



**Traffic Impact Study for  
BlueWave Car Wash**

APN 027-041-03  
4620 Wedekind Road  
Sparks, Nevada 89431

June 19, 2019

Prepared for:

BW Sparks LLC  
2175 Francisco Blvd. East, Suite G  
San Rafael, California 94901

Prepared by:

Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno, Nevada 89511



# Table of Contents

**EXECUTIVE SUMMARY ..... I**

**1.0 INTRODUCTION..... 1.1**

1.1 CITY OF SPARKS COORDINATION ..... 1.1

1.2 NDOT DISTRICT 2 COORDINATION..... 1.1

1.3 EXISTING AND PROPOSED LAND USES ..... 1.2

**2.0 EXISTING TRANSPORTATION FACILITIES ..... 2.5**

2.1 INTERSECTIONS ..... 2.5

2.2 ROADWAYS ..... 2.7

2.3 PEDESTRIAN AND BICYCLE FACILITIES ..... 2.7

2.4 TRANSIT SERVICE ..... 2.7

**3.0 PROJECT GENERATED TRAFFIC ..... 3.8**

3.1 TRIP GENERATION ..... 3.8

3.2 TRIP DISTRIBUTION..... 3.8

**4.0 TRAFFIC ANALYSIS..... 4.11**

4.1 POLICY LEVEL OF SERVICE ..... 4.11

4.2 BACKGROUND CONDITIONS..... 4.12

4.3 BACKGROUND + PROJECT..... 4.16

**5.0 PROJECT DRIVEWAYS AND ACCESS..... 5.19**

**6.0 TURN LANE STORAGE AT SULLIVAN LANE ..... 6.20**

**7.0 CONCLUSIONS & RECOMMENDATIONS..... 7.21**

## LIST OF TABLES

- Table 1: Trip Generation Data Source
- Table 2: Project Trip Generation
- Table 3: RTC 2040 Model ADTs
- Table 4: LOS Criteria for Unsignalized Intersections
- Table 5: LOS for Background Traffic
- Table 6: LOS for Background Plus Project Traffic

## LIST OF FIGURES

- Figure 1. Project Study Area
- Figure 2. Site Plan
- Figure 3. Existing Lane Configuration
- Figure 4. Trip Distribution
- Figure 5. Project Generated Peak Hour Traffic Volumes
- Figure 6. Background Condition Traffic Volumes
- Figure 7. Background Condition LOS



Figure 8. Background Plus Project Condition Traffic Volumes

Figure 9. Background Plus Project Condition LOS

## **LIST OF APPENDICES**

Appendix A – Traffic Counts

Appendix B – Background Condition LOS

Appendix C – Background Plus Project Condition LOS



## Executive Summary

BW Sparks LLC is proposing development of an automated car wash facility at the northeast corner of McCarran Boulevard and Wedekind Road. As requested by City of Sparks this traffic study evaluates impacts to the existing two-way stop controlled intersection of McCarran Boulevard and Wedekind Road, access of the proposed driveways, and queue storage for the westbound to southbound movement at the intersection of McCarran Boulevard and Sullivan Lane.

### Conclusions

The major approach movements at the intersection of McCarran Boulevard and Wedekind Road currently meet the Policy Level of Service (LOS). The minor approach left-turn and through movements currently operate at LOS F.

Previous coordination with the Nevada Department of Transportation (NDOT) have resulted in this proposed development being tasked to construct improvements on McCarran Boulevard to restrict left-out and through movements from Wedekind Road consistent with a recently completed Intersection Control Evaluation.

The proposed improvements to the BlueWave Car Wash are projected to generate 78 PM peak hour trips. The proposed BW CarWash traffic volumes will have a minor effect on the study intersections, with no changes to movement LOS and an overall increase in delay of less than 1 second per vehicle, during the peak hour. The traffic generated by this project do not indicate any additional improvements, other than those directed by NDOT, are necessary to the study intersections.

Two driveways are proposed for this development. A right-in only driveway is proposed along McCarran Boulevard. This driveway offset to Wedekind Road is less than required by NDOT's Access Management Standards but has been agreed to by NDOT consistent with construction of the above described improvements. A full access driveway is proposed along Wedekind Road. This driveway meets the Regional Transportation Plan Access Management Standards for spacing from McCarran Boulevard and is slightly below Access Management Standards for spacing to adjacent driveways. Given the horizontal curvature of the roadway adjacent to the project and the desire to maximize the driveway offset from McCarran Boulevard, no alterations to this proposed driveway location are recommended.

The project would not result in a significant impact to pedestrian, bicycle, or transit facilities.



## 1.0 INTRODUCTION

This report presents the results of a traffic study conducted to analyze the impact of traffic associated with development of a drive-through car wash facility at 4620 Wedekind Road, Sparks, Nevada (APN 027-041-03). The parcel is currently undeveloped. The City of Sparks requires a traffic study be performed as part of the Conditional Use Permit submittal.

The project study area is shown in Figure 1. This report describes the existing transportation conditions around the project site and addresses the potential traffic impacts of the project. The impacts have been reviewed in terms of intersection level of service as well as trip generation, traffic distribution, traffic assignment and potential intersection and roadway improvements needed to mitigate expected deficiencies. The study has also included a review of site access.

The project's potential effects on transit services, pedestrian, and bicycle facilities in the project area are also evaluated. Measures that would mitigate these impacts to a less than significant level are recommended, where appropriate.

### 1.1 CITY OF SPARKS COORDINATION

As per the City of Sparks Conditional Use Permit Application, a Traffic Study is required for any project which will generate more than 80 p.m. peak hour trips. A previous traffic study for this site and usage indicated a trip generation in excess of this requirement. Stantec staff had several phone calls with City of Sparks Community Development Department staff during the week of May 20, 2019 to discuss the project. At that time, City of Sparks staff requested a traffic study analyzing the entry and access of the project and impacts to the following intersections:

1. McCarran Boulevard/Wedekind Road
2. Project driveways
3. Westbound to Southbound turn lane storage at McCarran Boulevard/Sullivan Lane

This traffic study is submitted in fulfillment of this request.

### 1.2 NDOT DISTRICT 2 COORDINATION

Discussions with NDOT District 2 Permits during the pre-permit phase indicated that they were acceptable to processing the permit with the previously submitted traffic study developed by Solaegui Engineers. NDOT performed an Intersection Control Evaluation (ICE) in late 2018 at the request of the proposed Wildcreek High School and has conditioned BlueWave with implementing the access control recommendations of the study at the intersection of McCarran Boulevard and Wedekind Road. The access control recommendations of the ICE include restriction of left-out and through movements from Wedekind Road from both the north and south approaches to the intersection. This traffic study includes these restrictions as part of the traffic analysis presented in Section 4.



