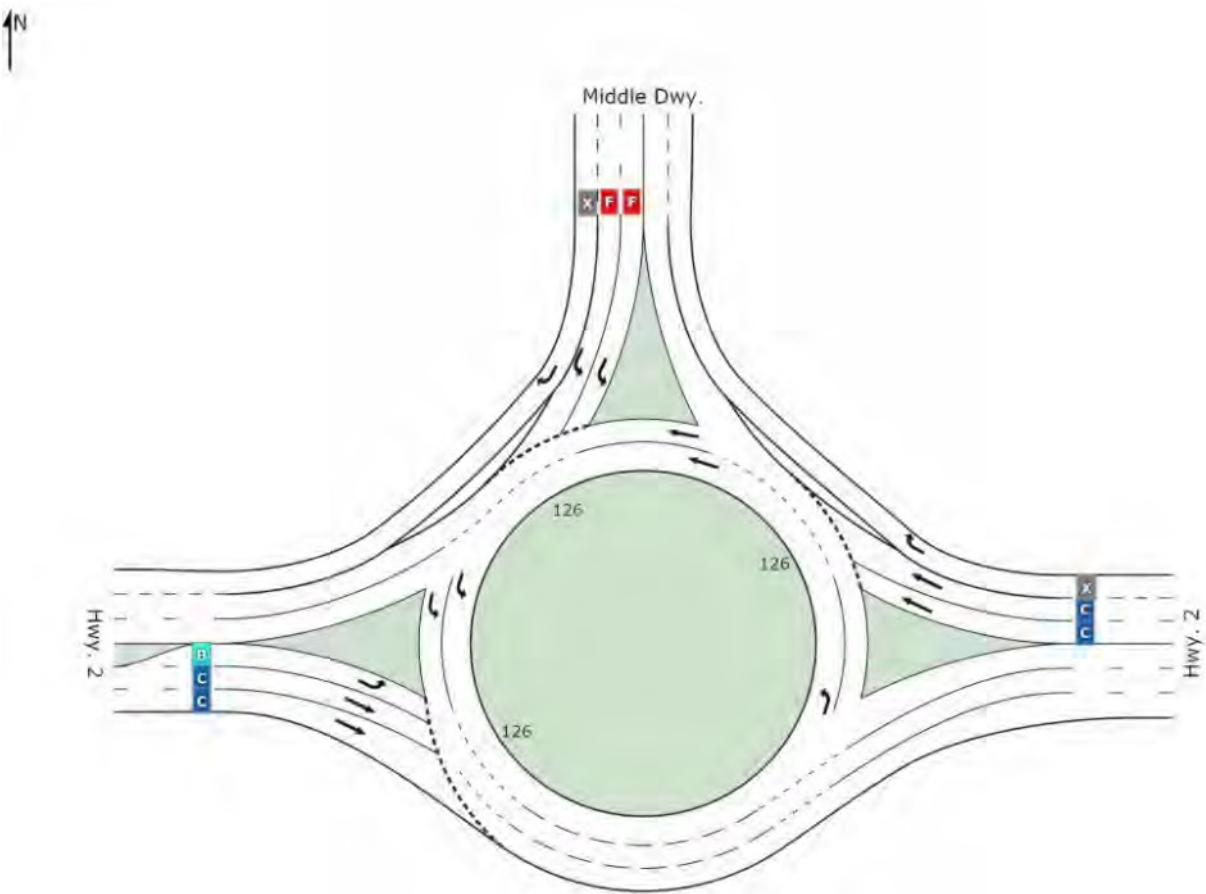
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	F	C	C

X: Not applicable for Continuous lane.

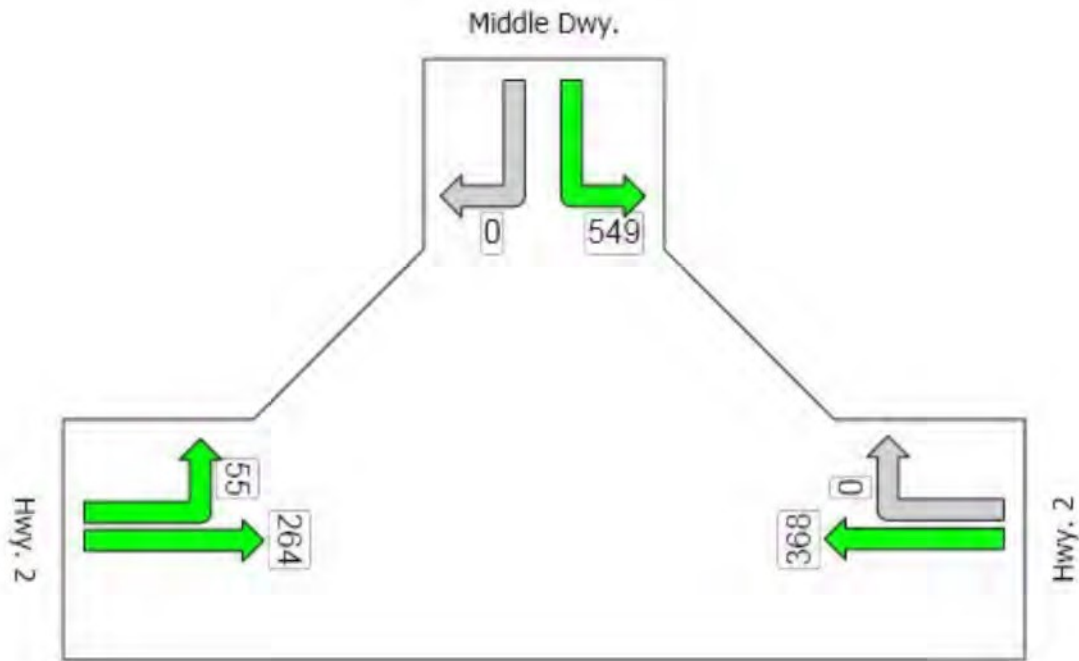
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

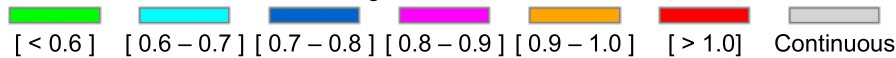
Largest 95% Back of Queue for any lane used by movement (feet)

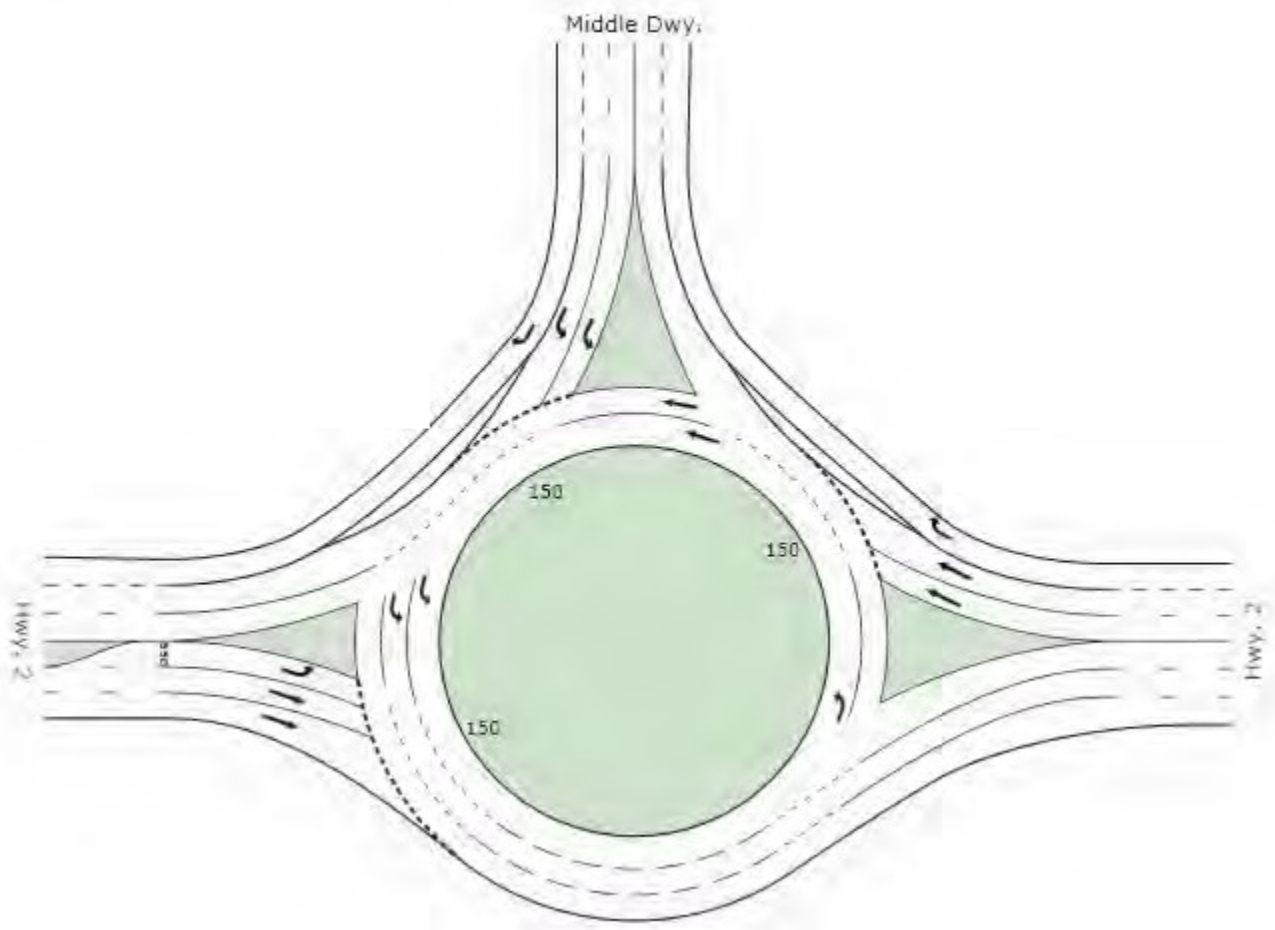
Middle Dwy./Hwy. (YEAR 2015 PM PEAK, ALT.1,PH.2)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	368	549	264	549

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	2054	1.0	0.940	34.2	LOS C	24.5	618.2	1.00	1.16	17.0
6R	R	589	1.0	0.367	0.1	X	X	X	X	0.33	32.1
Approach		2643	1.0	0.940	26.6	LOS C	24.5	618.2	0.78	0.97	19.1
North: Middle Dwy.											
7L	L	736	1.0	1.405	239.9	LOS F	49.9	1258.1	1.00	2.74	5.1
4R	R	226	1.0	0.141	0.0	X	X	X	X	0.33	32.1
Approach		962	1.0	1.405	183.6	LOS F	49.9	1258.1	0.77	2.18	6.2
West: Hwy. 2											
5L	L	304	1.0	0.448	11.8	LOS B	2.4	59.3	0.65	0.90	23.0
2T	T	1774	1.0	0.920	33.5	LOS C	14.5	366.0	1.00	1.26	17.9
Approach		2078	1.0	0.920	30.4	LOS C	14.5	366.0	0.95	1.21	18.6
All Vehicles		5683	1.0	1.405	54.6	LOS D	49.9	1258.1	0.84	1.26	13.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:52:36 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\Alt1-PH3.sip

