BUREAU OF RECLAMATION

DATE STREET COMPLEX

TRAFFIC STUDY

JULY 2009

URS

DATE STREET COMPLEX
TRAFFIC STUDY

Prepared for:

Bureau of Reclamation

PROFESSIONAL ENGINEER-STATE OF NEVADA
DAVID K. FRENCH
CIVIL
No.8860

David K French
July 27, 2009

Prepared by:

URS

and

BasePoint Design Corporation

July 2009

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Scope and Purpose 1

1.2 Project Description 2

1.3 Methodology 4

2. EXISTING CONDITIONS 11

2.1 Traffic Volumes 11

2.2 Crash Analysis 11

2.3 Level of Service and Queuing 15

2.4 Signal Warrants 16

3. BACKGROUND CONDITIONS 16

3.1 Traffic Volumes 16

3.2 Level of Service and Queuing 17

3.3 Signal Warrants 19

4. CUMULATIVE CONDITIONS 19

4.1 Project Trip Generation, Distribution, and Assignment 19

4.2 Traffic Volumes 21

4.3 Level of Service and Queuing 21

4.4 Signal Warrants 23

5. OTHER ANALYSES 24

5.1 Transit Analysis 24

5.2 Parking Analysis 24

5.3 Site Access Analysis 25

5.4 Bicycle and Pedestrian Analysis 25

6. CONCLUSIONS AND RECOMMENDATIONS 26

LIST OF TABLES

Table 1. Amount and Arrangement of BOR Employees 2
Table 2. Intersection LOS Thresholds 8
Table 3. Intersection Crash History and Rate Summary 12
Table 4. Existing Intersection LOS 15
Table 5. Existing Peak Hour SB Right Turn Queues at Hwy 93/Buchanan 16
Table 6. 2011 Background Intersection LOS 18
Table 7. Background Peak Hour SB Right Turn Queues at Hwy 93/Buchanan 18
Table 8. Trip Generation 20
Table 9. 2011 Cumulative Scenario Intersection LOS 21
Table 10. Cumulative Peak Hour SB Right Turn Queues at Hwy 93/Buchanan 23
Table 11. 2011 Peak Hour Intersection LOS and Delay Comparison by Scenario 26

LIST OF FIGURES

Figure 1. Project Vicinity Map 1
Figure 2. Date Street Complex Site Plan 3
Figure 3. Study Intersections and Surrounding Major Streets 5
Figure 4. Study Intersection Lanes and Control 6
Figure 5. RTC Route 402 in Boulder City 7
Figure 6. Bicycle Facilities in the Date Street Complex Area 7
Figure 7. MUTCD Peak Hour Warrant Chart 10
Figure 8. Existing Daily and Peak Hour Traffic Volume Estimates 12
Figure 9. Collision Diagram for the Hwy 93/Buchanan Intersection, 2006-2008 14
Figure 10. 2011 Background Daily and Peak Hour Traffic Volume Estimates 17
Figure 11. Estimated Distribution of Project Site Traffic 20
Figure 12. 2011 Cumulative Daily and Peak Hour Traffic Volume Estimates 22

1 INTRODUCTION

The Bureau of Reclamation (BOR) plans to construct new office buildings at its Boulder City, Nevada Date Street Complex. The first project within this building program is entitled the Boulder Canyon Operations Office Green Building (BCOO GB). In support of this program, a Traffic Study (TS) is required to assess the impacts of the BCOO GB as well as other BOR and City of Boulder City planned facilities in and around the Date Street Complex. The overall location of the proposed project relative to the Las Vegas area is indicated in **Figure 1**.

1.1 Scope and Purpose

This traffic study examines the traffic impacts of the proposed new office building arrangement in terms of traffic volumes, peak hour traffic conditions at key intersections, and the potential for additional roadway and/or intersection capacity to mitigate said impacts.

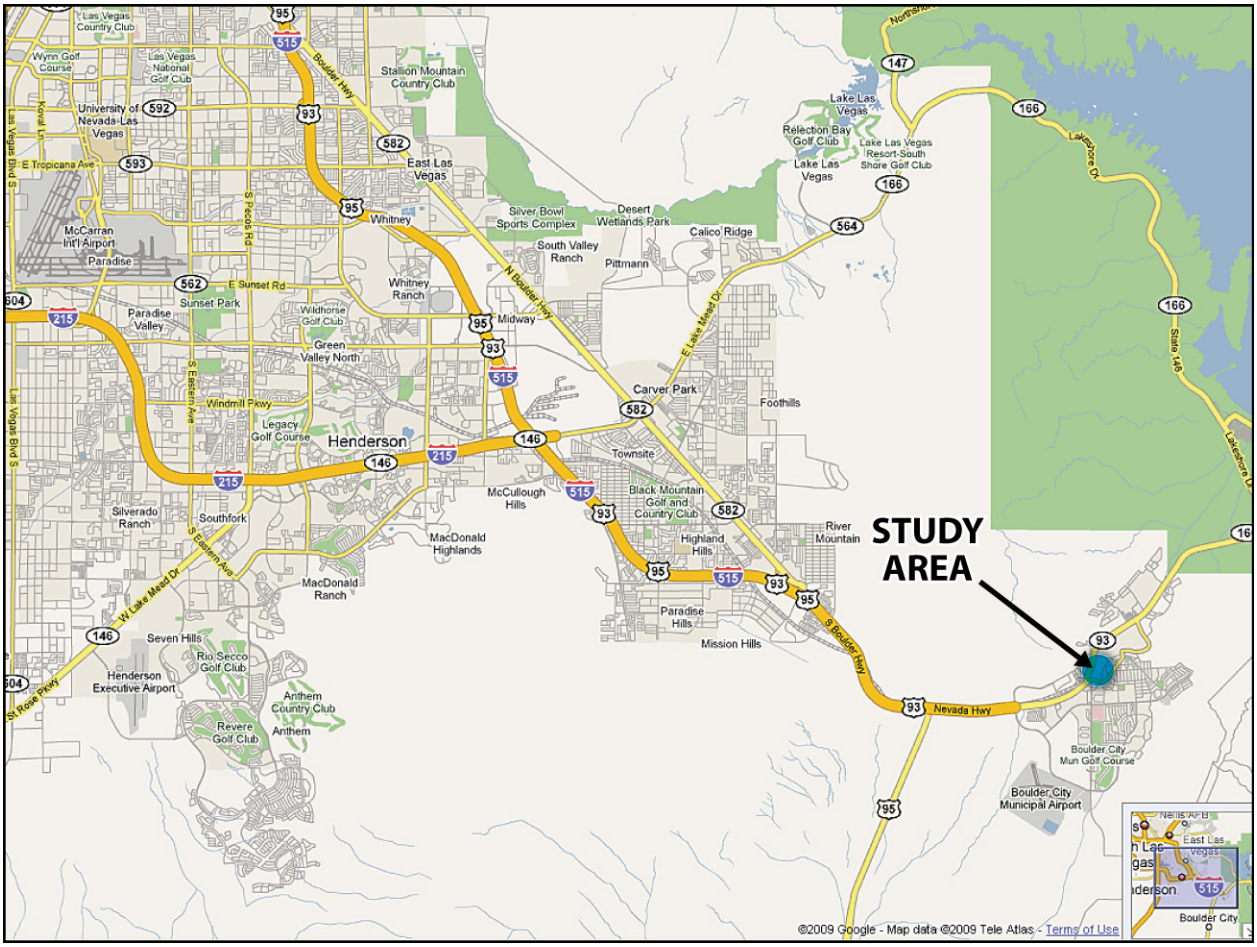


Figure 1. Project Vicinity Map

1.2 Project Description

The BCOO GB will be occupied by approximately 110 personnel. Approximately 60 of these personnel currently have office space in and around the Date Street Complex and approximately 50 personnel currently have office space at the Mead Building located at the southern end of Buchanan Boulevard past Boulder City's Veteran's Memorial Cemetery.

Standard BOR business hours for operations at this site are Monday through Friday 7:30 AM to 4:00 PM although flexible work schedules are implemented whereby BOR employee may work between the hours of 6:00 AM and 6:00 PM, and may only work 4 days per week. For the purposes of analyzing impacts of the proposed project, all of the employees employed at the site are assumed to have the traditional Monday-through-Friday work schedule. This assumption creates more conservative conditions for analyzing impacts because the "four-tens" schedule has employees arriving before morning peak hour conditions and departing after evening peak hour conditions.

Three alternatives are currently envisioned for the amount and arrangement of employees on the Date Street Complex and surrounding area upon completion of the BCOO GB, as shown in **Table 1**. The Date Street Complex Site Plan is shown in **Figure 2**.

Table 1. Amount and Arrangement of BOR Employees

Scenario	Date Street Complex	Railroad Building	Colorado Street Building
Existing	95	55	0
Alternative 1	95	50	110
Alternative 2	205	0	50
Alternative 3	255	0	0

Source: BOR Staff (D. Palumbo) in e-mail dated 06/16/2009.

Each alternative would feature the same number of BOR employees at the completion of the BCOO GB project, and therefore could reasonably be expected to generate approximately the same amount of traffic. However, each would have slightly different characteristics in terms of the assignment of these trips to the roadway network, because the arrangement of buildings on the site affects the route taken by travelers accessing them. The difference in travel patterns manifests itself in two primary ways. First, keeping in mind that most of the traffic is expected to be oriented to and from the west on Hwy 93, traffic using the Colorado and Railroad buildings might be more likely to use the Hwy 93/Colorado Street intersection, whereas traffic using the Date Street complex might be more likely to use the Nevada Way/Fir Street intersection.