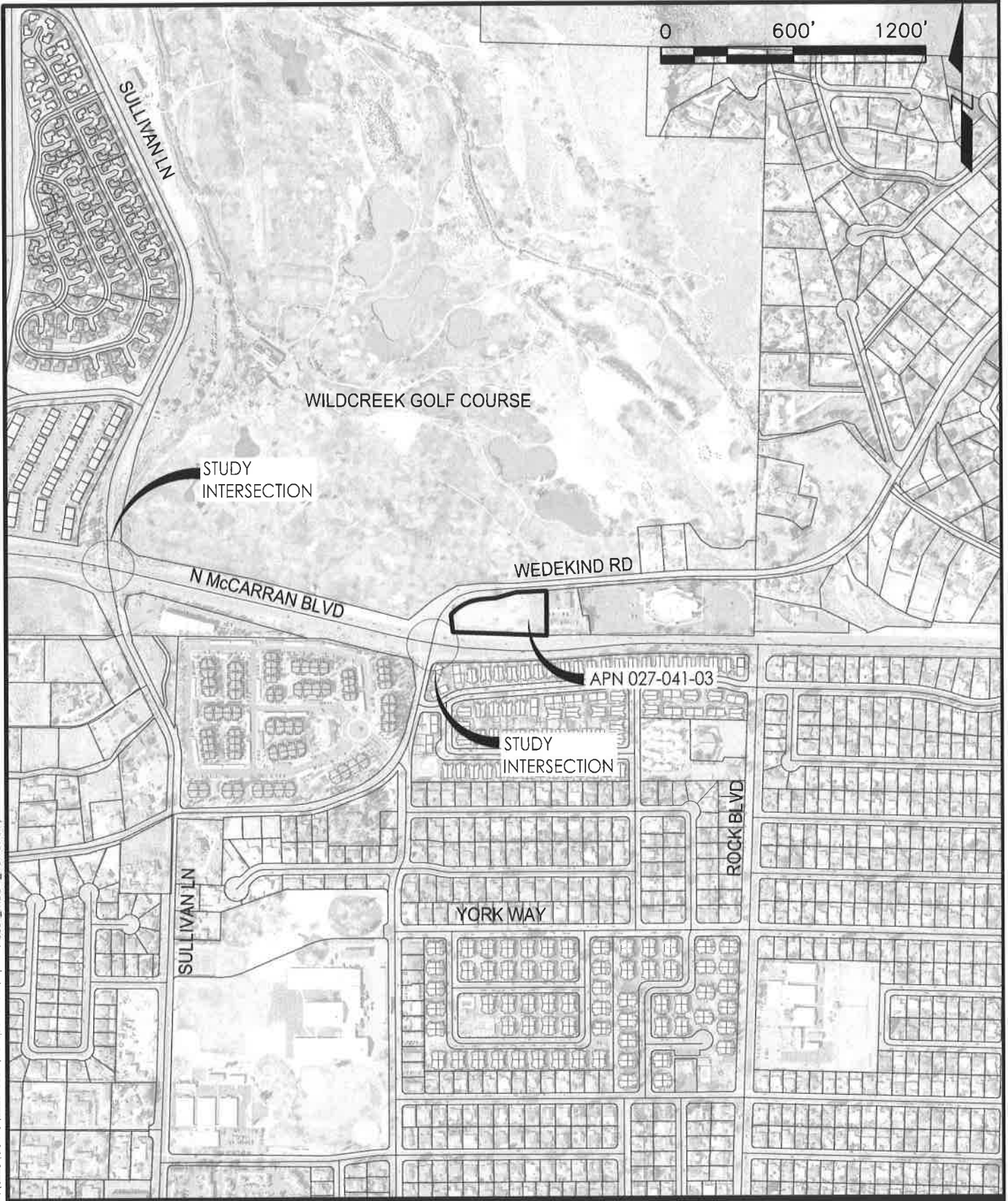
### **1.3 EXISTING AND PROPOSED LAND USES**

APN 027-041-03 is a 1.608 acre parcel located at the northeast quadrant of the intersection of McCarran Boulevard and Wedekind Road. The parcel is currently zoned PO – Professional Office. The parcel is currently undeveloped.

BW Sparks LLC proposes to develop a drive-through car wash on the project site. The drive-through car wash will consist of a single drive-through tunnel and approximately 25 self-service vacuum stalls.



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy  
2019.06.19 8:36:37 AM



Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

Client/Project  
BLUEWAVE SPARKS LLC.

BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.

Project No.  
222310634

Title  
PROJECT STUDY AREA

Revision  
0  
Reference Sheet

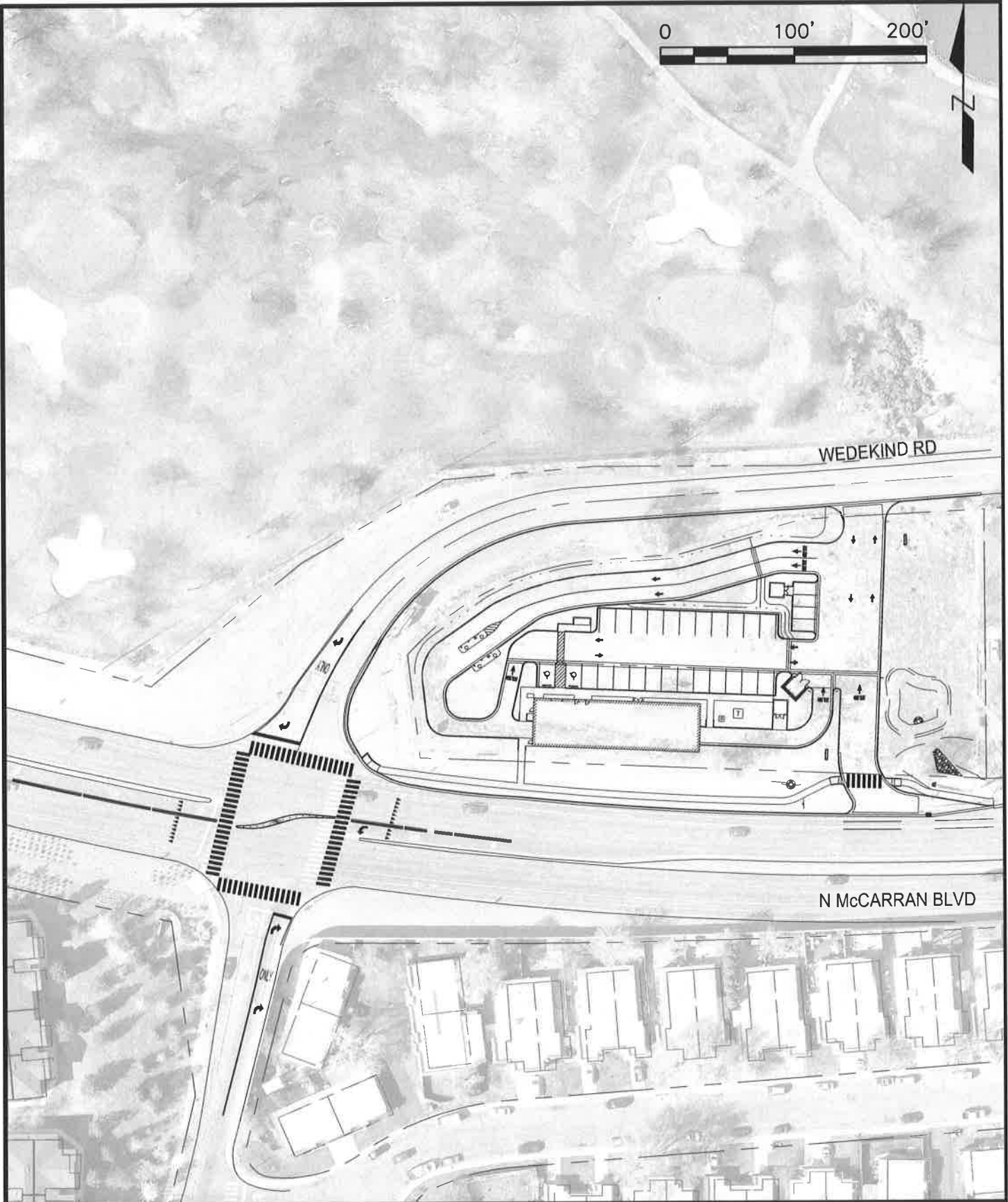
Date  
2019.06.19

Figure No.  
1



WEDEKIND RD

N McCARRAN BLVD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 8:41:08 AM



Stantec Consulting Services Inc.  
 6995 Sierra Center Parkway  
 Reno NV 89511-2213  
 Tel: (775) 850-0777  
 www.stantec.com