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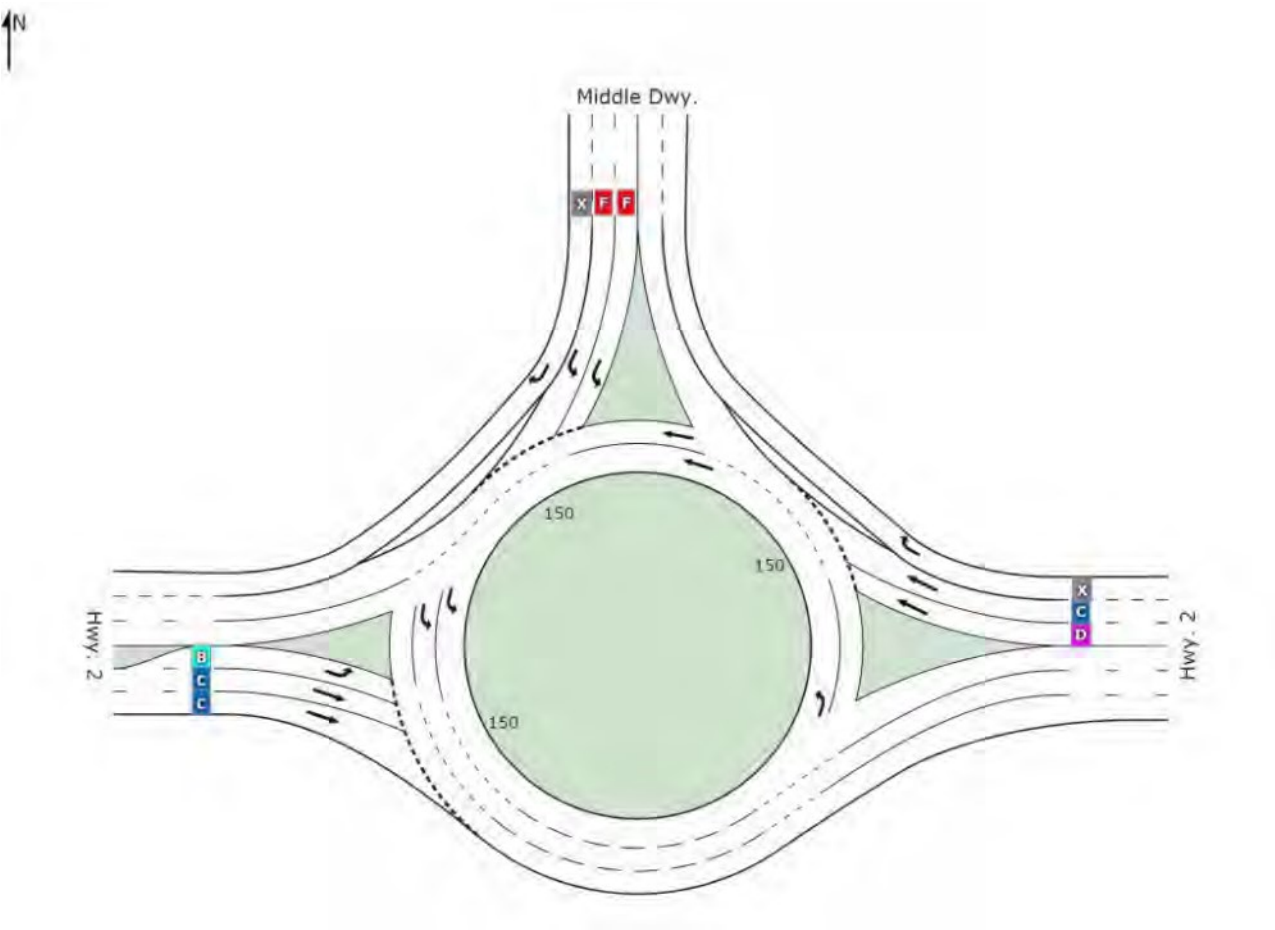
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	C	F	C	D

X: Not applicable for Continuous lane.

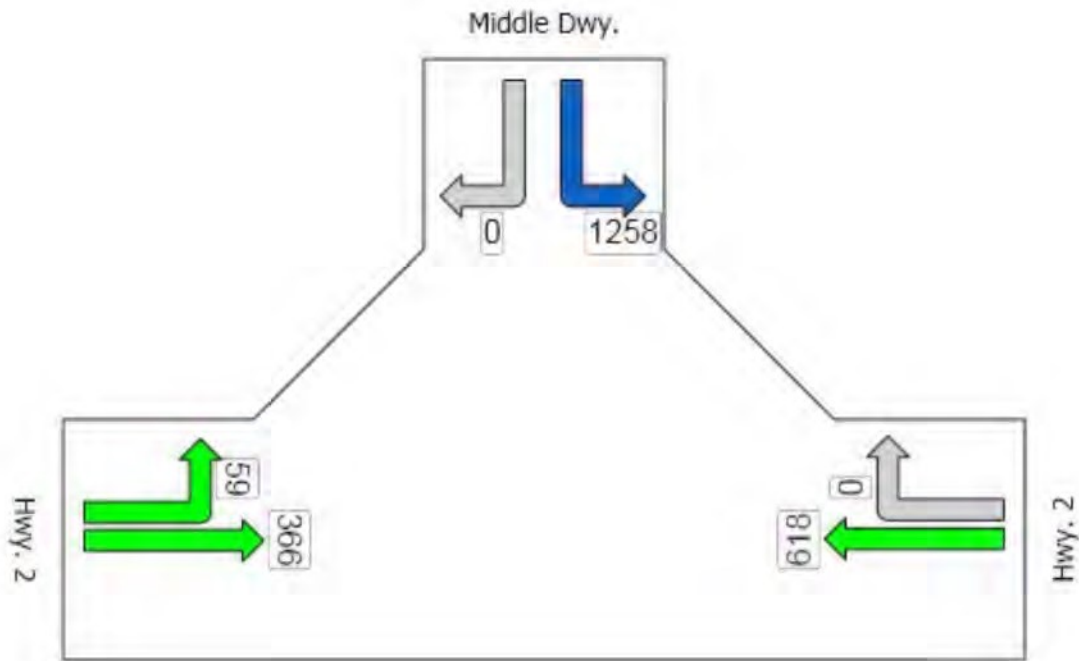
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

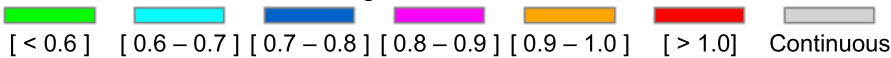
Largest 95% Back of Queue for any lane used by movement (feet)

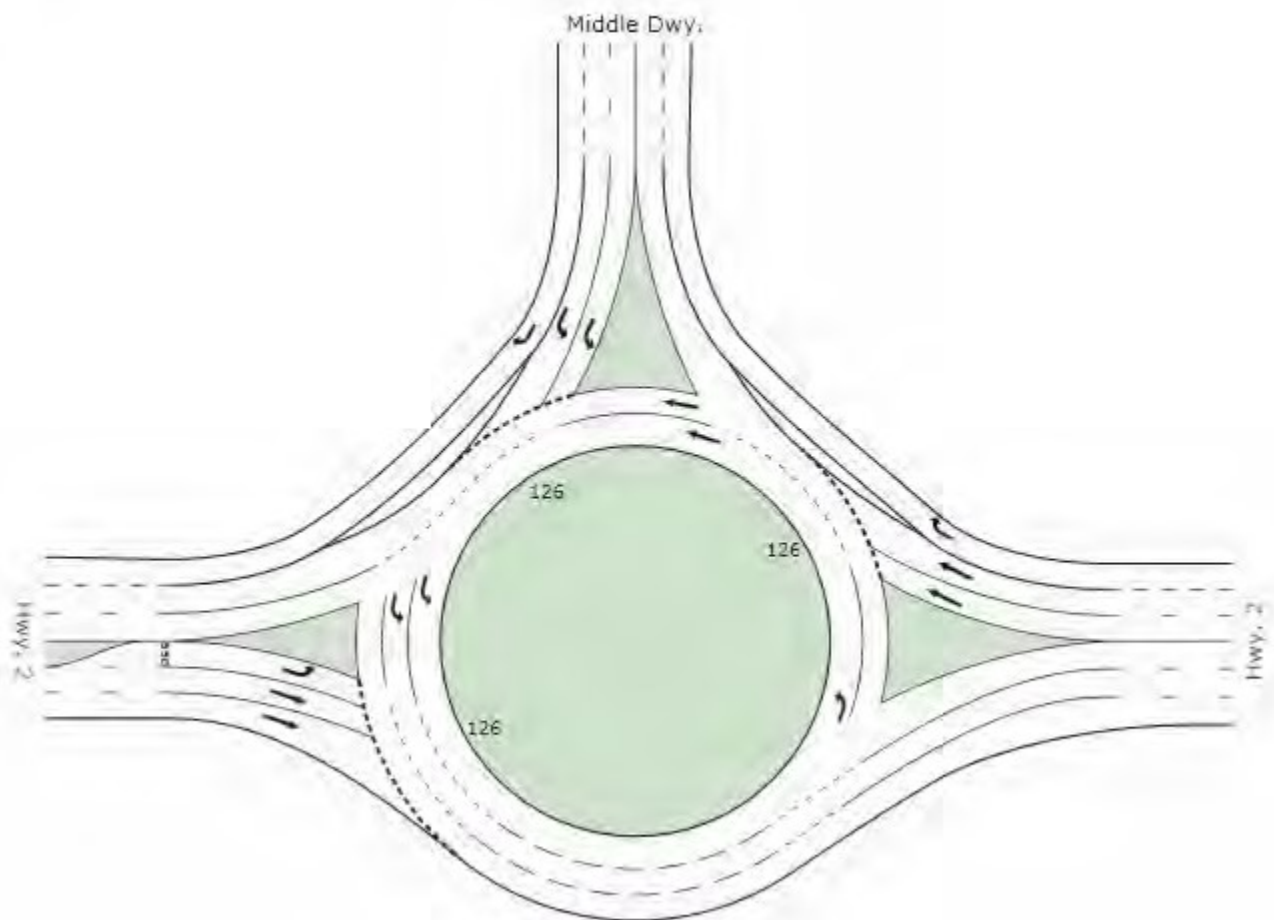
Middle Dwy./Hwy. (YEAR 2019 PM PEAK, ALT.1,PH.3)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	618	1258	366	1258

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1541	1.0	0.700	14.0	LOS B	7.6	190.7	0.74	0.66	23.5
6R	R	453	1.0	0.283	0.0	X	X	X	X	0.37	31.7
Approach		1995	1.0	0.700	10.9	LOS B	7.6	190.7	0.57	0.59	25.1
North: Middle Dwy.											
7L	L	550	1.0	0.654	26.6	LOS C	4.4	110.2	0.90	1.09	18.5
4R	R	186	1.0	0.116	0.0	X	X	X	X	0.37	31.7
Approach		736	1.0	0.654	19.9	LOS B	4.4	110.2	0.67	0.91	20.5
West: Hwy. 2											
5L	L	242	1.0	0.388	11.3	LOS B	1.8	45.4	0.63	0.89	23.0
2T	T	1383	1.0	0.767	19.6	LOS B	7.1	179.5	0.83	0.99	21.9
Approach		1625	1.0	0.767	18.4	LOS B	7.1	179.5	0.80	0.97	22.1
All Vehicles		4355	1.0	0.767	15.2	LOS B	7.6	190.7	0.67	0.79	22.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:21:13 AM