Because access via the Colorado Street intersection represents the 'worst case' in terms of traffic impacts, Alternative 1 has been selected for the traffic impact analysis documented here. The conclusions of the analysis of Alternative 1 regarding the suitability of the existing intersection configuration and control could reasonably be expected to apply to the other Alternatives as well.

Figure 2. Date Street Complex Site Plan

1.3 Methodology

1.3.1 Study Area/Setting

The area to be studied is required to include all intersections of collector or higher classification streets with collector or higher classification streets at which the proposed project will add 50 or more peak hour trips, not exceeding a 2-mile radius from the project site. There are only two intersections that meet this formal definition for this project. However, two other intersections would include substantial proportions of project-oriented traffic, and were therefore included in this analysis. The four intersections included in the project study area for the purposes of traffic analysis are:

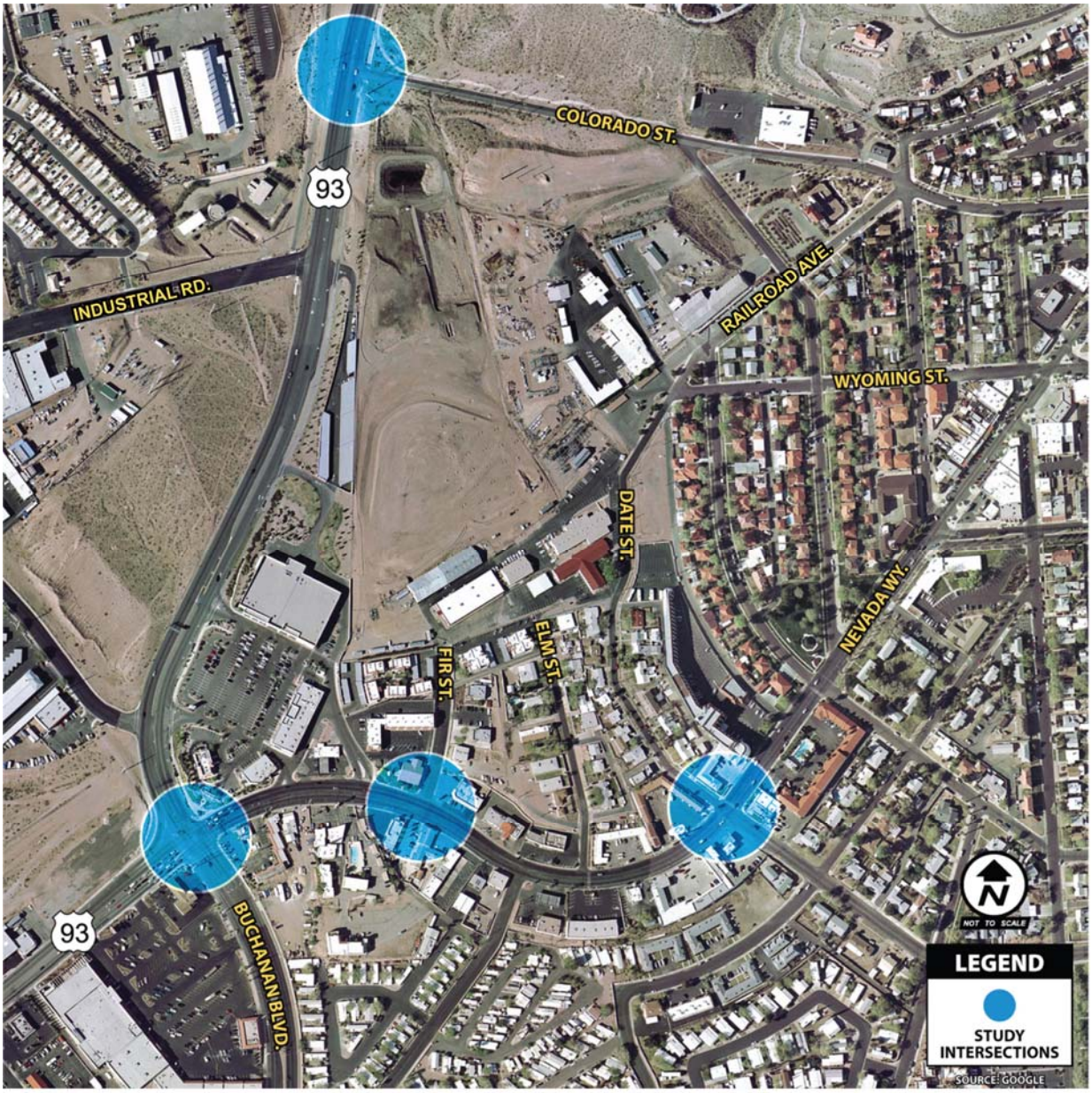
- Hwy 93/Nevada Way/Buchanan Boulevard (signal)
- Hwy 93/Colorado Street (stop)
- Nevada Way/Fir Street (stop)
- Nevada Way/Date Street (stop)

These study intersections are indicated along with the major streets in the area on **Figure 3**. The lane arrangements at these four intersections, along with their traffic control treatments, are presented in schematic form in **Figure 4**.

There are two roadways of substantial significance in the site area. **US Highway 93** generally borders the site area on the west and provides the only relevant transportation linkage to the nearby Las Vegas urbanized area (to the west). It is generally four lanes between the Buchanan intersection and Colorado Street, narrowing to two lanes as it continues northeast. **Nevada Way** is a collector roadway extending through Boulder City, generally on an east-west orientation in the site area, south of the Date Street Complex. It has four lanes plus a center left turn lane in the vicinity of the Buchanan intersection, narrowing to two lanes plus a center left turn lane as it continues east into Boulder City proper. The speed limit on the three-lane section of Nevada Way is 25 mph.

Three local streets provide important connections between the site and these two major roadways. **Colorado Street** borders the Date Street Complex to the north and connects Hwy 93 to the Boulder City civic center area. **Fir Street** is a short north-south two-lane local street that connects a main parking area on the south end of the complex to Nevada Way. Fir Street dead-ends at both of these places. **Date Street** runs generally north-south along the eastern edge of the complex, connecting Colorado Street through Nevada Way and to points south. It has two lanes with on-street parking on the east side south of the Date Street Complex.

The public transit system in the vicinity of the Date Street Complex is operated by the Regional Transportation Commission (RTC) of Southern Nevada. RTC operates one fixed route in