Client/Project  
**BLUEWAVE SPARKS LLC.**  
  
**BLUEWAVE SPARKS  
 CARWASH  
 4620 WEDEKIND RD.**  
  
 Project No.  
 222310634

Title  
**PROJECT SITE PLAN**

Revision 0	Date 2019.06.19
Reference Sheet	Figure No. 2



## 2.0 EXISTING TRANSPORTATION FACILITIES

The project site is generally serviced by the following transportation facilities:

### 2.1 INTERSECTIONS

McCarran Boulevard/Wedekind Road Intersection – The intersection of McCarran Boulevard and Wedekind Road is a four-leg two-way stop controlled intersection immediately adjacent to the project site. The westbound approach (McCarran Boulevard) consists of two through lanes with the right lane being a shared through-right turn lane, and an exclusive left turn lane. The eastbound approach (McCarran Boulevard) consists of two through lanes with the right lane being a shared through-right turn lane, and an exclusive left turn lane. The northbound approach (Wedekind Road) consists of a shared left turn lane-through lane, and an exclusive right turn lane. The northbound approach is stop controlled. The southbound approach (Wedekind Road) consists of a shared left turn-through-right turn lane. The approach is flared to allow concurrent movements. The southbound approach is stop controlled. The intersection lies within Nevada Department of Transportation right-of-way.

Pedestrian crosswalks with crosswalk markings exist across all four legs.

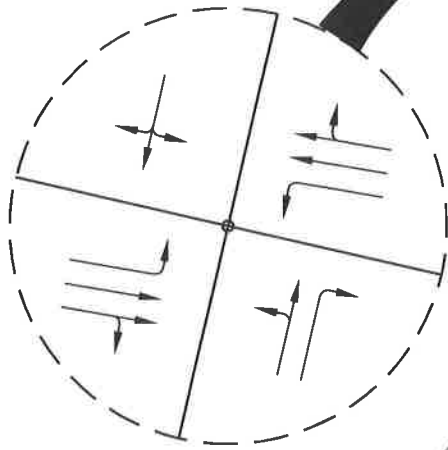
Figure 3 illustrates the existing lane configuration of this intersection. As noted in Section 1.2, NDOT has conditioned this project to construct improvements to modify the intersection to restrict left-out and through movements from Wedekind Road.





WEDEKIND RD

N McCARRAN BLVD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 8:44:51 AM



Stantec Consulting Services Inc.  
 6995 Sierra Center Parkway  
 Reno NV 89511-2213  
 Tel: (775) 850-0777  
 www.stantec.com

Client/Project  
 BLUEWAVE SPARKS LLC.

BLUEWAVE SPARKS  
 CARWASH  
 4620 WEDEKIND RD.

Project No.  
 222310634

Title  
 EXISTING LANE  
 CONFIGURATION

Revision  
 0

Reference Sheet

Date  
 2019.06.19

Figure No.  
 3

## 2.2 ROADWAYS

McCarran Boulevard – Existing McCarran Boulevard is an east-west four-lane arterial immediately adjacent to the project site. McCarran Boulevard is posted for a 45 MPH speed limit. The 2040 Regional Transportation Plan classifies McCarran Boulevard adjacent to the project site as a High Access Control Arterial. NDOT's functional classification maps classify McCarran Boulevard adjacent to the project site as Other Principal Arterial. McCarran Boulevard adjacent to the project site lies within Nevada Department of Transportation right-of-way.

Wedekind Road – Existing Wedekind Road is a north-south two-lane undivided collector immediately adjacent to the project site. Wedekind Road north of McCarran Boulevard is posted for a 30 MPH speed limit. Wedekind Road south of McCarran Boulevard is posted for a 25 MPH speed limit. The 2040 Regional Transportation Plan classifies Wedekind Road adjacent to the project site as a Low Access Control Collector. NDOT's functional classification maps classify Wedekind Road adjacent to the project site as Minor Collector. Wedekind Road adjacent to the project site lies primarily within City of Sparks right-of-way.

## 2.3 PEDESTRIAN AND BICYCLE FACILITIES

Striped and signed bike lanes exist along both sides of McCarran Boulevard immediately adjacent to the project site. There are no bike facilities on Wedekind Road. An asphalt surfaced sidewalk exists along the south side of McCarran Boulevard west of Wedekind Road. There are no other sidewalks on McCarran Boulevard or Wedekind Road. Pedestrian crosswalks with crosswalk markings exist across all four legs of the intersection of McCarran Boulevard and Wedekind Road.

## 2.4 TRANSIT SERVICE

Per the Spring 2019 RTC Bus Book, there is no regularly scheduled transit service adjacent to the project site. The nearest route servicing the area is Route 2 approximately 0.6 mile from the project site (at York Way and Rock Boulevard).



## 3.0 PROJECT GENERATED TRAFFIC

### 3.1 TRIP GENERATION

Stantec has estimated the trip generation for the proposed project based on rates provided in the standard reference Trip Generation (10<sup>th</sup> Edition) published by the Institute of Transportation Engineers (ITE). A land use of “Automated Car Wash” has been established for this project based on a review of project information. The tables below summarize the expected trip generation from the proposed project. Based on the trip generation analysis, the proposed project is expected to generate approximately 78 trips during the a.m. peak period and 78 trips during the p.m. peak period.

**Table 1: Trip Generation Data Source**

		Daily	AM Peak Hour			PM Peak Hour		
Land Use	ITE Code	Rate	Rate	% In	% Out	Rate	% In	% Out
Automated Car Wash	948	N/A	N/A	N/A	N/A	77.50	50%	50%

**Table 2: Project Trip Generation**

		Daily	AM Peak Hour			PM Peak Hour		
			Total	Entering	Exiting	Total	Entering	Exiting
Car Wash Tunnels	1	775*	78*	39*	39*	78	39	39