SIDRA INTERSECTION 5.1.3.1990

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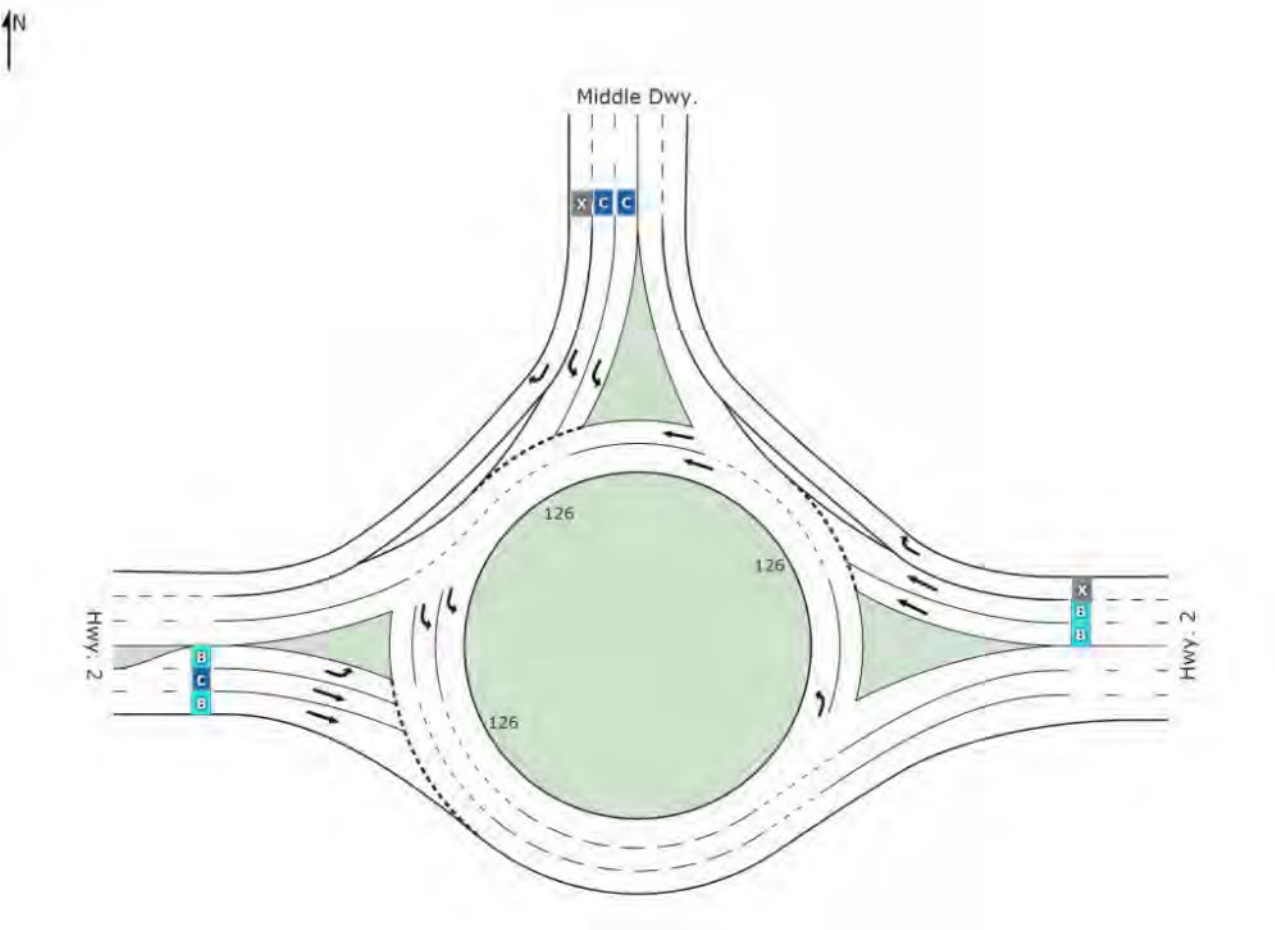
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	B	B	B

X: Not applicable for Continuous lane.

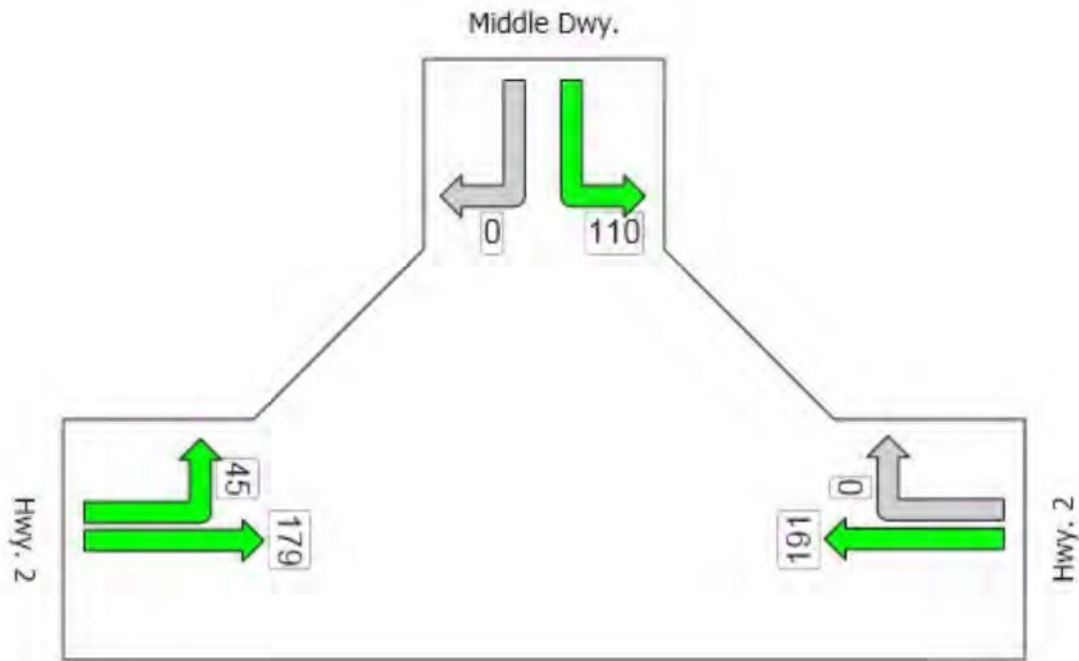
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

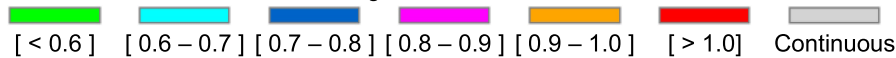
Largest 95% Back of Queue for any lane used by movement (feet)

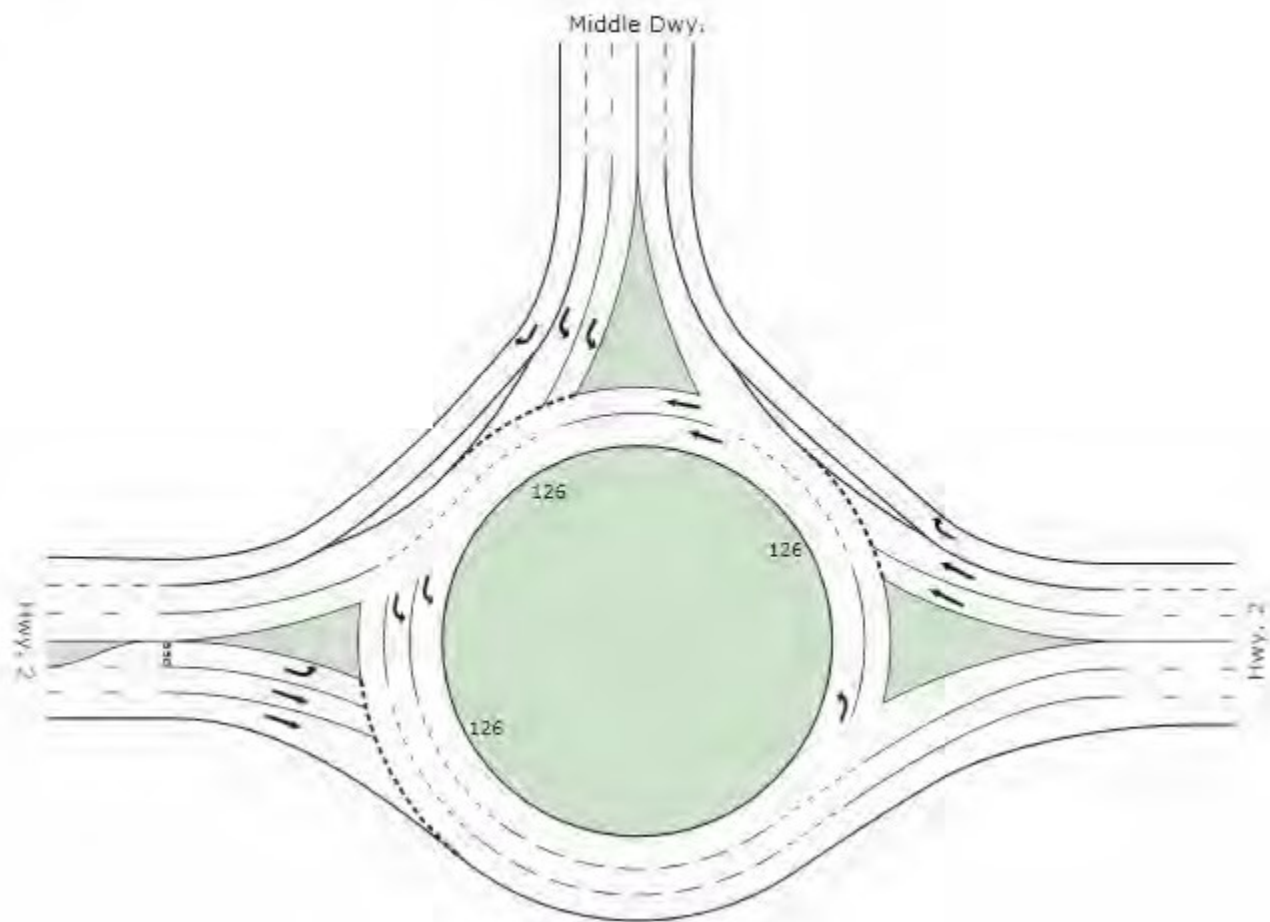
Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.2,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	191	110	179	191