Source (underlying aerial photo): Google Maps

Figure 3. Study Intersections and Surrounding Major Streets

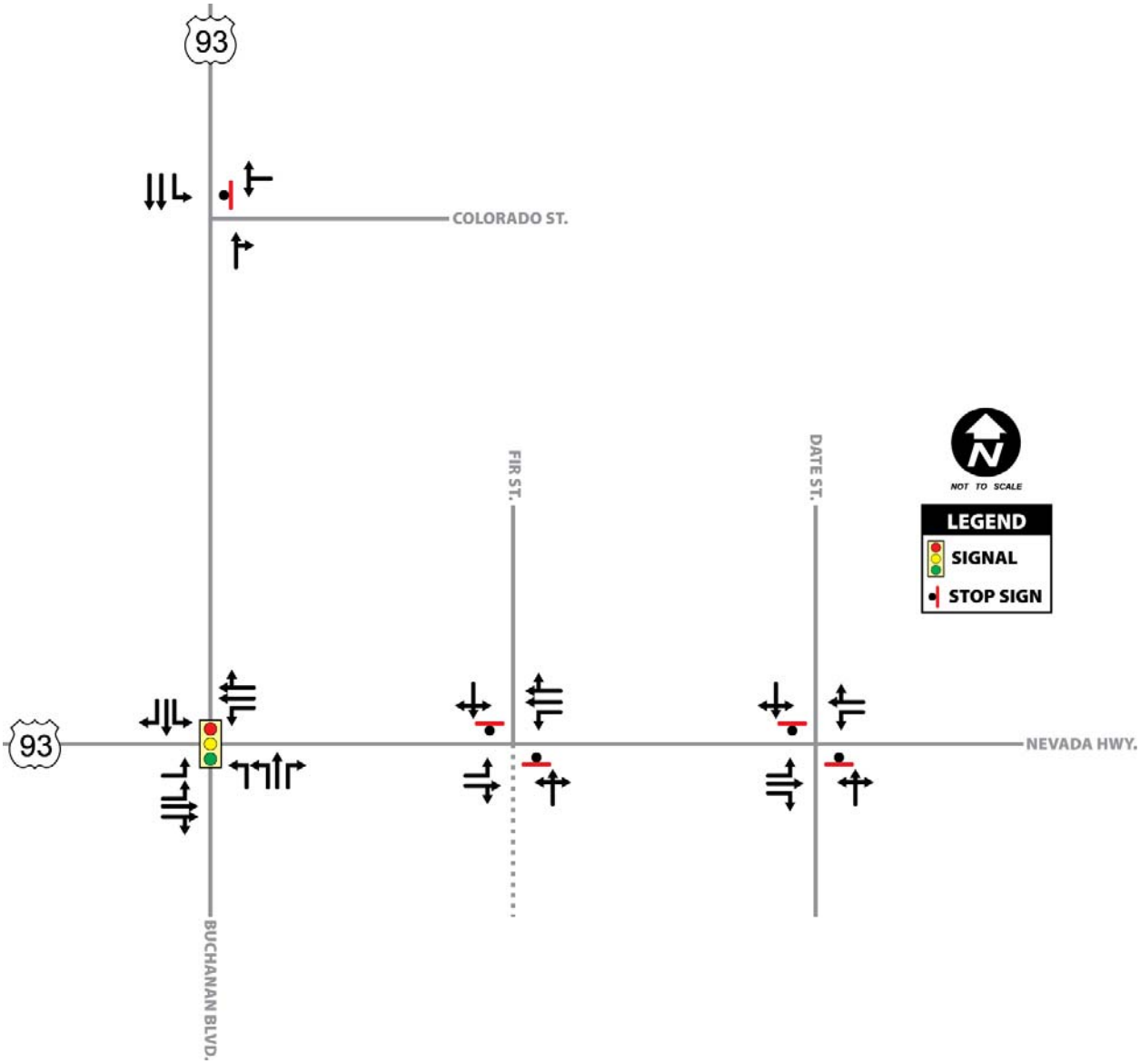


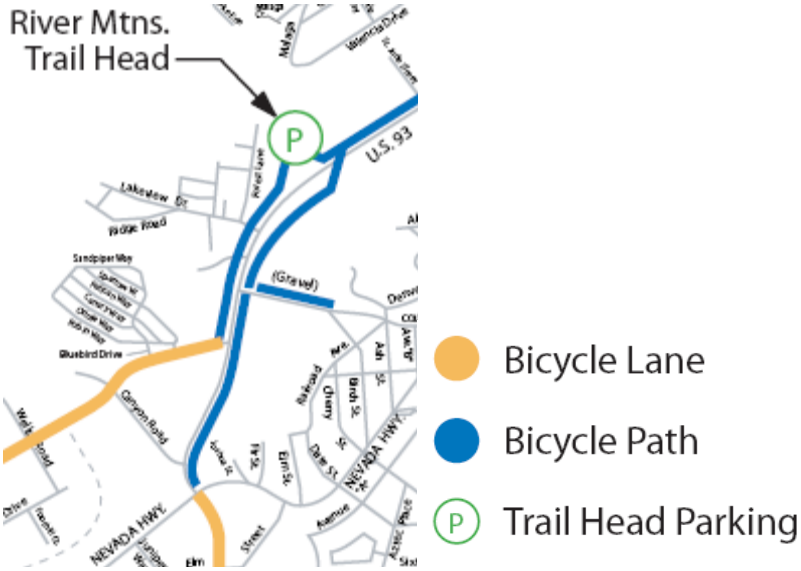
Figure 4. Study Intersection Lanes and Control

Boulder City, which is shown in **Figure 5**. The details of transit service are discussed further in Section 5.1 of this report.

Sidewalks are located on at least one side of most of the streets in the vicinity of the Date Street Complex. Sidewalks on both Nevada Way and Date Street are attached in some places and detached in others, but generally in fair condition. Both Fir Street and Date Street, which would be primary walking routes for employees that use transit to reach the complex, have sidewalks on both sides of the street. There are several bicycle facilities in the vicinity of the Date Street Complex, as indicated in **Figure 6**.

Source: Regional Transportation Commission of Southern Nevada, 2009

Figure 5. RTC Route 402 in Boulder City



Source: Regional Transportation Commission of Southern Nevada

Figure 6. Bicycle Facilities in the Date Street Complex Area

1.3.2 Operations Analysis

This traffic impact study identifies and analyzes the impacts to the operational conditions of the transportation facilities in the project area in accordance with the 2000 edition of the Highway Capacity Manual (HCM) as published by the Transportation Research Board (TRB). Analysis of intersections is based on the average amount of delay encountered by vehicles that travel through the intersection during the peak hour. Analysis of conditions during both the a.m. and p.m. peak hours is included in this study.

Information about intersection operational performance is conveyed by assigning a letter grade called the Level of Service (LOS) to specific ranges of average vehicle delay, from A (best) to F (worst). It is common for peak hour level of service of D or better to be considered acceptable, while E and F are considered unacceptable, and likely to result in traveler perceptions that something about the intersection needs to be improved. The delay ranges on which LOS grades are based are shown in **Table 2**.

It is important to note that signalized and unsignalized intersections are treated differently. Not only are the delay thresholds lower for unsignalized intersections, but the LOS at unsignalized intersections is only reported for the worst minor-street movement. In contrast, at signals an intersection-wide average is used. Queuing analysis is conducted as a matter of course in the estimation of intersection LOS, and is conducted for each lane group. A lane group is any movement or combination of movements that can move independently of other movements, as defined by which movements it shares lanes with.

Table 2. Intersection LOS Thresholds

LOS	Delay (seconds/vehicle)	
	Signalized	Unsignalized
A	0-10.0	0-10.0
B	10.1-20.0	10.1-15.0
C	20.1-35.0	15.1-25.0
D	35.1-55.0	25.1-35.0
E	55.1-80.0	35.1-50.0
F	80.1 or more	50.1 or more

Source, Transportation Research Board, *The Highway Capacity Manual*, 2000.

1.3.3 Collision Analysis

Most collisions in developed areas are associated with intersections. For this reason, crash data were analyzed in detail for the same four intersections analyzed for operational performance. Crash data were collected from the Nevada Department of Transportation for the three year period starting January 1, 2006 and ending December 31, 2008. Crash rates were calculated for each intersection area (at the intersection and up to 500 feet away) and compared to statewide and Clark County averages. Because accidents are counted at the intersection if they occurred within 500 feet of the intersection, each vehicle traveling through the intersection is assumed to have traveled 1000 feet in the intersection area (500 entering, 500 leaving) in the conversion of "vehicles entering the intersection" to "vehicle-miles traveled". Concentrations of crash type and/or specific location in the intersection area were also examined.

1.3.4 Trip Generation

The amount of traffic generated by the project was calculated using the methodology and guidelines of the 8th of the Trip Generation Manual as published by the Institute of Transportation Engineers (ITE) in 2008. Although there are two studies of "Government Office" facilities (use code 730) documented in the Trip Generation Manual, neither of these is complete or offers the type of data required for a full trip generation analysis. In addition, more studies are necessary to develop well-correlated regression equations to estimate trip generation with reliable accuracy. In order to approximate the trip generation characteristics of this project, a similar category was used. The "Single-Tenant Office" (use code 715) exhibits a similar daily trip generation rate to government office, but has substantially more studies from which to establish equations for predicting trip generation behavior. The Single-Tenant category is appropriate because a central feature of both this project and single-tenant office facilities is the most of the employees enter and leave the site at approximately the same time. This feature is important in estimating trip generation for this type of facility because it is different from a more general office complex consisting of many companies. In such facilities, traffic is more distributed over time.

1.3.5 Signal Warrant Analysis

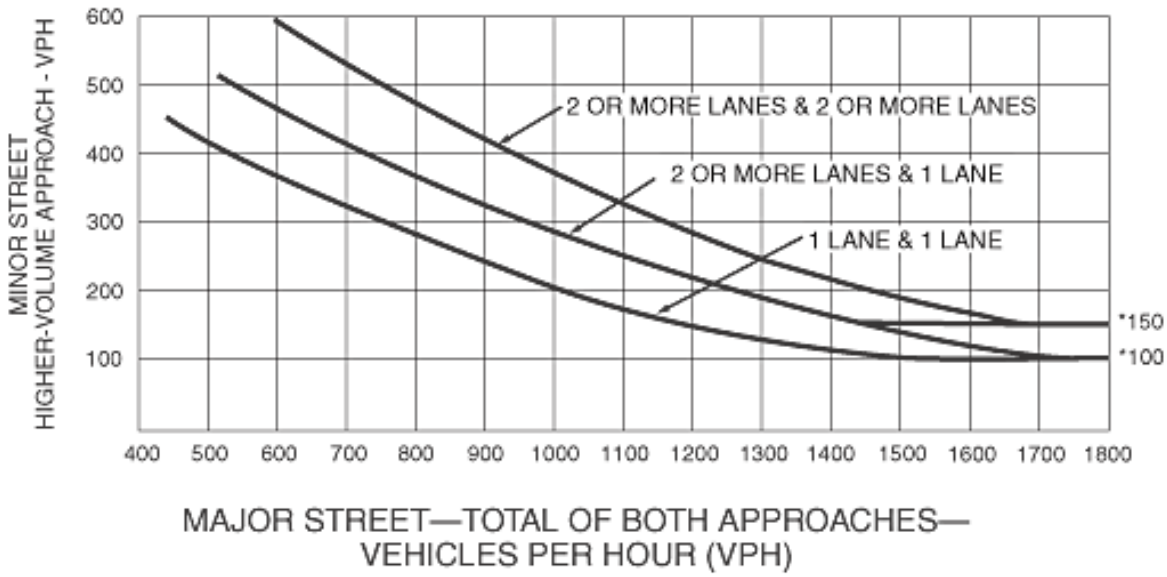
The Manual on Uniform Traffic Control Devices (MUTCD) provides a series of tests by which unsignalized intersections can be evaluated by a qualified engineer to determine whether the replacement of stop control with a signal might be warranted. There are eight such tests, or warrants, provided for in the MUTCD, as follows:

1. Eight-Hour Vehicular Volume.
2. Four-Hour Vehicular Volume.
3. Peak Hour.
4. Pedestrian Volume.
5. School Crossing.
6. Coordinated Signal System.
7. Crash Experience.
8. Roadway Network.