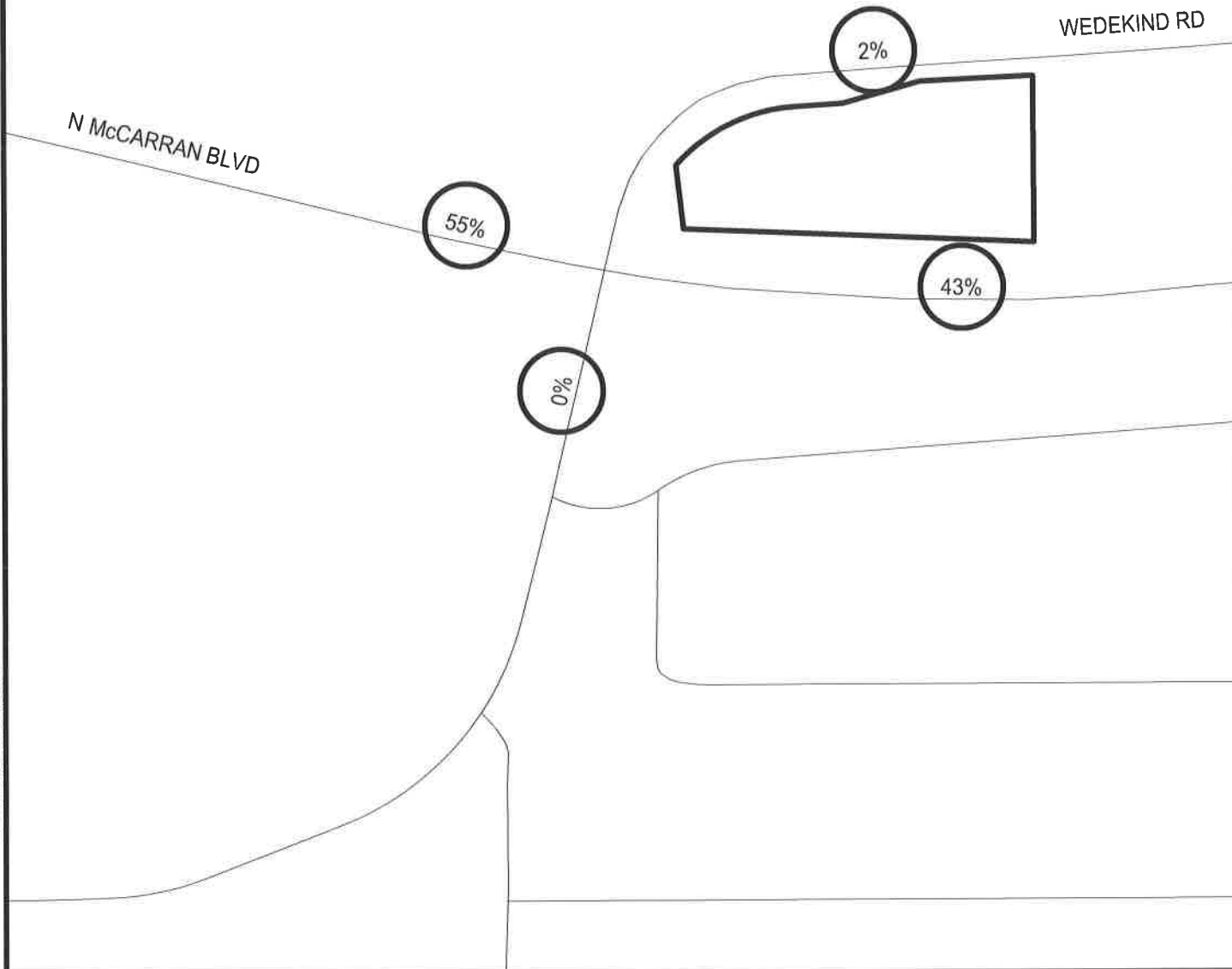
\*Estimated. Data not included in ITE Trip Generation (10<sup>th</sup> Edition)

Note that ITE Trip Generation did not contain information for a.m. peak hour trips or daily trips. For the purpose of this study, the a.m. peak hour trips are assumed to be equivalent to the p.m. peak hour trips. The peak hour trips are assumed to reflect the traffic patterns of McCarran Boulevard. Per NDOT traffic count information, peak hour trips represent approximately 10% of daily trips.

### 3.2 TRIP DISTRIBUTION

Stantec has assigned the additional project generated traffic based on existing travel patterns. This additional traffic generally matches existing traffic patterns. Although some trips are expected to be “pass-by” trips, for the purpose of this study, all trips are assumed to be “new”. Figure 4 illustrates the assumed trip distribution for this proposed project. Figure 5 visually depicts the trip generation volumes at the study intersections.





v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

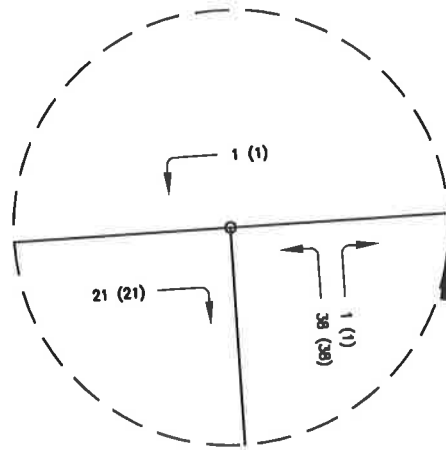
2019.06.19 11:27:48 AM



Stantec Consulting Services Inc.,  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

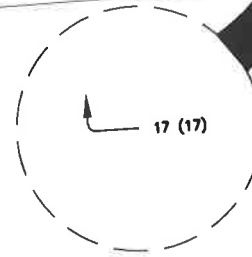
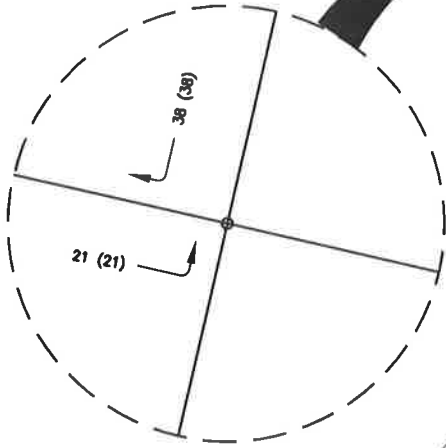
Client/Project  
**BLUEWAVE SPARKS LLC.**  
  
BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.  
  
Project No.  
222310634

Title	
TRAFFIC DISTRIBUTION	
Revision	Date
0	2019.06.19
Reference Sheet	Figure No.
	4



N McCARRAN BLVD

WEDEKIND RD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 11:27:39 AM



Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

Client/Project  
BLUEWAVE SPARKS LLC.

BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.

Project No.  
222310634

Title  
PROJECT GENERATED  
TRAFFIC

Revision  
0

Reference Sheet

Date  
2019.06.19

Figure No.  
5

## 4.0 TRAFFIC ANALYSIS

### 4.1 POLICY LEVEL OF SERVICE

According to Appendix G of the 2040 Regional Transportation Plan, the Regional Level of Service (LOS) Standards for all regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon is LOS D. Table 3 contains the 2040 Average Daily Traffic volumes, as provided by the RTC. As shown, all roadway segments have projected 2040 volumes below the 27,000 threshold. Therefore, for the purpose of this traffic study, the Policy LOS for the study intersection is LOS D.

**Table 3: RTC 2040 Model ADTs**

Intersection of McCarran Boulevard and Wedekind Road	
McCarran (w/o Wedekind)	– 22,826
McCarran (e/o Wedekind)	– 21,044
Wedekind (n/o McCarran)	– 964
Wedekind (s/o McCarran)	– 6,833

The 6<sup>th</sup> Edition of the Highway Capacity Manual (HCM), published by the Transportation Research Board, provides standard traffic operational analysis methods for intersections, freeways, and ramps. LOS is the fundamental HCM parameter describing operational conditions within a traffic stream. LOS is an A-through-F letter ranking scale with LOS A indicating free-flow, low density, or nearly negligible delay conditions and LOS F indicating facility breakdown with low speeds, high densities and high delay.