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	1482	1.0	0.656	12.3	LOS B	6.2	155.0	0.67	0.57	24.3
6R	R	405	1.0	0.253	0.0	X	X	X	X	0.37	31.7
Approach		1887	1.0	0.656	9.7	LOS A	6.2	155.0	0.52	0.53	25.7
North: Middle Dwy.											
7L	L	520	1.0	0.569	20.6	LOS C	3.5	88.9	0.86	1.05	20.1
4R	R	175	1.0	0.109	0.0	X	X	X	X	0.37	31.7
Approach		695	1.0	0.569	15.4	LOS B	3.5	88.9	0.65	0.88	21.9
West: Hwy. 2											
5L	L	217	1.0	0.357	10.9	LOS B	1.6	39.6	0.60	0.87	23.2
2T	T	1371	1.0	0.741	17.9	LOS B	6.6	165.8	0.80	0.94	22.6
Approach		1588	1.0	0.741	16.9	LOS B	6.6	165.8	0.77	0.93	22.7
All Vehicles		4170	1.0	0.741	13.4	LOS B	6.6	165.8	0.64	0.74	23.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 7:24:06 AM

SIDRA INTERSECTION 5.1.3.1990

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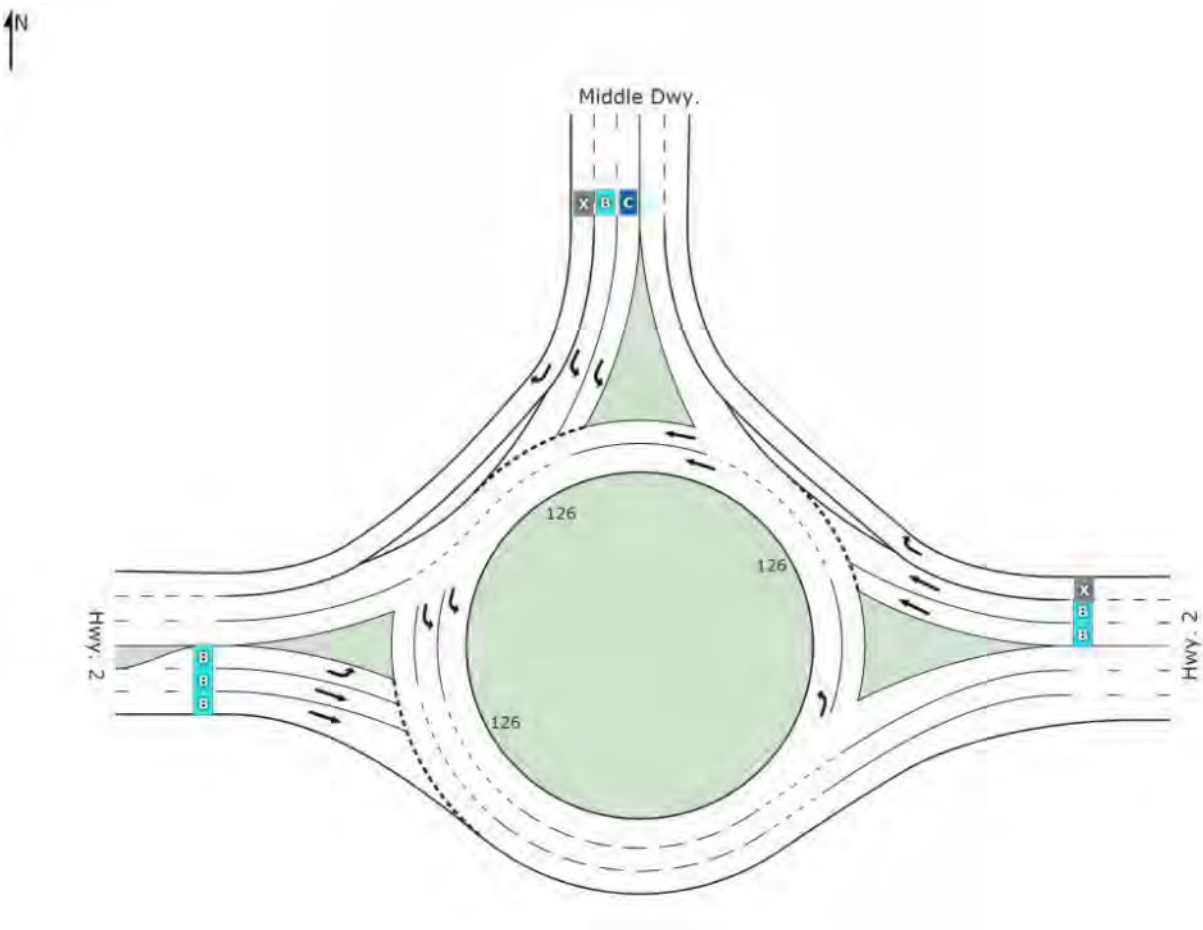
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	A	B	B	B

X: Not applicable for Continuous lane.

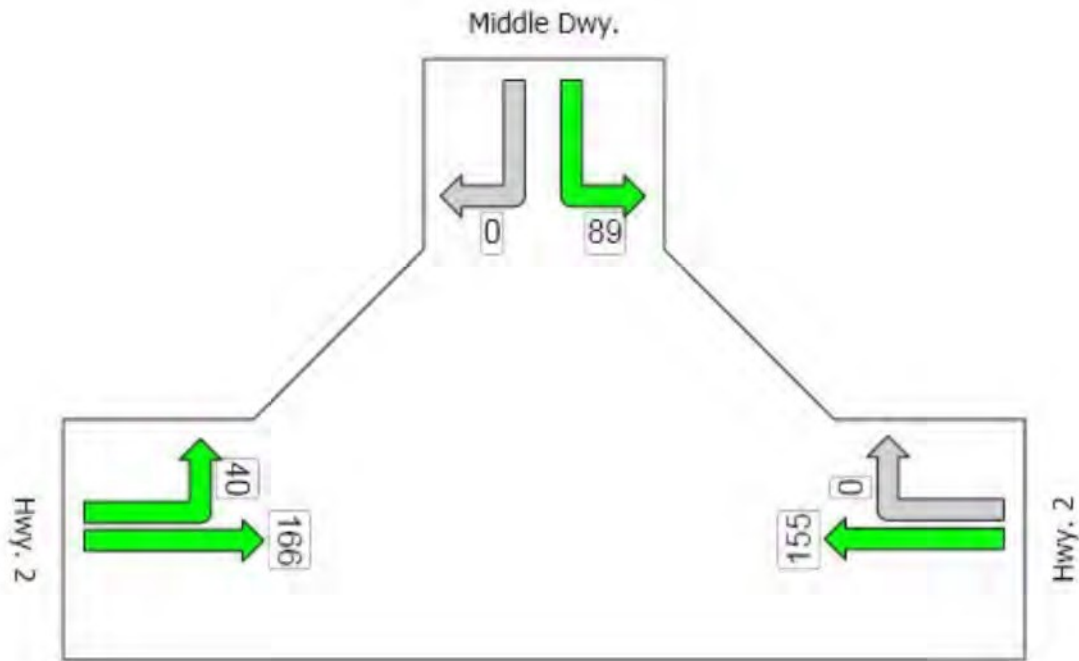
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

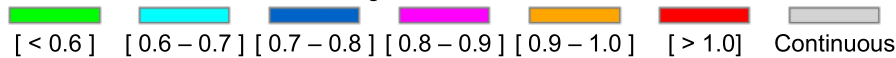
Largest 95% Back of Queue for any lane used by movement (feet)

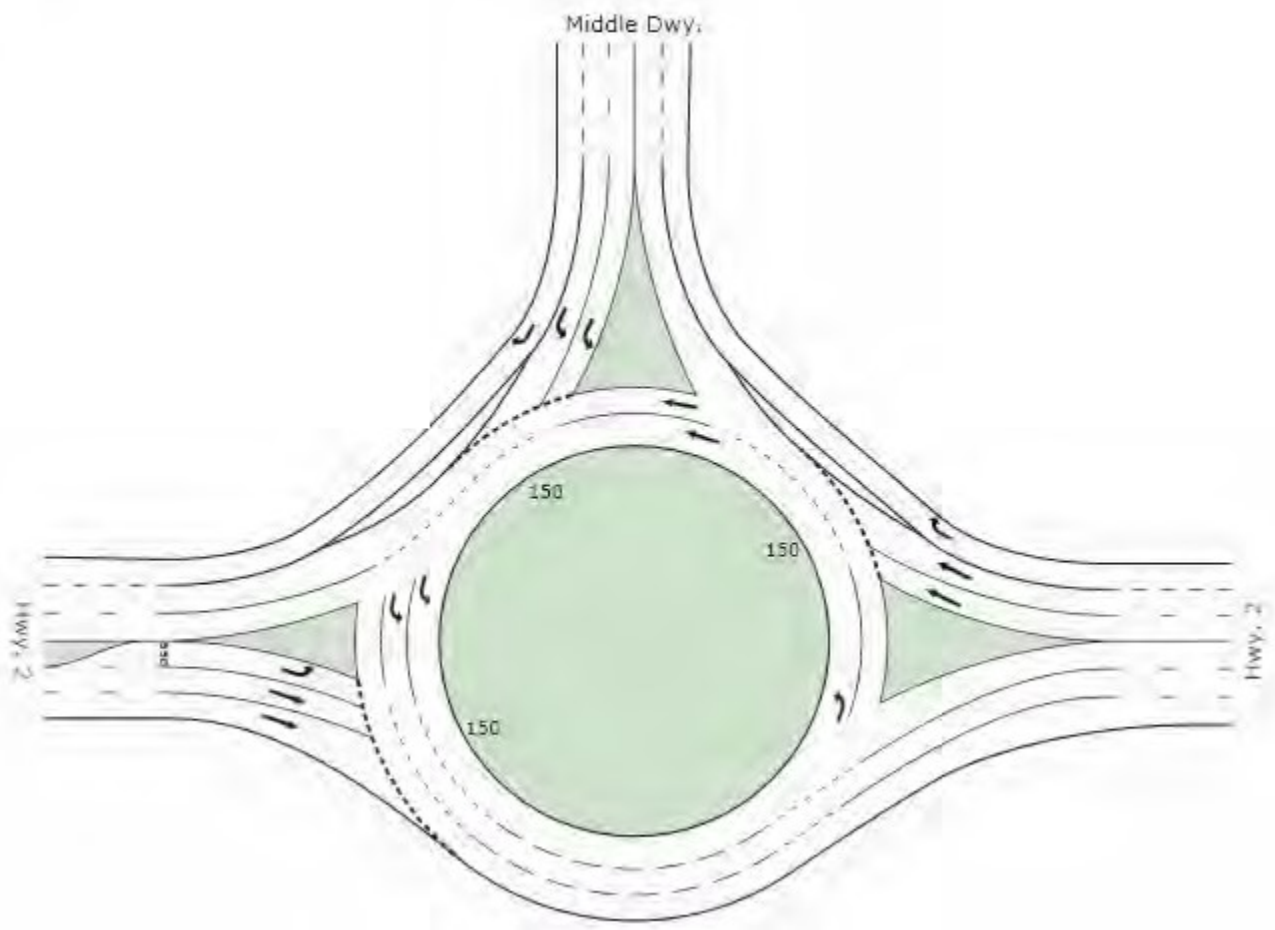
Middle Dwy./Hwy. (YEAR 2012 PM PEAK, ALT.3,Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	155	89	166	166