Based on data availability and conditions of the intersections, this warrant analysis only checked Warrants 3, 7, and 8. Each warrant is briefly discussed below.

- **Warrant 3—Peak Hour**. This warrant is considered to be met if the peak hour volumes on the major street (total of both approaches) and on the higher-volume minor street approach result in a point above the applicable curve as shown in **Figure 7**.

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Source: MUTCD 2003 (a screen shot from the MUTCD website: http://mutcd.fhwa.dot.gov/htm/2003r1r2/part4/fig4c-03_longdesc.htm)

Figure 7. MUTCD Peak Hour Warrant Chart

- **Warrant 7—Crash Experience**. To satisfy conditions of this warrant, an intersection must experience five or more crashes, which are considered as correctible by a traffic signal, within a 12-month period. Examples of signal-correctible accident types include right-angle, approach turn, and head on. The Crash Experience warrant is only applied to existing conditions.

- **Warrant 8—Roadway Network**. The premise of applying this warrant is that the analyzed intersection consists of two or more major routes, so some benefit could be derived from adding a signal.

1.3.6 Analysis Scenarios

The following three scenarios are analyzed in this traffic study:

Existing Conditions. Existing traffic was counted in early June 2009 to determine current conditions and to establish a baseline for estimating projected future traffic growth.

Background Conditions. Conditions just before the proposed development is completed will be estimated by increasing the existing traffic counts by an appropriate growth rate, projected to the year that the project is estimated to be completed (2011), which accounts for other potential projects in the study area. The Background scenario forms the basis for determining project specific impacts, mitigation, and other conditions. Background traffic not associated with the BOR facilities in the are was estimated to grow at 3% per year for this analysis.

Cumulative Conditions. To assess impacts, the additional traffic generated by the proposed project is identified and added to the 2011 traffic identified in the Background scenario. Cumulative conditions are analyzed for each of the three alternative scenarios.

2. EXISTING CONDITIONS

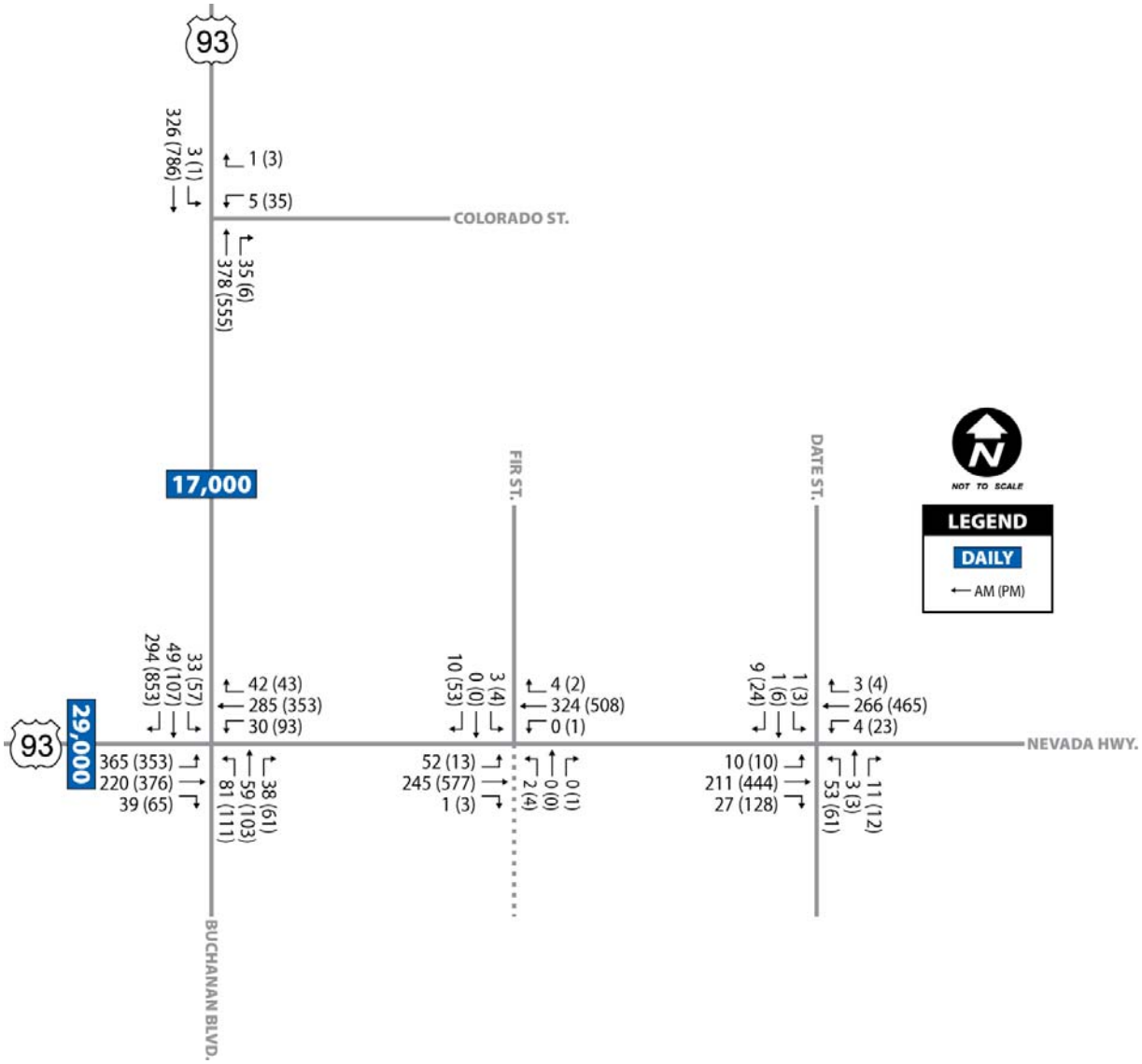
The Existing scenario indicates conditions in terms of traffic operations and crash history for the purpose of establishing a frame of reference readers of this study that are familiar with Boulder City today. Existing traffic volumes form the basis for future Background volumes and identify the primary traffic patterns and flows, as well as the temporal distribution of traffic throughout the day and the relationship between peak hour volumes and daily volumes. Existing crash data represent a recent history, and could help indicate where improvements should be investigated.

2.1 Traffic Volumes

Two types of traffic volume information were gathered in Boulder City in early June 2009. Daily traffic volumes were measured west of the Hwy 93/Buchanan Blvd. intersection for 72 consecutive mid-week hours. Intersection turning movement traffic was also counted between 6:00 and 8:30 a.m. and between 3:30 and 6:00 p.m. to identify peak hour volumes. In addition, daily traffic was gathered from the Nevada Department of Transportation for Hwy 93, both west and north of the Buchanan Boulevard intersection. The existing daily and peak hour traffic volumes collected for this project are indicated in **Figure 8**.

2.2 Crash Analysis

Crash rates are presented and analyzed separately for each of the four intersections examined for this traffic study. The collision rates calculated are expressed in terms of the number of annual accidents per million vehicle-miles traveled. According to NDOT's 2006 "Crash Book", in 2006 the statewide average crash rate was 2.82 crashes per million vehicle-miles traveled. Clark County's 2006 average crash rate was somewhat higher, at 3.48. Urban areas (including Boulder City) can generally be expected to have somewhat higher rates because the density of potential hazards is much higher, but urban areas also experience significantly higher traffic. A summary of the crash rate calculations is presented in **Table 3**.



Source: Nevada Department of Transportation; field counts and analysis by URS

Figure 8. Existing Daily and Peak Hour Traffic Volume Estimates

Table 3. Intersection Crash History and Rate Summary

Intersection	Daily Entering Traffic Volume	Crashes	Crash Rate[1]
Hwy 93/Colorado Street	14,100	4	1.37
Hwy 93/Buchanan Boulevard	38,400	24	3.01
Nevada Way/Fir Street	16,700	1	0.29
Nevada Way/Date Street	17,100	0	0.00

1. Accidents per million vehicle-miles traveled; 2006 averages: statewide 2.82, Clark County 3.48.
Source: Crash data from NDOT; Analysis by URS