For intersections, LOS is based on the average control delay per entering vehicle measured in seconds. Control delay includes not only stops at intersections, but also slower speeds as vehicles advance in queue or decelerate upstream of an intersection. For two way stop controlled intersections, individual approach delays are calculated. An overall average delay is not calculated for each intersection. The description of level of service for stop controlled intersections are show in Table 4.

**Table 4: LOS Criteria for Stop Controlled Intersections**

Control Delay (s/veh)	Level of Service
<=10	A
>10-15	B
>15-25	C
>25-35	D
>35-50	E
>50	F



## 4.2 BACKGROUND CONDITIONS

The background conditions for this project consist of existing field measured traffic counts plus anticipated traffic volumes generated by adjacent approved development projects. Peak hour turning movement counts were conducted at the study intersections on Tuesday, June 4, 2019. The counts were conducted on a school day with no unusual weather or traffic conditions. The following provides the hours of study and identified peak hour. Appendix A contains the full traffic count data.

- AM Count – From 7:00 to 9:00.
  - Peak hour 7:00 to 8:00.
- PM Count – From 4:00 to 6:00.
  - Peak hour 4:45 to 5:45.

Discussions with City of Sparks Community Development Department and NDOT District 2 staff indicated one potential relevant development projects:

1. Wildcreek High School

The Wildcreek High School is currently working its way through design development and review process at the time of the development of this traffic study. Per the Wildcreek High School traffic study, Wildcreek High School will not be using Wedekind Road as an access point and is proposing no modifications to the intersection of McCarran Boulevard and Wedekind Road. Therefore, trip generation volumes from the Wildcreek High School were not added to existing traffic counts for the purpose of developing background traffic volume conditions.

Figure 6 depicts the existing traffic volumes at the study intersection. Figure 7 and Table 5 below depict the LOS of the existing traffic movements for the study intersection. Appendix B contains the full LOS worksheets, as calculated by Synchro 10 applying the HCM 6<sup>th</sup> Edition methodology.





**Table 5: LOS for Baseline Traffic**

Intersection/ Approach/ Movement	AM Peak Hour		PM Peak Hour	
	Level of Service	Delay (sec)	Level of Service	Delay (sec)
<b>McCarran Boulevard and Wedekind Road</b>				
Eastbound Approach				
Left	C	16.7	C	15.5
Westbound Approach				
Left	C	17.2	C	22.5
Northbound Approach	F	218.4	F	+
Left-Through	F	2409.4*	F	+
Right	C	15.5	F	327.9
Southbound Approach				
Left-Through-Right	F	677.2*	F	+

\*Indicates calculated delay >300 sec.  
 +Indicates calculated queue length outside realistic limits.

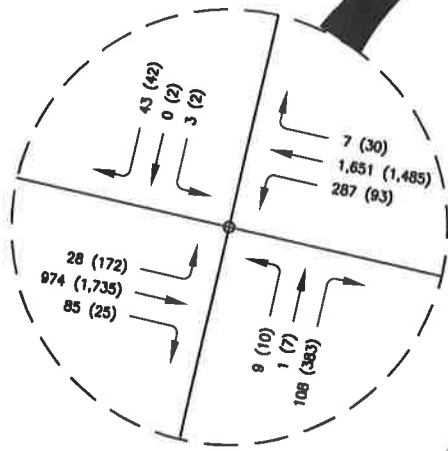
The major movements of the eastbound and westbound lefts currently operate at LOS D or better during the AM and PM peak hours, meeting the Policy LOS of LOS D. The minor street northbound and southbound currently operate at LOS F. This corresponds well with field observations indicating minor street left and through movements experience difficulty executing maneuvers during the peak hours.





WEDEKIND RD

N McCARRAN BLVD



V:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 11:27:29 AM



Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

Client/Project  
BLUEWAVE SPARKS LLC.

BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.

Project No.  
222310634

Title  
BACKGROUND CONDITION  
TRAFFIC VOLUMES

Revision  
0

Reference Sheet

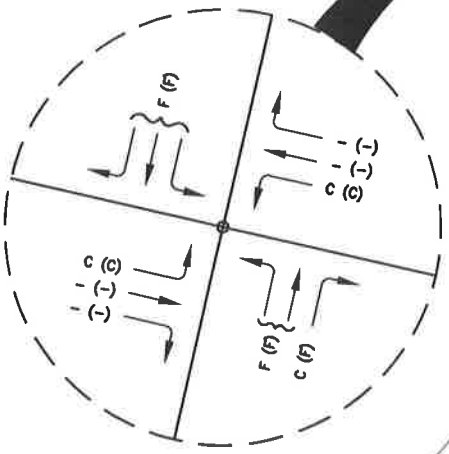
Date  
2019.06.19

Figure No.  
6



WEDEKIND RD

N McCARRAN BLVD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 12:03:19 PM



Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

Client/Project  
**BLUEWAVE SPARKS LLC.**  
  
BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.  
  
Project No.  
222310634

Title  
**BACKGROUND CONDITION  
LEVEL OF SERVICE**

Revision	Date
0	2019.06.19
Reference Sheet	Figure No.
	7

### 4.3 BACKGROUND + PROJECT

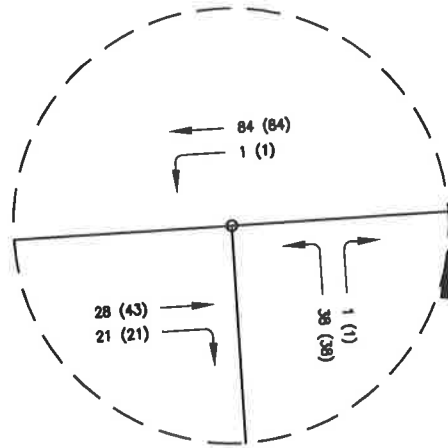
The background traffic volumes as shown in Figure 6 were combined with the project generated traffic volumes as shown in Figure 5 to develop the Background + Project Conditions Model. No modifications were made to the existing Peak Hour Factors. Permitted movements were modified to be consistent with NDOT direction to eliminate left-out and through movements from Wedekind Road as noted in Section 1.2. Figure 8 depicts the background plus project traffic volumes at the study intersections. Figure 9 and Table 6 below depict the LOS of the background plus project traffic movements for the study intersections. Appendix C contains the full LOS worksheets, as calculated by Synchro 10 applying the HCM 6<sup>th</sup> Edition methodology.