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	2287	1.0	1.062	64.5	LOS E	52.0	1310.2	1.00	1.91	12.0
6R	R	398	1.0	0.248	0.0	X	X	X	X	0.33	32.1
Approach		2685	1.0	1.062	54.9	LOS D	52.0	1310.2	0.85	1.68	13.3
North: Middle Dwy.											
7L	L	407	1.0	0.838	65.5	LOS E	7.1	178.0	0.99	1.24	12.5
4R	R	243	1.0	0.152	0.0	X	X	X	X	0.33	32.1
Approach		651	1.0	0.838	41.0	LOS D	7.1	178.0	0.62	0.90	15.9
West: Hwy. 2											
5L	L	324	1.0	0.462	11.8	LOS B	2.5	63.0	0.62	0.86	23.0
2T	T	2087	1.0	0.991	45.4	LOS D	25.8	650.9	1.00	1.43	15.4
Approach		2412	1.0	0.991	40.9	LOS D	25.8	650.9	0.95	1.36	16.2
All Vehicles		5747	1.0	1.062	47.5	LOS D	52.0	1310.2	0.87	1.46	14.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:41:23 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600\INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\2032 Alt1-

Buildout-Middle.sip

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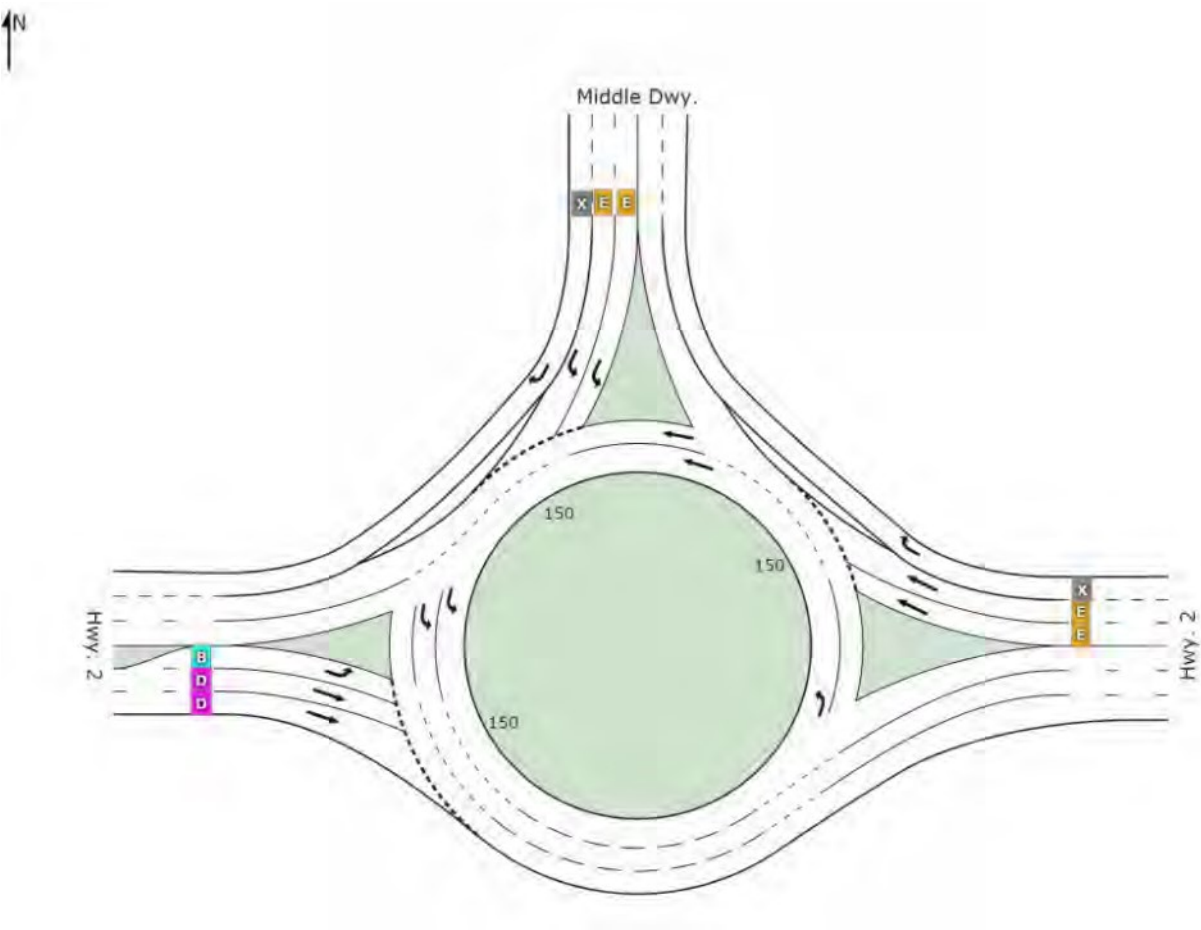
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	D	D	D	D

X: Not applicable for Continuous lane.

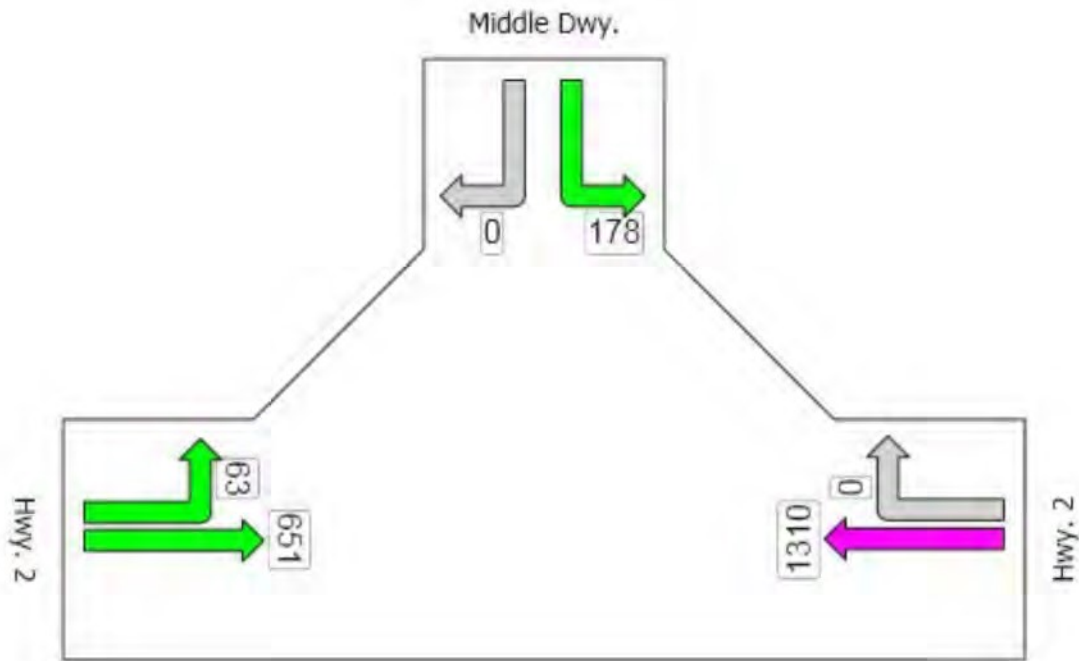
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

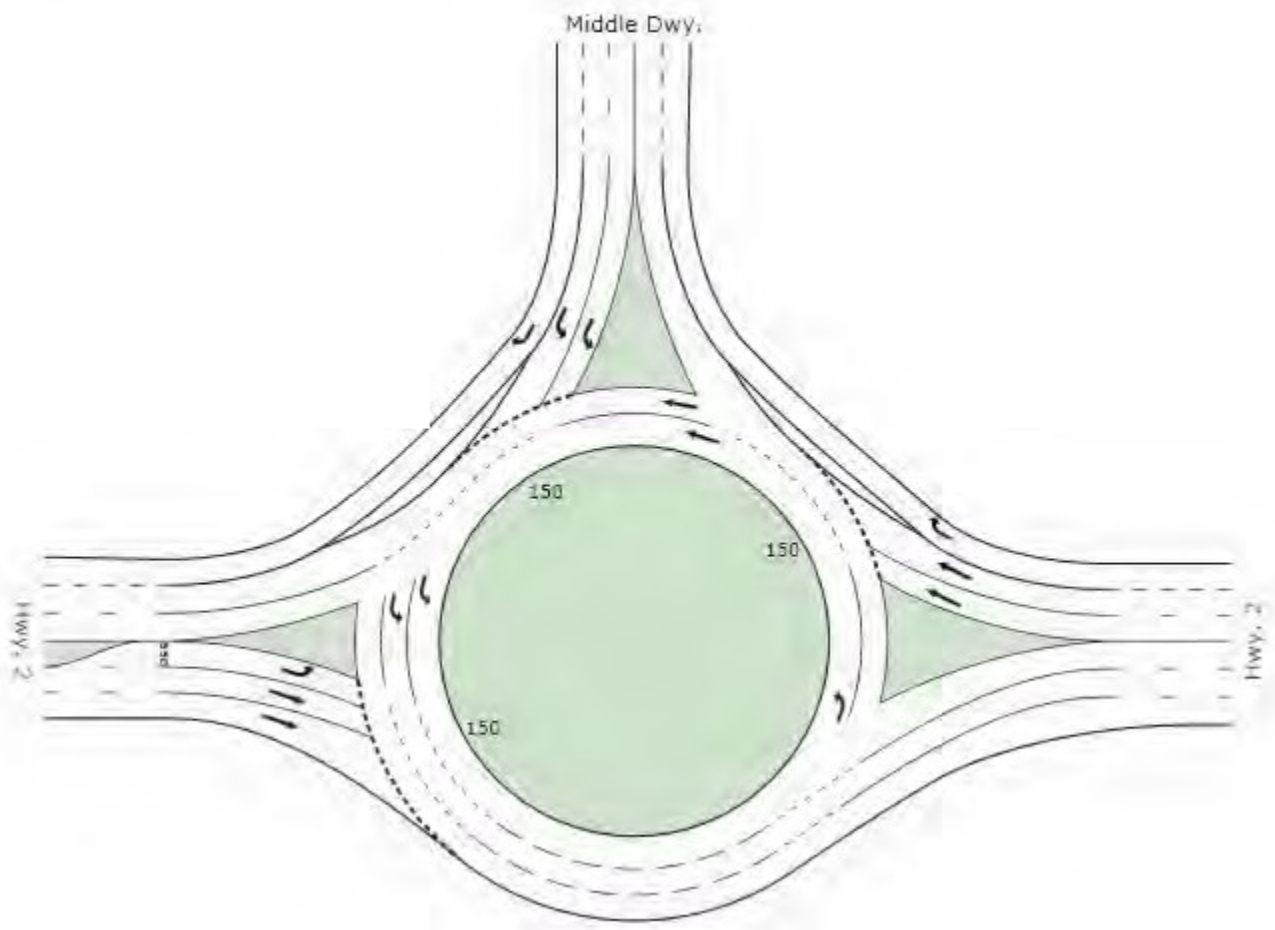
Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 1 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	1310	178	651	1310

Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0] Continuous



MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	2065	1.0	0.886	25.3	LOS C	17.7	446.6	0.99	0.93	19.3
6R	R	242	1.0	0.151	0.0	X	X	X	X	0.33	32.1
Approach		2307	1.0	0.886	22.6	LOS C	17.7	446.6	0.88	0.86	20.2
North: Middle Dwy.											
7L	L	196	1.0	0.371	23.3	LOS C	2.2	55.5	0.93	1.01	19.5
4R	R	195	1.0	0.121	0.0	X	X	X	X	0.33	32.1
Approach		391	1.0	0.371	11.7	LOS B	2.2	55.5	0.47	0.67	23.9
West: Hwy. 2											
5L	L	252	1.0	0.330	8.7	LOS A	1.6	40.9	0.45	0.70	24.2
2T	T	2044	1.0	0.821	18.6	LOS B	11.0	277.3	0.79	0.65	22.5
Approach		2296	1.0	0.821	17.5	LOS B	11.0	277.3	0.75	0.65	22.7
All Vehicles		4994	1.0	0.886	19.4	LOS B	17.7	446.6	0.79	0.75	21.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:43:46 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600\INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\2032 Alt2-

Buildout-Middle.sip

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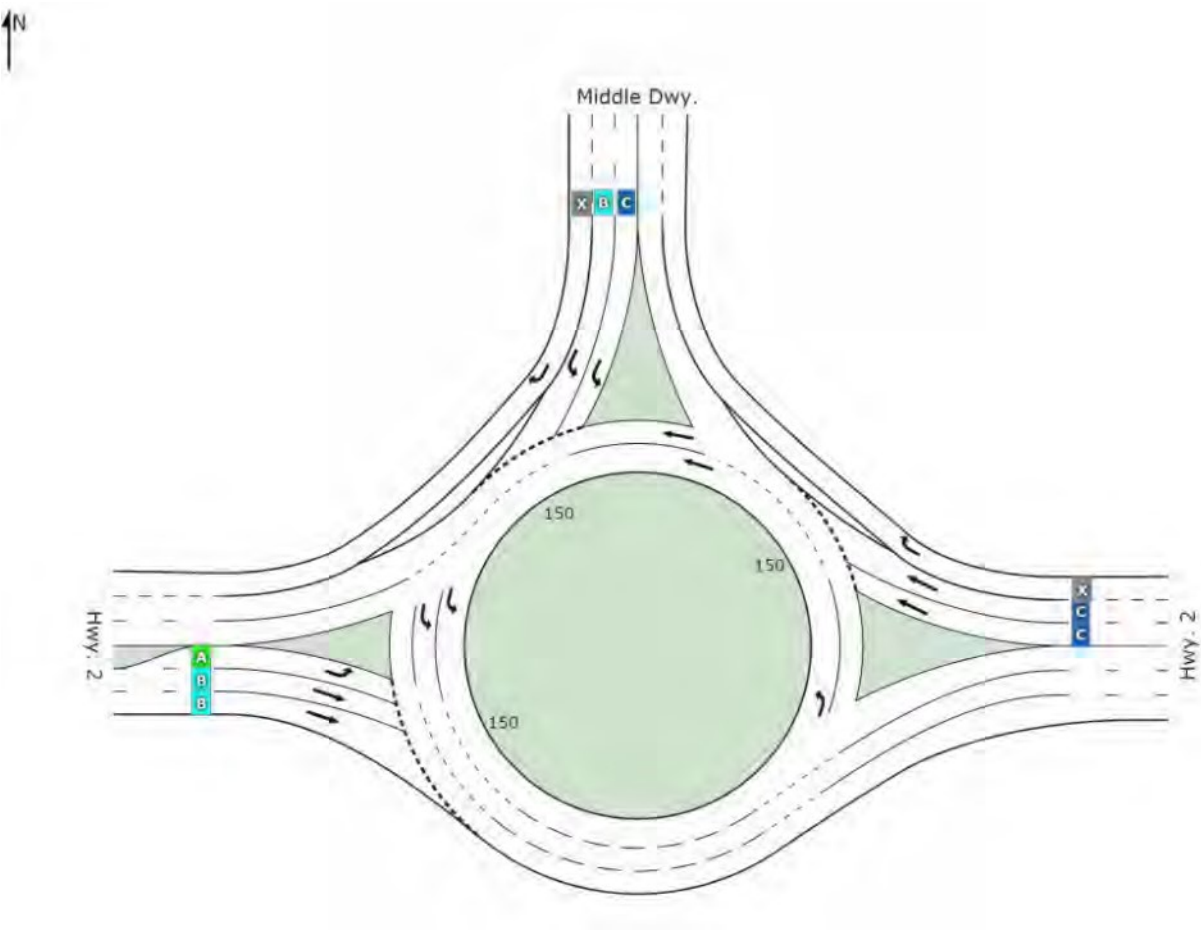
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	C	B	B	B

X: Not applicable for Continuous lane.

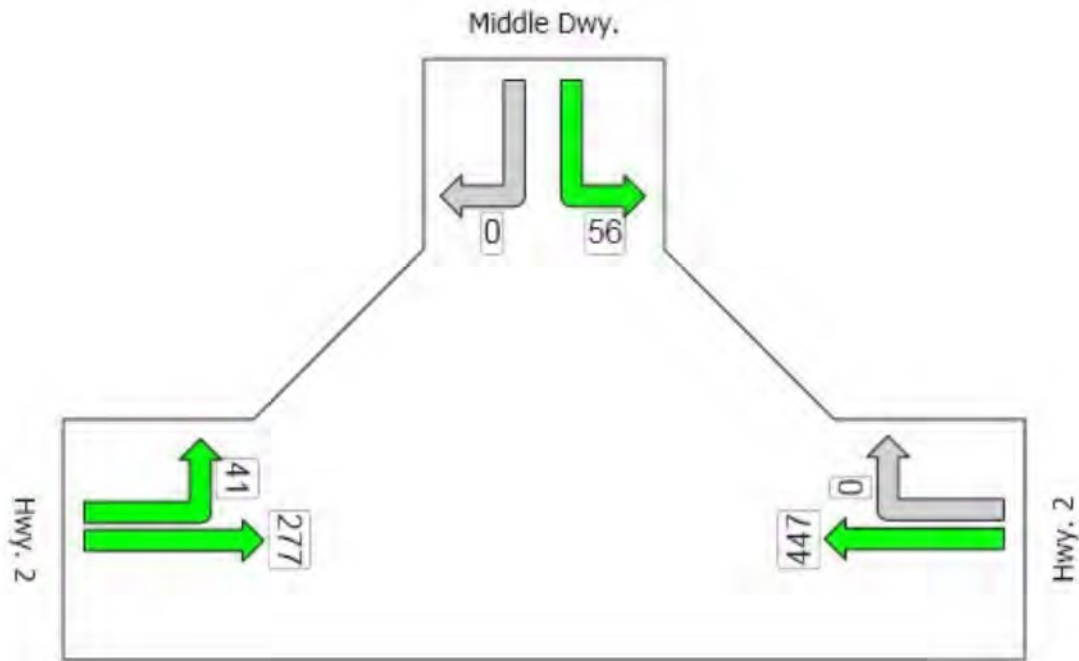
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

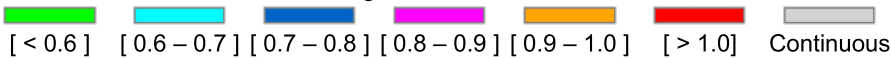
Largest 95% Back of Queue for any lane used by movement (feet)

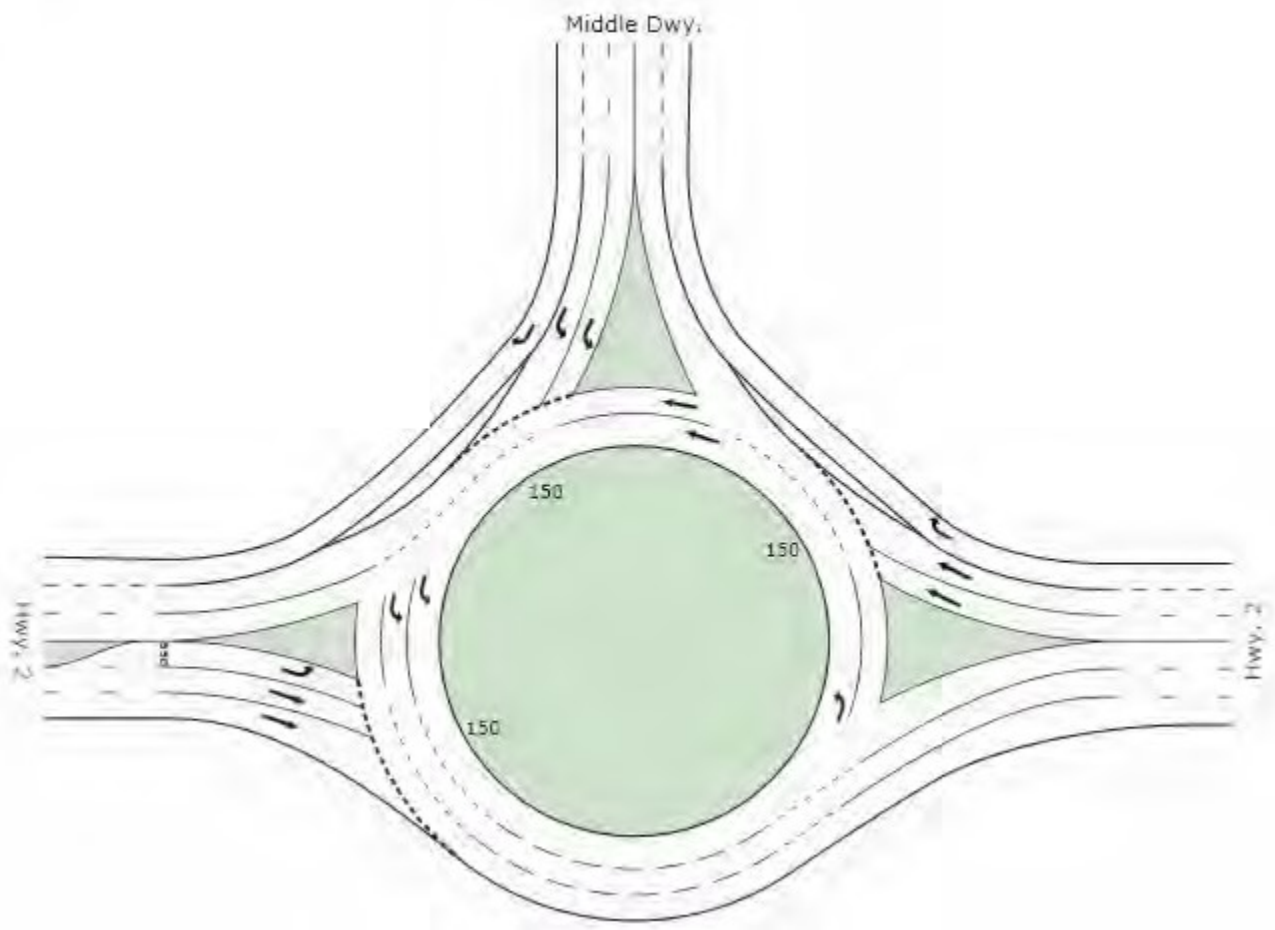
Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 2 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	447	56	277	447