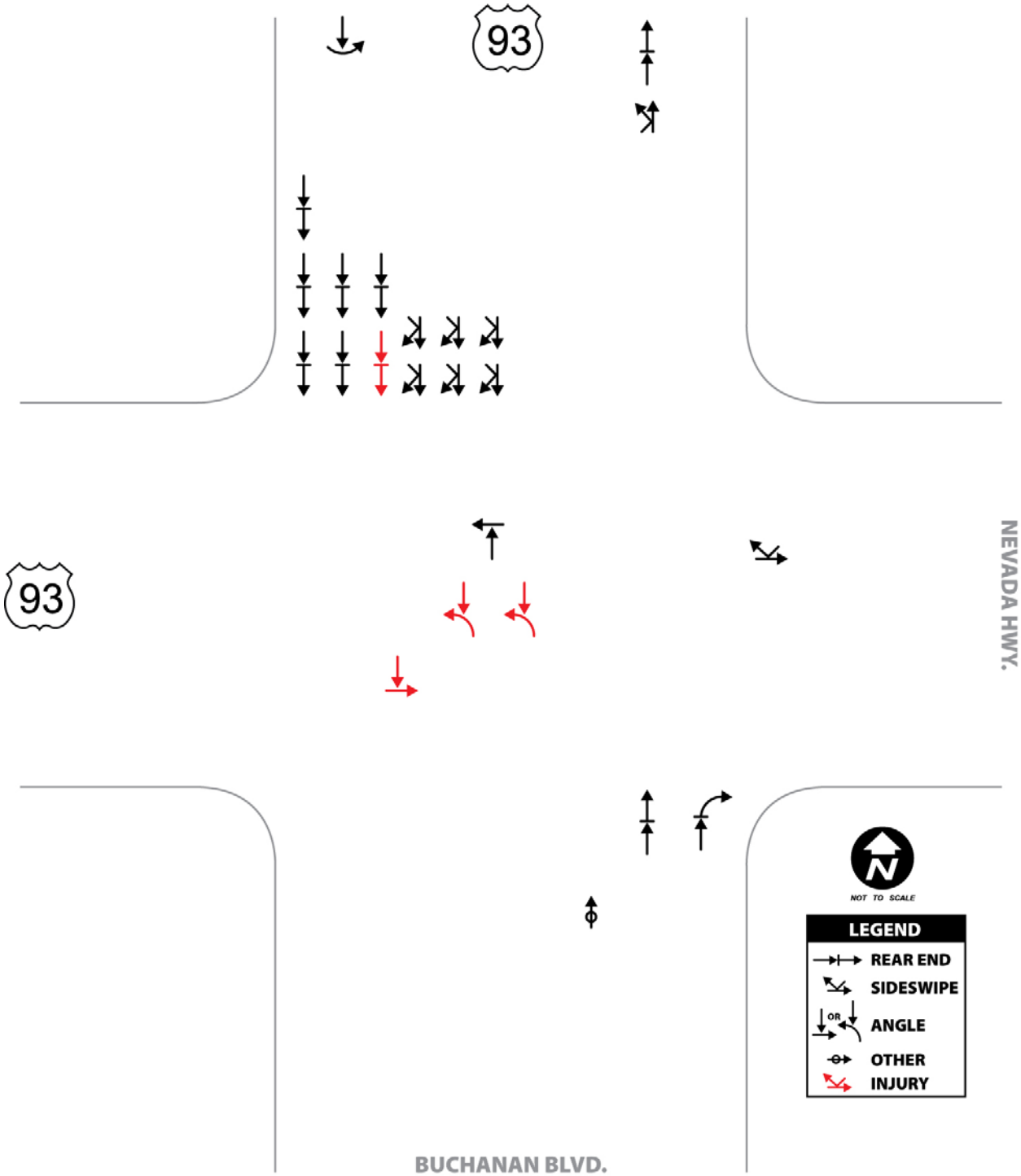
As indicated in **Table 3**, the Nevada Way/Date Street intersection did not experience any reported crashes during the analysis period (1/1/06 through 12/31/08), and the Fir Street intersection experienced only one reported crash. This was a side-swipe collision (of a parked car at night) that did not result in any injuries.

The Hwy 93/Colorado Street intersection experienced more crashes, but had less traffic than the Nevada Way intersections. This could be due in part to the much higher speeds on Hwy 93, which tend to increase hazards in three ways: (1) vehicles traveling faster can make it harder to judge whether gaps are available to enter or cross traffic streams, (2) vehicles traveling faster take longer to stop or change course in the event of a potential collision, and (3) vehicles traveling faster may be more likely to experience loss of traction or to overturn when braking or changing course to attempt to avoid a collision. The four crashes at the Colorado Street intersection were one injury crash and three property-damage-only crashes. The injury crash involved a vehicle turning left from Colorado Street onto Hwy 93, but failing to yield the right of way to a southbound vehicle on Hwy 93. Darkness could have been a factor in this crash. There was no particular concentration of crash types or crash locations within the intersection at the Colorado Street intersection.

The Hwy 93/Buchanan Boulevard intersection, which is signalized, experienced much higher traffic volumes, crashes, and crash rate than the three unsignalized intersections analyzed in this study. The larger number of crashes reported at this intersection facilitate the identification of some particular trends or groupings. These include:

- Of the 24 crashes, 18 (75%) involved at least one vehicle traveling southbound;
- Of the 18 crashes involving a southbound vehicle 13 (72%, or 54% of the intersection total) were either rear-end or sideswipe collisions in which both (or all 3, in one case) vehicles were traveling southbound;
- Of the 18 crashes involving a southbound vehicle, nine (50%) occurred between about 11:00 a.m. and 3:00 p.m., which, given the orientation of the intersection, could indicate that sunlight facing the driver could be a factor (seven of these nine crashes occurred under “clear” conditions);
- Of the five injury crashes, three were angle collisions involving turning vehicles, and the other two were rear-end collisions (one northbound, one southbound);
- At least three of the crashes attributed to this intersection occurred 100-400 feet north of the intersection, and could have been related to operations at a property driveway or secondary intersection with Hwy 93.

A collision diagram is presented in **Figure 9**. The locations of crashes represented in the diagram are approximate, as this diagram was constructed using only summary information, without the benefit of individual crash reports.



Source: Nevada Department of Transportation; analysis by URS

Figure 9. Collision Diagram for the Hwy 93/Buchanan Intersection, 2006-2008

2.3 Level of Service and Queuing

Level of Service and queuing results are both drawn from the same traffic analysis, but are presented here separately. Existing peak hour intersection LOS results are shown in **Table 4**.

Table 4. Existing Intersection LOS

Intersection	Highest-Delay Movement	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Hwy 93/Colorado Street	WB left	B	12.6	C	21.1
Hwy 93/Buchanan Boulevard	(signal)	B	16.1	C	25.9
Nevada Way/Fir Street	NB Left	B	13.6	B	19.7
Nevada Way/Date Street	NB Left	B	13.4	D	28.3

Delay is reported as an average number of seconds per vehicle.
Source: URS analysis with Highway Capacity Software (HCS)

Existing conditions at the four study intersections are characterized by generally moderate delays, with LOS B in the morning peak hour at all four locations and mixed results in the afternoon. The Nevada Way/Date street intersection exhibits some afternoon delay in the northbound left movement, with LOS D conditions prevailing. However, the volume there should not be considered heavy, keeping in mind that 61 vehicles per hour counted for the northbound left turn equates to an average arrival rate of about one vehicle per minute.

Queuing results for low-volume unsignalized intersections are generally inconsequential. Movements not subject to a yielding condition do not queue, and those that yield (major street left turns and minor street left, through, or right) all have very low volumes. Low volumes can also be thought of as high arrival headways, or long times (more than 30 seconds) between the arrival of each vehicle. In general, when a movement's average delay as calculated by HCS is much lower than its arrival headway, there are very few opportunities for queues of any consequence to form. The longest queue at any of the three unsignalized intersection in either peak hour for existing conditions is on the northbound approach of Date Street at Nevada Way. This queue is estimated to be less than 1.45 vehicles long 95% of the time. Every other yielding movement is expected to have an average 95%-confident queue of less than one vehicle.

Queuing at signals is a different story. The nature of signalized intersections' operation makes multiple-vehicle queues a virtual certainty during almost any conditions. The average and 95%-confident peak hour queues for the southbound right turn lane group at the Hwy 93/Buchanan signal are shown in **Table 5**.

The other movements at the intersection all have average queues of fewer than five vehicles (125 feet) in either peak hour.

Table 5. Existing Peak Hour SB Right Turn Queues at Hwy 93/Buchanan

Measure	AM Peak Hour		PM Peak Hour	
	Average	95%	Average	95%
Queue in Vehicles	3.0	6.1	12.8	23.0
Queue in Feet	75’	153’	320’	575’

Vehicles in queue are estimated to take up an average of 25 feet each.
Source: URS analysis with Highway Capacity Software (HCS)

2.4 Signal Warrants

Existing signal warrants were evaluated as follows:

Warrant 3 – Peak Hour Volume. Existing peak hour intersection volumes for all three of the unsignalized intersections studied fall below the warrant threshold. Therefore, none of the intersections meet Warrant 3 under existing conditions.

Warrant 7 – Crash Experience. According to historical crash data of years 2006 through 2008, the intersection of US Highway 93 and Colorado Street experienced no more than three total crashes over a 12-month period; the intersection of Nevada Highway and Fir Street experienced no more than one crash over a 12-month period. No reported crashes occurred at the intersection of Nevada Highway and Date Street during the three years studied. Therefore none of the three intersections meet Warrant 7.

Warrant 8 – Network. The Network condition covered by Warrant 8 requires that the intersection in question is the intersection of two major routes. None of the three unsignalized intersections studied meet this requirement. Therefore none of the three unsignalized intersections studied meet Warrant 8.