**Table 6: LOS for Background + Project Traffic**

Intersection/ Approach/ Movement	AM Peak Hour		PM Peak Hour	
	Level of Service	Delay (sec)	Level of Service	Delay (sec)
<b>McCarran Boulevard and Wedekind Road</b>				
Eastbound Approach				
Left	C	17.6	C	16.3
Westbound Approach				
Left	C	17.2	C	22.5
Northbound Approach				
Right	C	15.8	F	358.5*
Southbound Approach				
Right	C	23.9	C	21.0
<b>Proposed Driveway – Wedekind Road</b>				
Westbound Approach				
Left	A	7.4	A	7.4
Northbound Approach				
Left-Right	A	9.2	A	9.3

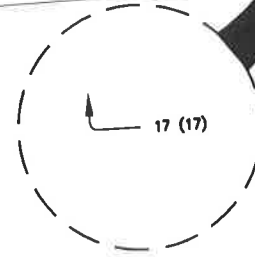
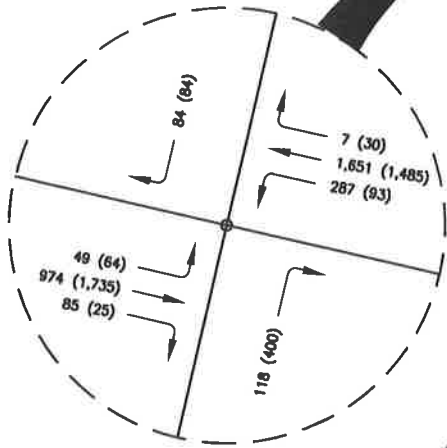
In general the intersection is projected to operate at the same Level of Service during the peak hours with the addition of the project generated traffic and turning restrictions required by NDOT. Average delay of the major approach left turning movements is anticipated to increase by less than 1 second in the AM peak with the PM peak remaining LOS F. The northbound right turn minor approach turning movement increases by less than 0.5 second. By restricting the southbound and through and left turn movements, the level of service for this approach improves from LOS F to LOS C.





N McCARRAN BLVD

WEDEKIND RD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

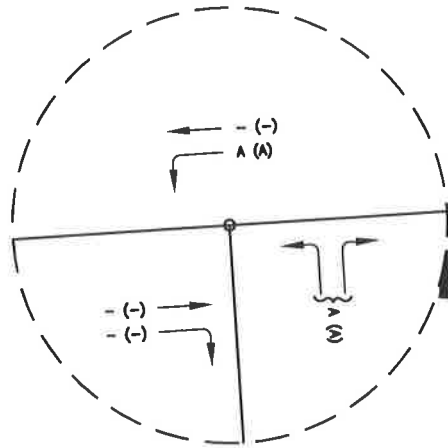
2019.06.19 11:27:10 AM



Stantec Consulting Services Inc.  
6995 Sierra Center Parkway  
Reno NV 89511-2213  
Tel: (775) 850-0777  
www.stantec.com

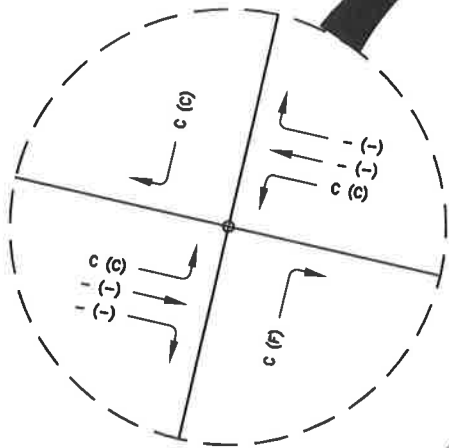
Client/Project  
BLUEWAVE SPARKS LLC.  
  
BLUEWAVE SPARKS  
CARWASH  
4620 WEDEKIND RD.  
  
Project No.  
222310634

Title  
BACKGROUND + PROJECT  
CONDITION  
TRAFFIC VOLUME  
  
Revision  
0  
Reference Sheet  
  
Date  
2019.06.19  
Figure No.  
8



N McCARRAN BLVD

WEDEKIND RD



v:\2223\active\222310634\transportation\report\10634\_mcbw\_trafficstudy

2019.06.19 12:05:14 PM



Stantec Consulting Services Inc.  
 6995 Sierra Center Parkway  
 Reno NV 89511-2213  
 Tel: (775) 850-0777  
 www.stantec.com

Client/Project  
**BLUEWAVE SPARKS LLC.**  
  
**BLUEWAVE SPARKS  
 CARWASH**  
**4620 WEDEKIND RD.**  
  
 Project No.  
 222310634

Title	
BACKGROUND + PROJECT CONDITION LEVEL OF SERVICE	
Revision	Date
0	2019.06.19
Reference Sheet	Figure No.
	9

## 5.0 PROJECT DRIVEWAYS AND ACCESS

The project is proposed to be served by one driveway on McCarran Boulevard and one driveway on Wedekind Road.

The north driveway on Wedekind Road is proposed to be a full access driveway approximately 480 feet from the intersection with McCarran Boulevard. The Access Management Standards as included in the Regional Transportation Plan for a Low Access Control Collector indicates driveways should be a minimum of 150 feet from major streets and 200 feet from adjacent driveways. The proposed driveway offset from McCarran Boulevard meets this standard. There is a driveway for the eastern adjacent parcel that is only 185 feet from this driveway, which is slightly below the above listed standard. However, the proposed driveway has been located as far east as practically possible in order to maximize the offset from McCarran Boulevard and maximize the driveway distance from the tight horizontal curvature along Wedekind Road near this location. It is recommended that this slight deviation be deemed acceptable to the City of Sparks.

The south driveway on McCarran Boulevard is proposed to be a right-in only driveway approximately 450 feet east of the intersection with McCarran Boulevard. Per the NDOT Access Management System and Standards, the minimum driveway offset for right-in/right-out access is 660 feet from adjacent accesses. This condition has been extensively discussed with NDOT and has resulted in NDOT accepting this proposed access with the condition that the driveway be right-in only, a right turn lane be constructed as long as practically possible, and the Wedekind Road left-out and through movements be restricted as described in Section 1.2.



## 6.0 TURN LANE STORAGE AT SULLIVAN LANE

The NDOT requested restriction of left-turns and through movements from Wedekind Road described in Section 1.2 has the potential of sending additional traffic westbound on McCarran Boulevard to make a left turn or u-turn at Sullivan Lane. City of Sparks has requested analysis and commentary how this additional potential traffic relates to the existing queues and turn lane storage at Sullivan Lane.

In general the required storage length is 1.5 to 2 times the average number of vehicles expected to accumulate during a signal cycle during design traffic. According to the Wildcreek High School traffic study, the PM peak hour volume utilizing the left turn pocket is 77 vehicles per hour. Assuming a 2 minute cycle, this corresponds to a storage requirement of 5 to 6 vehicles, or a storage length of 125 to 150 feet. The existing condition has a storage length of 150 feet with a 100 foot transition.

Based on the trips generated onsite and the existing traffic counts, it is estimated that approximately 20 vehicles would desire to make the southbound Wedekind Road to eastbound McCarran Boulevard movement, but would be rerouted to Sullivan Lane by the proposed turn restrictions. This has the potential to increase the volume utilizing the left turn pocket at Sullivan Lane to 97 vehicles per hour during the PM peak hour. Assuming a 2 minute cycle, this still corresponds to a storage requirement of 5 to 6 vehicles, and a storage length of 125 to 150 feet. The reason for the lack of change of storage length for this additional traffic is due to rounding to the nearest whole vehicle within the calculations. The existing storage length for the westbound McCarran Boulevard to southbound Sullivan Lane, or u-turn to eastbound McCarran Boulevard appears to be sufficient.