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: Hwy. 2											
6T	T	2006	1.0	0.839	20.5	LOS C	13.8	347.5	0.88	0.77	20.9
6R	R	196	1.0	0.122	0.0	X	X	X	X	0.33	32.1
Approach		2202	1.0	0.839	18.7	LOS B	13.8	347.5	0.80	0.73	21.6
North: Middle Dwy.											
7L	L	166	1.0	0.272	17.4	LOS B	1.5	38.1	0.90	0.97	21.2
4R	R	184	1.0	0.115	0.0	X	X	X	X	0.33	32.1
Approach		351	1.0	0.272	8.3	LOS A	1.5	38.1	0.43	0.63	25.5
West: Hwy. 2											
5L	L	227	1.0	0.289	7.9	LOS A	1.4	35.0	0.40	0.68	24.5
2T	T	2034	1.0	0.794	16.6	LOS B	9.7	245.2	0.72	0.56	23.4
Approach		2261	1.0	0.794	15.7	LOS B	9.7	245.2	0.69	0.57	23.5
All Vehicles		4814	1.0	0.839	16.5	LOS B	13.8	347.5	0.72	0.65	22.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Wednesday, July 13, 2011 10:45:52 AM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\S\SPTR00000001\0600\INFO\Traffic\April 2011-Final TIA\Sidra\7-12-11\Hwy.2-Middle Dwy\2032 Alt3-

Buildout-Middle.sip

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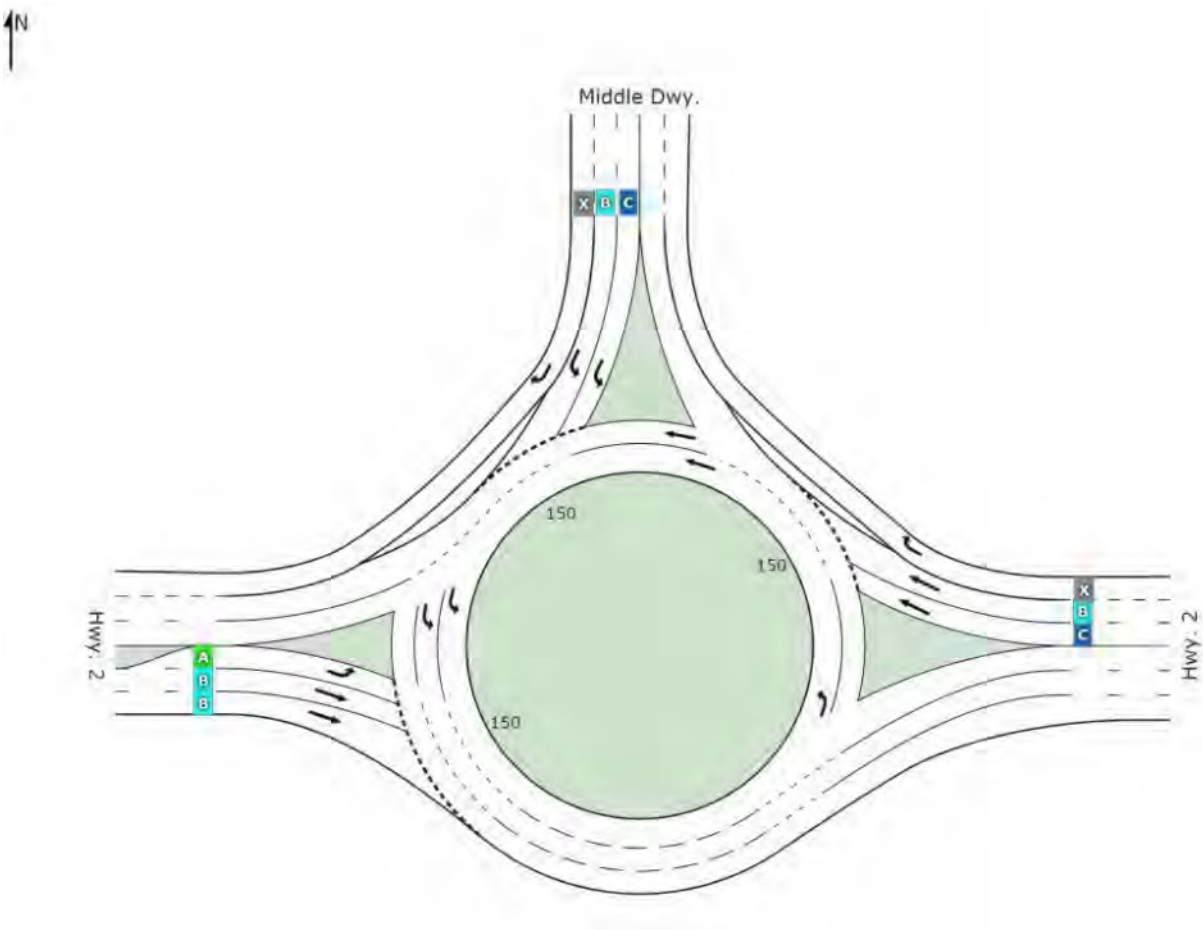
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
LOS	B	A	B	B

X: Not applicable for Continuous lane.

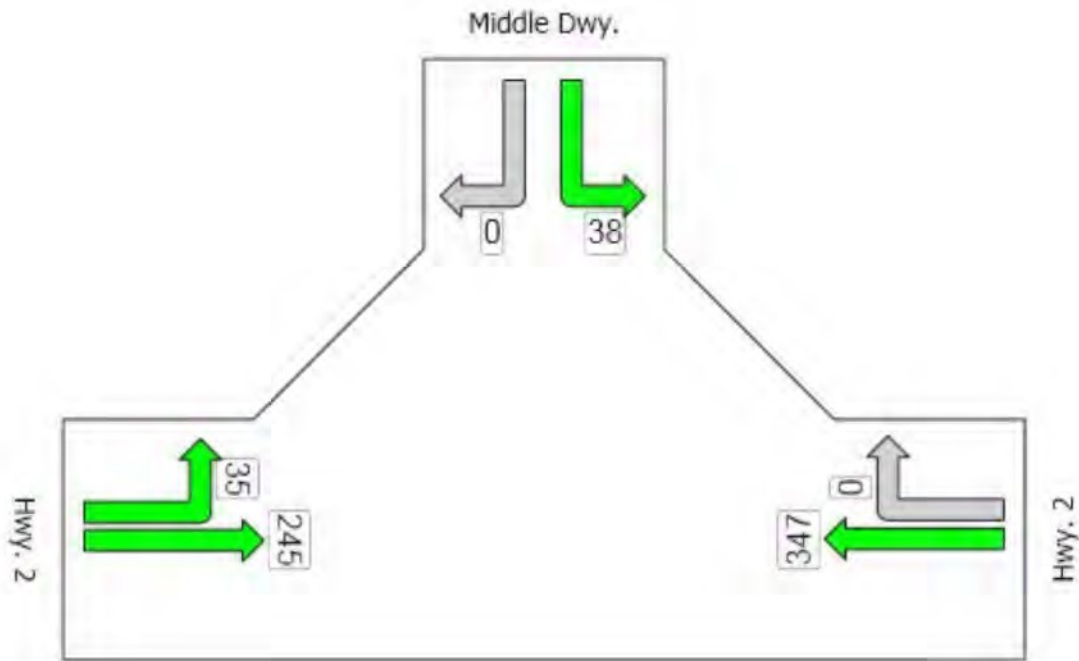
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

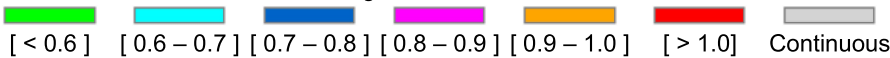
Largest 95% Back of Queue for any lane used by movement (feet)

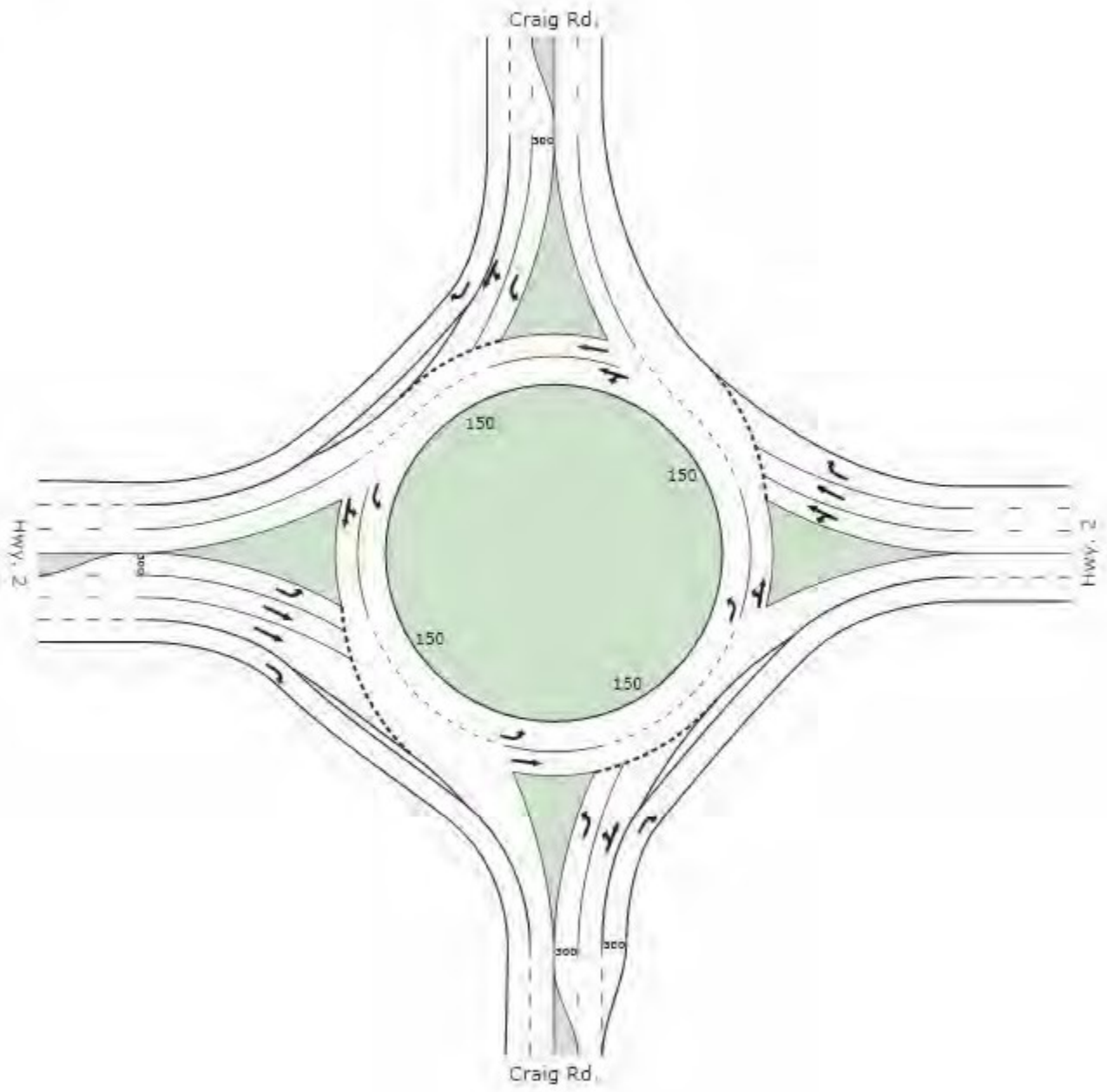
Middle Dwy./Hwy. (YEAR 2032 PM PEAK, Alt 3 Buildout)
West Plains Development
Roundabout