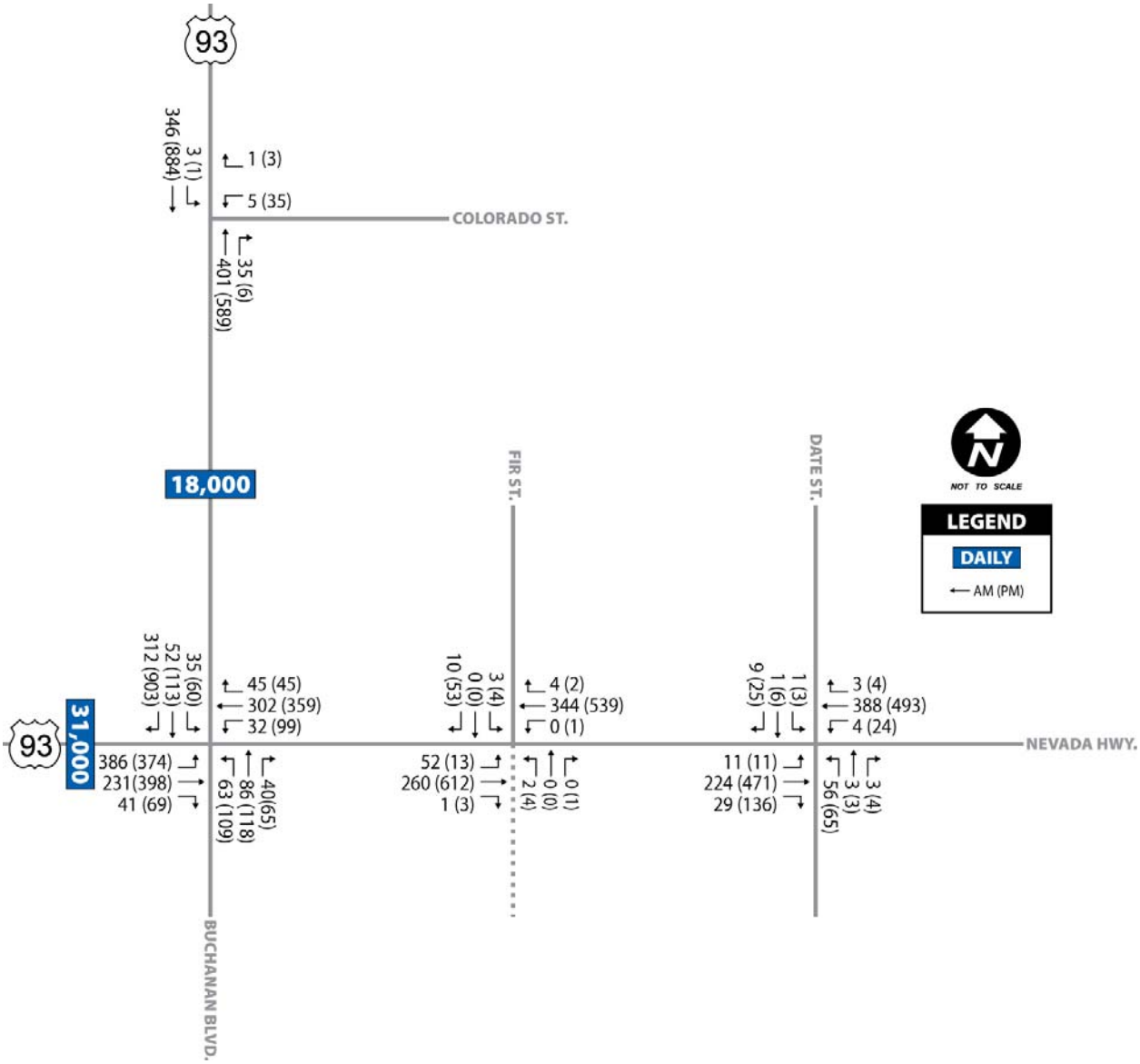
None of the three unsignalized intersections studied met any of the three warrants studied under Existing conditions. Details regarding signal warrant analysis are provided in the Appendix.

3. BACKGROUND CONDITIONS

The Background scenario represents traffic conditions in 2011 if the proposed office complex improvements are not built. It is the basis of determining the impacts of the proposed expansion by allowing the comparison between Cumulative and Background conditions to be free of any growth effects. It is important to note that Background conditions, by definition, do not require any mitigation. No new roadway improvement projects were identified in the project area.

3.1 Traffic Volumes

Year 2011 background traffic was estimated using a 3% growth rate for all traffic not associated with the BOR facilities under study. Background traffic volumes are shown in **Figure 10**.



Source: Nevada Department of Transportation; field counts and analysis by URS

Figure 10. 2011 Background Daily and Peak Hour Traffic Volume Estimates

3.2 Level of Service and Queuing

Peak hour intersection LOS analysis for the 2011 Background condition indicates very similar results to the existing condition, which is not surprising given the short growth horizon (two years). While the growth rate of 3 percent per year could be considered aggressive given the flat trend in traffic volumes in the area in the recent past, applying it for only two years results in

traffic volumes not considerably higher than existing, and therefore intersection LOS results that are accordingly similar. Background LOS results are shown in **Table 6**.

Table 6. 2011 Background Intersection LOS

Intersection	Highest-Delay Movement	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Hwy 93/Colorado Street	WB left	B	13.2	C	23.6
Hwy 93/Buchanan Boulevard	(signal)	B	18.0	C	31.1
Nevada Way/Fir Street	NB Left	B	14.0	C	21.0
Nevada Way/Date Street	NB Left	B	13.9	D	33.2

Delay is reported as an average number of seconds per vehicle.
Source: URS analysis with Highway Capacity Software (HCS)

Queuing results for low-volume unsignalized intersections are generally inconsequential. Movements not subject to a yielding condition do not queue, and those that yield (major street left turns and minor street left, through, or right) all have very low volumes. Low volumes can also be thought of as high arrival headways, or long times (more than 30 seconds) between the arrival of each vehicle. In general, when a movement's average delay as calculated by HCS is much lower than its arrival headway, there are very few opportunities for queues of any consequence to form. The longest queue at any of the three unsignalized intersection in either peak hour for Background conditions is on the northbound approach of Date Street at Nevada Way. This queue is estimated to be less than 1.86 vehicles long 95% of the time. Most of the other yielding movements at all three unsignalized intersections studied are expected to have an average 95%-confident queue of less than one vehicle in either peak hour.

As mentioned in the discussion of existing conditions, the nature of signalized intersections' operation makes multiple-vehicle queues a virtual certainty during almost any conditions. The southbound right turn movement has the largest predicted queue at the Buchanan signal by a wide margin. The average and 95%-confident peak hour queues for the southbound right turn lane group at the Hwy 93/Buchanan signal are shown in **Table 7**.

Table 7. Background Peak Hour SB Right Turn Queues at Hwy 93/Buchanan

Measure	AM Peak Hour		PM Peak Hour	
	Average	95%	Average	95%
Queue in Vehicles	4.4	8.8	16.6	28.8
Queue in Feet	110'	220'	415'	720'

Vehicles in queue are estimated to take up an average of 25 feet each.
Source: URS analysis with Highway Capacity Software (HCS)

The other movements at the intersection all have average queues of fewer than six vehicles (150 feet) in either peak hour.

3.3 Signal Warrants

Background signal warrants were evaluated as follows.

Warrant 3 – Peak Hour Volume. Background peak hour intersection volumes for all three of the unsignalized intersections studied fall below the warrant threshold. Therefore, none of the intersections would meet Warrant 3 under Background conditions.

Warrant 7 – Crash Experience. This warrant was only applied to existing conditions.

Warrant 8 – Network. The Network condition covered by Warrant 8 requires that the intersection in question is the intersection of two major routes. None of the three unsignalized intersections studied would meet this requirement in the Background condition. Therefore none of the three unsignalized intersections studied would meet Warrant 8.

None of the three unsignalized intersections studied met either of the warrants studied under Background conditions. Details regarding signal warrant analysis are provided in the Appendix.

4. CUMULATIVE CONDITIONS

When the proposed office complex expansion is completed, more traffic is expected to be generated than under today's conditions. The Cumulative scenario examined for this traffic study would occur when the existing number of employees at the Date Street Complex remains the same (about 95 employees), all 110 new employees are located in a Colorado Street Building, and about 50 employees remain in a Railroad Avenue facility.

4.1 Project Trip Generation, Distribution, and Assignment

The generation, distribution, and assignment of trips are used to determine where the impacts of those trips should be analyzed. Trip generation is described separately from distribution and assignment.

4.1.1 Trip Generation

The studies in the ITE Trip Generation manual (8th edition) indicate the levels of daily, a.m. peak hour, and p.m. peak hour for the type of office use proposed for this project. They also specify the percentage of traffic generated that is entering (inbound) or exiting (outbound) the facility. The details of project trip generation, with comparison to the existing condition, are presented in **Table 8**.

Table 8. Trip Generation

Scenario	Employees	Daily (50% Inbound)	AM (89% Inbound)	PM (15% Inbound)
Equation:		Ln(T) = 0.75 Ln(E) + 2.79	T = 0.5(E) + 16.91	T = 0.45(E) + 32.37
Existing	150	698 (349 inbound)	92 (82 inbound)	100 (15 inbound)
Cumulative	255	1,039 (520 inbound)	144 (128 inbound)	147 (22 inbound)
Net Project	105	341 (171 inbound)	52 (46 inbound)	47 (7 inbound)

T = Trips (vehicles), E = Employees
Source: Equations from *Trip Generation, 8th ed.* (Institute of Transportation Engineers, 2008), for Land use code 715, "Single Tenant Office".

4.1.2 Trip Distribution

Trip distribution accounts for the general directions in which traffic to and from the project site travels when it's coming to or going away from it. Trip distribution percentages are rough estimates, and, in theory, could change over time. Because the trips to and from this project site would be primarily commute trips, the trip distribution percentages chosen for this analysis are based on an inspection and a judgment of the project site in relation to the major population centers in the area. The trip distribution percentages assumed for this traffic analysis are shown in **Figure 11**.