## 7.0 CONCLUSIONS & RECOMMENDATIONS

The following recommendations and conclusions have been derived from this traffic study:

1. The proposed BlueWave Car Wash project is proposed to generate 78 PM peak hour trips.
2. The major approach movements at McCarran Boulevard and Wedekind Road and the northbound right turn movement currently meet the Policy LOS.
3. The minor approach left and through movements at McCarran Boulevard and Wedekind Road do not meet the Policy LOS.
4. NDOT has conditioned BlueWave with constructing improvements on McCarran Boulevard restricting left-turn and through movements from Wedekind Road consistent with a recently completed Intersection Control Evaluation.
5. The proposed BlueWave development traffic volumes combined with the NDOT mandated improvements will have a minor effect on the intersection of McCarran Boulevard and Wedekind Road, with no change to any of the major movement or minor movement LOS, with overall increase in delay of less than 1 second per vehicle during the peak hour.
6. The traffic generated by this project do not indicate any improvements to McCarran Boulevard or Wedekind Road are necessary, other than what is previously conditioned by NDOT.



# **APPENDIX A**

## **Traffic Counts**

Tuesday, June 4, 2019

Weather: Hot and Sunny

Observers: T. Scott and H. Zimmerman

Method: Sheet tally

= PEAK HOUR FOR MORNING PERIOD

Traffic Counts  
McCarran Blvd and Wedekind Road

CARS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
AM 15 min												
7:00 AM	5	192	26	3	0	18	47	367	2	0	0	6
7:15 AM	6	243	36	3	1	42	73	419	1	0	0	10
7:30 AM	7	283	13	2	0	27	78	426	2	1	0	13
7:45 AM	9	226	4	1	0	18	88	412	1	2	0	14
8:00 AM	7	207	5	1	0	26	36	331	0	1	1	10
8:15 AM	6	233	1	5	0	41	41	310	0	0	0	11
8:30 AM	10	216	1	2	1	28	39	319	1	0	0	10
8:45 AM	11	213	9	11	2	26	30	328	0	0	0	10

TRUCKS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
AM 15 min												
7:00 AM	0	10	5	0	0	2	1	6	1	0	0	0
7:15 AM	1	7	1	0	0	1	0	7	0	0	0	0
7:30 AM	0	6	0	0	0	0	0	6	0	0	0	0
7:45 AM	0	7	0	0	0	0	0	8	0	0	0	0
8:00 AM	0	8	0	0	0	0	0	10	0	0	0	0
8:15 AM	1	11	0	1	0	1	0	9	0	0	0	0
8:30 AM	1	10	0	0	0	3	0	6	0	0	0	0
8:45 AM	0	13	0	0	0	0	0	4	0	0	0	0

TOTAL	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
AM 15 min												
7:00 AM	5	202	31	3	0	20	48	373	3	0	0	6
7:15 AM	7	250	37	3	1	43	73	426	1	0	0	10
7:30 AM	7	289	13	2	0	27	78	432	2	1	0	13
7:45 AM	9	233	4	1	0	18	88	420	1	2	0	14
8:00 AM	7	215	5	1	0	26	36	341	0	1	1	10
8:15 AM	7	244	1	6	0	42	41	319	0	0	0	11
8:30 AM	11	226	1	2	1	31	39	325	1	0	0	10
8:45 AM	11	226	9	11	2	26	30	332	0	0	0	10

Notes: No incidents impacting typical traffic flows were noted. U-Turns were tallied as movement in direction of turning movement. There were very few U-turn movements during the study, both observers believe they are fewer than 10 total in number.

Tuesday, June 4, 2019

Weather: Hot and Sunny

Observers: T. Scott and H. Zimmerman

Method: Sheet tally

Traffic Counts  
McCarran Blvd and Wedekind Road

= PEAK HOUR FOR LUNCH PERIOD

CARS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	LUNCH 15'	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through
11:30 AM	16	276	1	1	0	4	9	264	4	7	0	29
11:45 AM	36	229	0	0	0	11	18	241	2	1	0	36
12:00 PM	25	251	0	0	0	9	6	248	1	3	0	27
12:15 PM	17	252	2	1	0	19	12	277	1	5	0	14
12:30 PM	15	249	1	1	1	7	11	286	4	5	1	25
12:45 PM	14	278	1	0	0	10	0	250	1	7	1	30
1:00 PM	19	240	3	0	1	7	9	255	4	0	0	14
1:15 PM	15	247	1	0	0	9	10	293	2	3	1	17

TRUCKS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	LUNCH 15'	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through
11:30 AM	0	1	0	0	0	0	0	15	0	0	0	1
11:45 AM	0	7	1	0	0	0	0	4	0	0	0	0
12:00 PM	0	2	0	0	0	0	0	5	0	0	0	1
12:15 PM	0	4	0	0	0	0	0	4	0	0	0	1
12:30 PM	0	5	0	0	0	0	0	2	0	1	0	0
12:45 PM	0	5	0	0	0	0	0	1	1	0	0	0
1:00 PM	1	5	0	0	0	1	0	3	0	0	0	0
1:15 PM	0	4	0	0	0	0	1	1	0	0	0	0

TOTAL	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	LUNCH 15'	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through
11:30 AM	16	277	1	1	0	4	9	279	4	7	0	30
11:45 AM	36	236	1	0	0	11	18	245	2	1	0	36
12:00 PM	25	253	0	0	0	9	6	253	1	3	0	28
12:15 PM	17	256	2	1	0	19	12	281	1	5	0	15
12:30 PM	15	254	1	1	1	7	11	288	4	6	1	25
12:45 PM	14	283	1	0	0	10	0	251	2	7	1	30
1:00 PM	20	245	3	0	1	8	9	258	4	0	0	14
1:15 PM	15	251	1	0	0	9	11	294	2	3	1	17

Notes: No incidents impacting typical traffic flows were noted. U-Turns were tallied as movement in direction of turning movement. There were very few U-turn movements during the study, both observers believe they are fewer than 10 total in number.

Tuesday, June 4, 2019

Weather: Hot and Sunny

Observers: T. Scott and H. Zimmerman

Method: Sheet Tally

= PEAK HOUR FOR AFTERNOON/STUDY

Traffic Counts  
McCarran Blvd and Wedekind Road

CARS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
PM 15 min												
4:00 PM	28	370	9	4	0	53	18	353	2	0	0	13
4:15 PM	18	446	7	8	2	94	21	343	4	0	0	12
4:30 PM	21	423	4	1	0	88	28	306	0	1	0	9
4:45 PM	51	421	6	1	1	85	44	360	4	2	0	13
5:00 PM	37	467	4	3	3	98	11	389	10	0	2	5
5:15 PM	33	415	8	0	3	103	25	405	11	0	0	14
5:30 PM	47	407	7	6	0	97	13	321	5	0	0	10
5:45 PM	53	404	21	1	2	51	20	374	13	0	0	8

TRUCKS	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
PM 15 min												
4:00 PM	0	9	0	0	7	0	0	7	0	0	0	0
4:15 PM	0	5	0	0	0	0	0	10	0	0	0	0
4:30 PM	2	9	0	0	0	0	0	3	0	0	0	0
4:45 PM	0	9	0	0	0	0	0	1	0	0	0	0
5:00 PM	0	4	0	0	0	0	0	5	0	0	0	0
5:15 PM	4	2	0	0	0	0	0	3	0	0	0	0
5:30 PM	0	10	0	0	0	0	0	1	0	0	0	0
5:45 PM	0	2	0	0	1	0	2	4	0	0	0	0

TOTAL	McCarran (EB)			Wedekind (NB)			McCarran (WB)			Wedekind (SB)		
	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn	Left Turn	Through	Right Turn
PM 15 min												
4:00 PM	28	379	9	4	7	53	18	360	2	0	0	13
4:15 PM	18	451	7	8	2	94	21	353	4	0	0	12
4:30 PM	23	432	4	1	0	88	28	309	0	1	0	9
4:45 PM	51	430	6	1	1	85	44	361	4	2	0	13
5:00 PM	37	471	4	3	3	98	11	394	10	0	2	5
5:15 PM	37	417	8	0	3	103	25	408	11	0	0	14
5:30 PM	47	417	7	6	0	97	13	322	5	0	0	10
5:45 PM	53	406	21	1	3	51	22	378	13	0	0	8

Notes: No incidents impacting typical traffic flows were noted. U-Turns were tallied as movement in direction of turning movement. There were very few U-turn movements during the study, both observers believe they are fewer than 10 total in number.