	East	North	West	Intersection
Queue Distance	347	38	245	347

Colour code based on Queue Storage Ratio





MOVEMENT SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)
West Plains Development
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Craig Rd.											
3L	L	235	1.0	1.164	183.5	LOS F	19.7	497.1	1.00	1.52	6.6
8T	T	116	1.0	1.164	182.7	LOS F	15.9	401.1	1.00	1.71	6.2
8R	R	92	1.0	0.057	0.0	X	X	X	X	0.43	34.9
Approach		443	1.0	1.164	145.2	LOS F	19.7	497.1	0.79	1.34	7.7
East: Hwy. 2											
1L	L	110	1.0	0.961	42.6	LOS D	22.0	554.7	1.00	1.55	16.8
6T	T	1864	1.0	0.961	39.2	LOS D	24.6	619.8	1.00	1.58	15.9
6R	R	619	1.0	0.708	17.0	LOS B	7.1	178.9	0.87	1.05	22.5
Approach		2593	1.0	0.961	34.0	LOS C	24.6	619.8	0.97	1.45	17.2
North: Craig Rd.											
7L	L	465	1.0	1.199	167.7	LOS F	28.6	721.3	1.00	2.07	6.7
4T	T	102	1.0	1.199	156.8	LOS F	28.6	721.3	1.00	2.09	7.0
4R	R	265	1.0	0.165	0.0	X	X	X	X	0.33	32.1
Approach		831	1.0	1.199	113.0	LOS F	28.6	721.3	0.68	1.52	8.8
West: Hwy. 2											
5L	L	357	1.0	0.438	10.0	LOS B	2.7	68.1	0.72	0.88	23.7
2T	T	2121	1.0	1.020	52.9	LOS D	34.8	876.2	1.00	1.86	14.2
2R	R	314	1.0	0.196	0.0	X	X	X	X	0.44	34.8
Approach		2792	1.0	1.020	41.5	LOS D	34.8	876.2	0.85	1.57	16.2
All Vehicles		6660	1.0	1.199	54.4	LOS D	34.8	876.2	0.87	1.50	13.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

HCM Delay Model used.

Processed: Thursday, July 14, 2011 4:52:01 PM

SIDRA INTERSECTION 5.1.3.1990

Project: P:\SPTR00000001\0600INFO\Traffic\April 2011-Final TIA\Sidra\Craig-Hwy.2\2032 Alt1-Buildout-Craig-REV-7=14-11.sip

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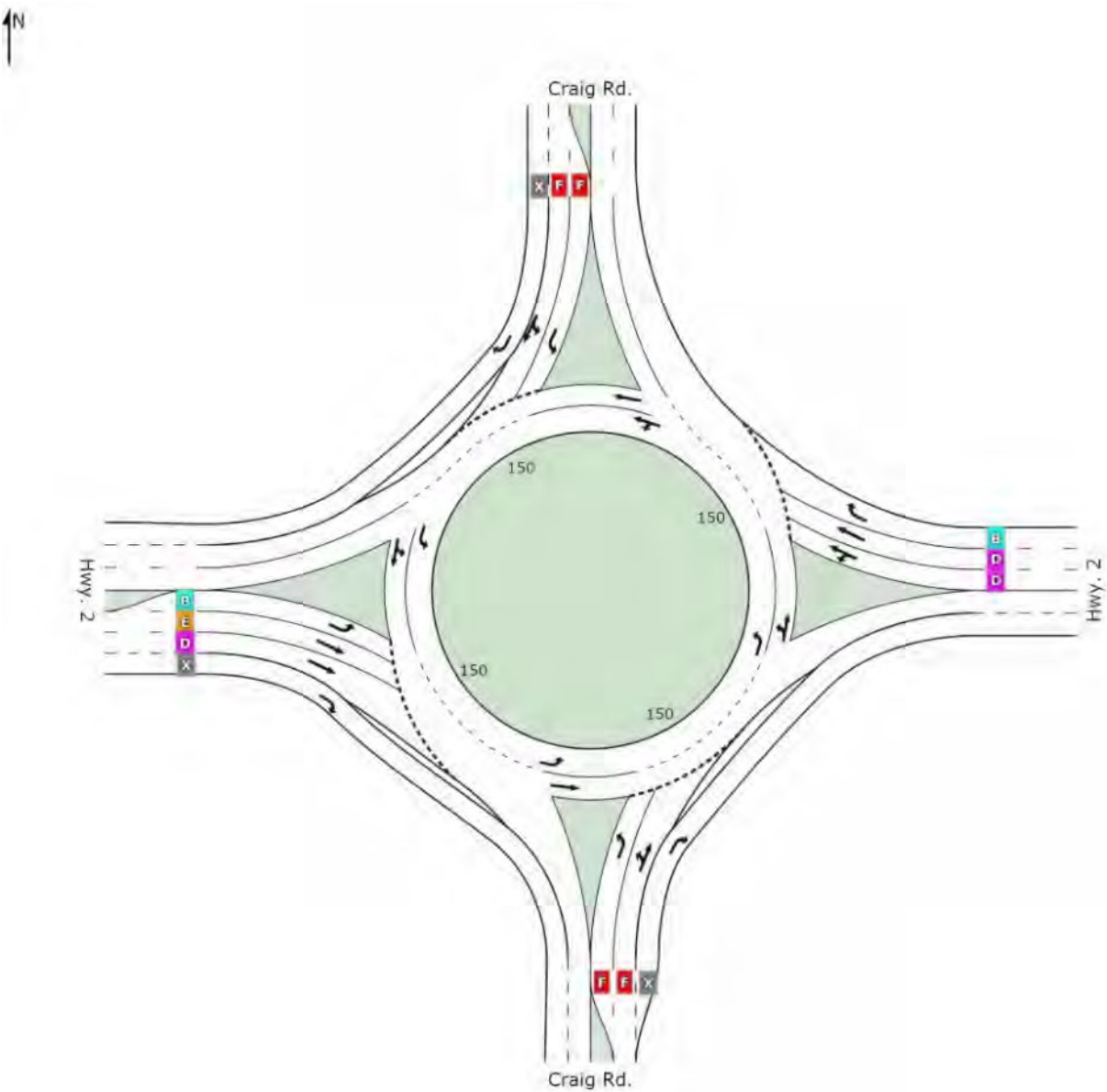
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SIDRA
INTERSECTION

LEVEL OF SERVICE SUMMARY

Site: Roundabout

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)
West Plains Development
Roundabout



	South	East	North	West	Intersection
LOS	F	C	F	D	D

X: Not applicable for Continuous lane.

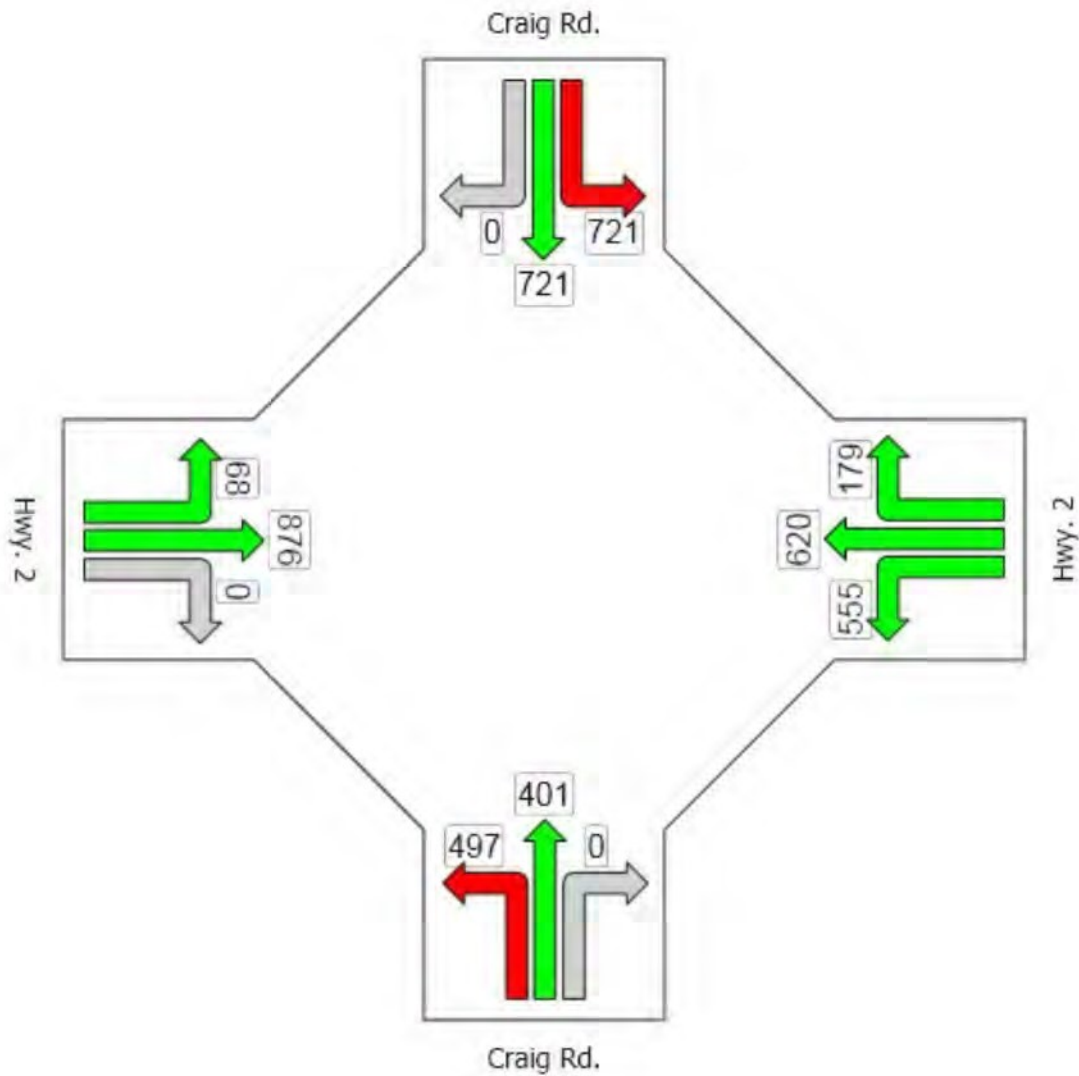
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.

QUEUE DISTANCE

Site: Roundabout

Largest 95% Back of Queue for any lane used by movement (feet)

Craig Rd./Hwy. (YEAR 2032 PM PEAK, ALT1 Buildout)
West Plains Development
Roundabout



	South	East	North	West	Intersection
Queue Distance	497	620	721	876	876

Colour code based on Queue Storage Ratio