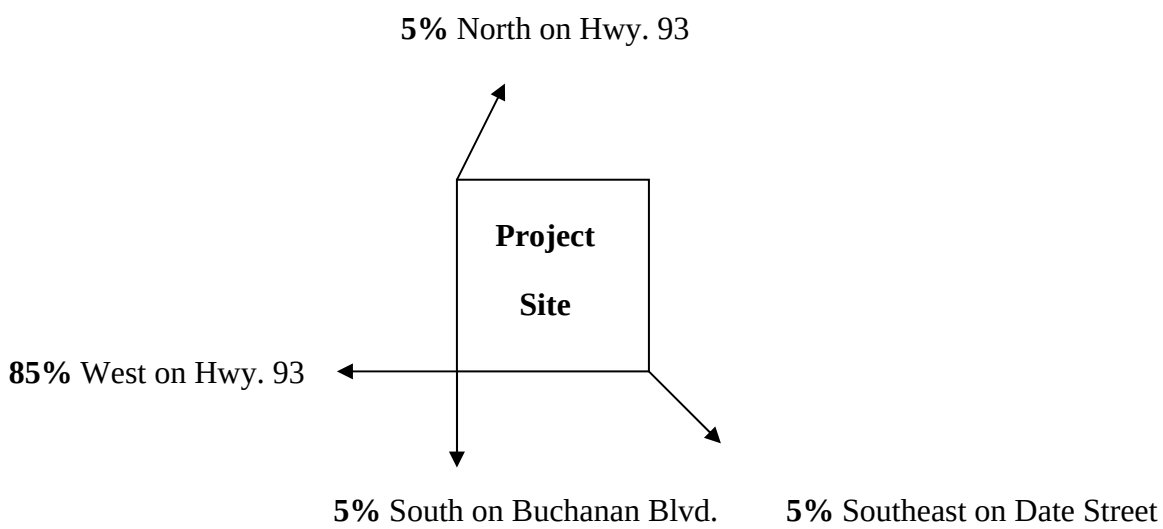


Figure 11. Estimated Distribution of Project Site Traffic

The assignment of traffic to the surrounding intersections based on the trip distribution percentages shown above is a fairly simple process, and was made with a few qualifying assumptions, as follows:

- All traffic to and from the Date Street Complex uses Fir Street to access the primary roadway network;
- All traffic to and from the Colorado Street and Railroad Avenue buildings uses either Date Street (to/from the southeast) or Colorado Street (to/from all other directions) to access the primary roadway network.

4.2 Traffic Volumes

The Cumulative scenario traffic was generated, distributed, and assigned as described in the previous subsection. The total volumes represented by the Cumulative scenario are show in **Figure 12**.

4.3 Level of Service and Queuing

For the Cumulative scenario, traffic volumes assigned varied slightly from the Background condition, but overall the volumes related to the proposed project did not result in substantial changes over Background volumes. As a result, the peak hour intersection LOS results are also generally similar. All intersections operate at LOS D or better. Cumulative LOS results are shown in **Table 9**.

Table 9. 2011 Cumulative Scenario Intersection LOS

Intersection	Highest-Delay Movement	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
Hwy 93/Colorado Street	WB left	B	13.6	D	29.6
Hwy 93/Buchanan Boulevard	(signal)	B	17.0	C	33.0
Nevada Way/Fir Street	NB Left	B	13.8	C	20.8
Nevada Way/Date Street	NB Left	B	14.0	D	33.5

Delay is reported as an average number of seconds per vehicle.
Source: URS analysis with Highway Capacity Software (HCS)

For the most part, delays would increase very slightly as a result of the proposed project, but all LOS grades would remain the same. The primary LOS impact of the project is the worsening of the westbound Colorado Street left turn movement in the p.m. peak hour from LOS C to LOS D. It is important to note that the satisfactory operation of the Hwy 93/Colorado Street intersection validates the selection of Alternative 1 for the Cumulative condition analysis. Other Cumulative alternatives would feature lower levels of employment at facilities whose primary access would be through this intersection. Because Alternative 1 results in satisfactory LOS at this location, it is easily inferred that alternatives with less employment would also result in satisfactory LOS.

Minor changes in volume resulted in a very slight improvement in intersection delay in both peak hours at the Nevada Way/Fir Street intersection, and a revised signal optimization used in the analysis process resulted in the Cumulative condition average delay at the Hwy 93/Buchanan

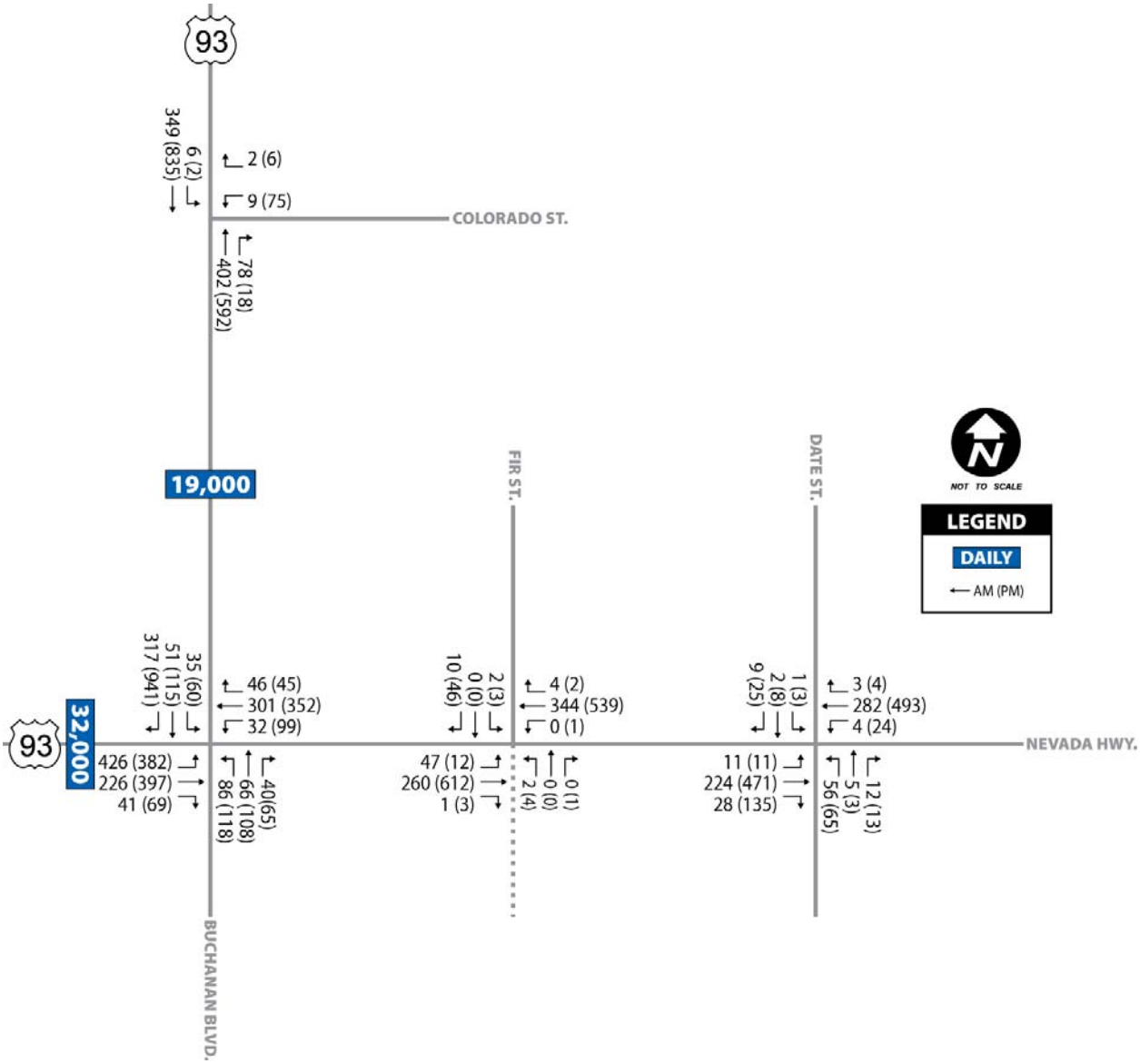


Figure 12. 2011 Cumulative Daily and Peak Hour Traffic Volume Estimates

Boulevard intersection showing a small improvement over Background conditions. Additionally, the nature of weighted averaging in some cases (such as this one) produces a phenomenon by which adding traffic to a movement with low delay results in a lower overall delay. While it is counterintuitive that adding traffic to an intersection can lower its average delay, it is possible in certain situations.

Queuing results for low-volume unsignalized intersections are generally inconsequential. Movements not subject to a yielding condition do not queue, and those that yield (major street left turns and minor street left, through, or right) all have very low volumes. Low volumes can

also be thought of as high arrival headways, or long times (more than 30 seconds) between the arrival of each vehicle. In general, when a movement's average delay as calculated by HCS is much lower than its vehicle arrival headway, there are very few opportunities for queues of any consequence to form. The longest queue at any of the three unsignalized intersection in either peak hour for Cumulative conditions is during the p.m. peak hour on the northbound approach of Date Street at Nevada Way. This queue is estimated to be less than 1.85 vehicles long 95% of the time. Most of the other yielding movements at all three unsignalized intersections studied expected to have an average 95%-confident queue of less than one vehicle in either peak hour.