# **APPENDIX B**

## **Background Condition LOS**



Intersection												
Int Delay, s/veh	19.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕	↗		↕	
Traffic Vol, veh/h	28	974	85	287	1651	7	9	1	108	3	0	43
Future Vol, veh/h	28	974	85	287	1651	7	9	1	108	3	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	30	1059	92	312	1795	8	10	1	117	3	0	47

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	1803	0	0	1151	0	0	2687	3592	576	3013	3634	902
Stage 1	-	-	-	-	-	-	1165	1165	-	2423	2423	-
Stage 2	-	-	-	-	-	-	1522	2427	-	590	1211	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	338	-	-	603	-	-	10	5	460	6	5	281
Stage 1	-	-	-	-	-	-	206	267	-	33	62	-
Stage 2	-	-	-	-	-	-	124	62	-	461	253	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	338	-	-	603	-	-	~ 5	2	460	~ 2	2	281
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 5	2	-	~ 2	2	-
Stage 1	-	-	-	-	-	-	188	243	-	30	30	-
Stage 2	-	-	-	-	-	-	50	30	-	311	230	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	2.5	218.4	\$ 677.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	4	460	338	-	-	603	-	-	28
HCM Lane V/C Ratio	2.717	0.255	0.09	-	-	0.517	-	-	1.786
HCM Control Delay (s)	\$ 2409.4	15.5	16.7	-	-	17.2	-	-	\$ 677.2
HCM Lane LOS	F	C	C	-	-	C	-	-	F
HCM 95th %tile Q(veh)	2.5	1	0.3	-	-	3	-	-	5.9

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



3:

Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕	↖		↕	
Traffic Vol, veh/h	43	1735	25	93	1485	30	10	7	383	2	2	42
Future Vol, veh/h	43	1735	25	93	1485	30	10	7	383	2	2	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	1886	27	101	1614	33	11	8	416	2	2	46

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1647	0	0	1913	0	0	3004	3843	957	2874	3840	824
Stage 1	-	-	-	-	-	-	1994	1994	-	1833	1833	-
Stage 2	-	-	-	-	-	-	1010	1849	-	1041	2007	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	389	-	-	306	-	-	~ 6	~ 4	~ 258	7	4	316
Stage 1	-	-	-	-	-	-	62	104	-	79	125	-
Stage 2	-	-	-	-	-	-	257	123	-	246	102	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	389	-	-	306	-	-	-	~ 2	~ 258	-	~ 2	316
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	~ 2	-	-	~ 2	-
Stage 1	-	-	-	-	-	-	54	91	-	69	84	-
Stage 2	-	-	-	-	-	-	143	82	-	-	90	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	1.3		
HCM LOS			-	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	258	389	-	-	306	-	-	-
HCM Lane V/C Ratio	-	1.614	0.12	-	-	0.33	-	-	-
HCM Control Delay (s)	-	\$ 327.9	15.5	-	-	22.5	-	-	-
HCM Lane LOS	-	F	C	-	-	C	-	-	-
HCM 95th %tile Q(veh)	-	25.8	0.4	-	-	1.4	-	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



**Intersection**

Int Delay, s/veh 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕				↗			↗
Traffic Vol, veh/h	49	974	85	287	1651	7	0	0	118	0	0	84
Future Vol, veh/h	49	974	85	287	1651	7	0	0	118	0	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	53	1059	92	312	1795	8	0	0	128	0	0	91

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	1803	0	0	902
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.14	-	4.14	6.94
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.22	-	2.22	3.32
Pot Cap-1 Maneuver	338	-	603	281
Stage 1	-	-	0	0
Stage 2	-	-	0	0
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	338	-	603	281
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	2.5	15.8	23.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	460	338	-	-	603	-	-	281
HCM Lane V/C Ratio	0.279	0.158	-	-	0.517	-	-	0.325
HCM Control Delay (s)	15.8	17.6	-	-	17.2	-	-	23.9
HCM Lane LOS	C	C	-	-	C	-	-	C
HCM 95th %tile Q(veh)	1.1	0.6	-	-	3	-	-	1.4

Intersection						
Int Delay, s/veh	2.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	35	21	1	46	38	1
Future Vol, veh/h	35	21	1	46	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	23	1	50	41	1

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	61	0	102
Stage 1	-	-	-	-	50
Stage 2	-	-	-	-	52
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1542	-	896
Stage 1	-	-	-	-	972
Stage 2	-	-	-	-	970
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1542	-	895
Mov Cap-2 Maneuver	-	-	-	-	895
Stage 1	-	-	-	-	972
Stage 2	-	-	-	-	969

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	898	-	-	1542	-
HCM Lane V/C Ratio	0.047	-	-	0.001	-
HCM Control Delay (s)	9.2	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

3:

Intersection												
Int Delay, s/veh	37.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕		↘	↕				↗			↗
Traffic Vol, veh/h	64	1735	25	93	1485	30	0	0	400	0	0	84
Future Vol, veh/h	64	1735	25	93	1485	30	0	0	400	0	0	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	70	1886	27	101	1614	33	0	0	435	0	0	91

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	1647	0	0	1913	0	0	-	-	957	-	-	824
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.14	-	-	4.14	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	389	-	-	306	-	-	0	0	~ 258	0	0	316
Stage 1	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	389	-	-	306	-	-	-	-	~ 258	-	-	316
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	1.3	\$ 358.5	21
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	258	389	-	-	306	-	-	316
HCM Lane V/C Ratio	1.685	0.179	-	-	0.33	-	-	0.289
HCM Control Delay (s)	\$ 358.5	16.3	-	-	22.5	-	-	21
HCM Lane LOS	F	C	-	-	C	-	-	C
HCM 95th %tile Q(veh)	27.9	0.6	-	-	1.4	-	-	1.2

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



**Intersection**

Int Delay, s/veh 2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Vol, veh/h	43	21	1	46	38	1
Future Vol, veh/h	43	21	1	46	38	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	23	1	50	41	1

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	70	0	111
Stage 1	-	-	-	-	59
Stage 2	-	-	-	-	52
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1531	-	886
Stage 1	-	-	-	-	964
Stage 2	-	-	-	-	970
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1531	-	885
Mov Cap-2 Maneuver	-	-	-	-	885
Stage 1	-	-	-	-	964
Stage 2	-	-	-	-	969

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	888	-	-	1531	-
HCM Lane V/C Ratio	0.048	-	-	0.001	-
HCM Control Delay (s)	9.3	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-