As discussed previously, the nature of signalized intersections' operation makes multiple-vehicle queues a virtual certainty during almost any conditions. The southbound right turn movement has the longest predicted queue by a wide margin under Cumulative conditions. The average and 95%-confident peak hour queues for the southbound right turn lane group at the Hwy 93/Buchanan signal are shown in **Table 10**.

Table 10. Cumulative Peak Hour SB Right Turn Queues at Hwy 93/Buchanan

	AM Peak Hour		PM Peak Hour	
Measure	**Average**	**95%**	**Average**	**95%**
Queue in Vehicles	3.7	7.3	19.6	33.4
Queue in Feet	93'	183'	490'	835'

Vehicles in queue are estimated to take up an average of 25 feet each.
Source: URS analysis with Highway Capacity Software (HCS)

The other movements at the intersection all have average queues of fewer than six vehicles (150 feet) in either peak hour.

4.4 Signal Warrants

Warrant 3 – Peak Hour Volume. Existing peak hour intersection volumes for all three of the unsignalized intersections studied fall below the warrant threshold. Therefore, none of the intersections meet Warrant 3 under existing conditions.

Warrant 7 – Crash Experience. This warrant was only applied to existing conditions.

Warrant 8 – Network. The Network condition covered by Warrant 8 requires that the intersection in question is the intersection of two major routes. None of the three unsignalized intersections studied would meet this requirement under Cumulative conditions. Therefore none of the three unsignalized intersections studied would meet Warrant 8.

None of the three unsignalized intersections studied would meet any of the three warrants studied under Cumulative conditions. Details regarding signal warrant analysis are provided in the Appendix.

5. OTHER ANALYSES

5.1 Transit Analysis

There are two types of public transit service that serve Boulder City (fixed-route and paratransit), both provided by the region's public transit service provider, the Regional Transportation Commission (RTC) of Southern Nevada. Private service is limited. Each is discussed below.

5.1.1 RTC Fixed-Route Service

The RTC operates one fixed route that serves Boulder City (Route 402). It provides hourly service seven days per week, approximately 16 hours per day (6 a.m. to 10 p.m.) between Boulder City and downtown Las Vegas. The route in Boulder City is a counter-clockwise loop that separates at the Hwy 93/Buchanan Boulevard intersection. The Route 402 map in Boulder City was shown previously in **Figure 5**.

5.1.2 RTC Paratransit Service

Paratransit is a reservation-based door-to-door shared-ride service designed for transit patrons that are unable to use the fixed-route system without assistance. Eligibility to use the paratransit system is determined through an in-person functional assessment of personal mobility, including the degree of disability, strength, balance, and range of motion. RTC Paratransit service operates 24 hours a day, 7 days a week. The RTC Paratransit service area is shown in **Figure 13**. Boulder City is in the lower right corner of the figure.

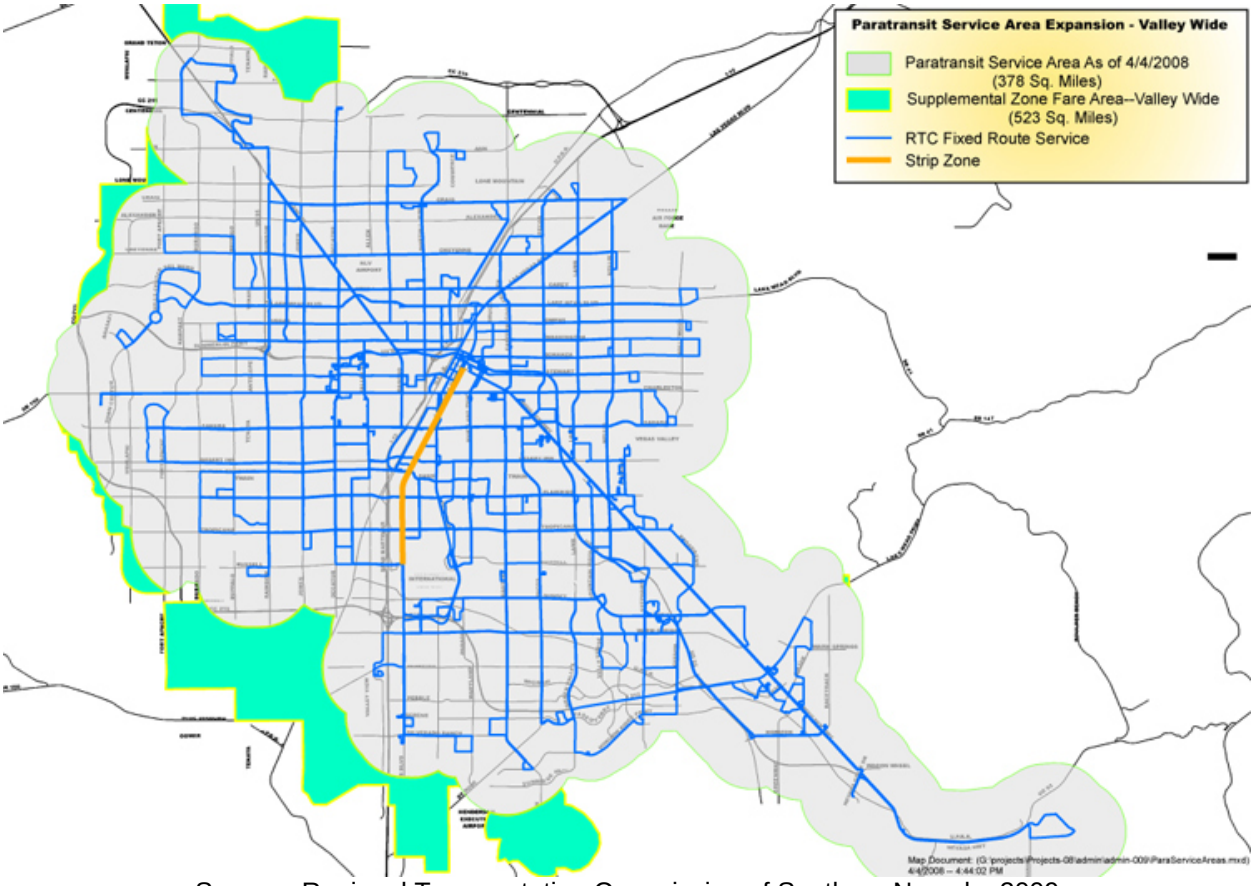
5.1.3 Private Services

There are no taxi companies currently operating in Boulder City. The Senior Center of Boulder City operates a shuttle service between 8 a.m. and 4 p.m. seven days a week that is not limited to senior citizens and serves the entire city (not just to and from the senior center).

Source: www.seniorcenterbouldercity.org

5.2 Parking Analysis

All parking needs for the proposed project are anticipated to be met through the provision of off-street parking located on the project site. Boulder City completed a Downtown Parking Study in 2004, but its study area was limited, and at its closest point was several blocks away from the Date Street Complex.



Source: Regional Transportation Commission of Southern Nevada, 2009

Figure 13. RTC Paratransit Service Area

5.3 Site Access Analysis

The primary site access points would be located on Colorado Street and at the northern end of Fir Street, with secondary access to Date Street. As shown in section 4.1, incremental trip generation for the proposed project would be very low. The site access points are all local streets that carry very low volumes. Given that the analysis of the three unsignalized intersections most impacted by traffic generated by the project indicated satisfactory LOS under all conditions, additional analysis of site access intersections is not warranted.

5.4 Bicycle and Pedestrian Analysis

The sidewalk network serving the project site is reasonably well connected and in fair condition. The proposed project has the potential to add pedestrian traffic in the surrounding area, whether the employees would be accessing transit services, leaving the office for lunch, or running short errands. This pedestrian traffic is not likely to cause any capacity-related problems on the sidewalk system.

Boulder City staff reports that the RTC of Southern Nevada is in the process of expanding the bicycle facility network in and around Boulder City. Specifically, bicycle lanes similar to those already in place are being added in the near future. Connections to prominent civic destinations will be enhanced, and commuting by bicycle will be made easier. Access to regional bicycle facilities such as the Hemenway Wash Trail and the River Mountains Trail, as well as to enhanced bicycle routes such as the Veterans Memorial and Adams Boulevard facilities will also be improved. Boulder City's Master Plan has policies encouraging the increased use of bicycling and supporting regional cooperation and funding for bicycle facility improvements. In concert, these projects and policies will contribute to a more favorable environment for bicycling in the future.

Source: Boulder City Master Plan

6. CONCLUSIONS AND RECOMMENDATIONS

The proposed project to expand Bureau of Reclamation office facilities at the Date Street Complex has been analyzed using industry standard references, practices, and procedures, including those documented in the MUTCD, ITE Trip Generation manual, and the Highway Capacity Manual. This analysis has indicated that the proposed project would have no adverse impacts to traffic operations or transportation facilities in general. As a result of this finding, there are no recommendations for any specific mitigating projects, programs, or transportation facility changes. For the sake of comparison, the LOS results are presented for each scenario in a combined format in **Table 11**.

Table 11. 2011 Peak Hour Intersection LOS and Delay Comparison by Scenario

Intersection	Existing	Background	Cumulative
AM Peak Hour			
Hwy 93/Colorado Street (WB Left)	B (12.6)	B (13.2)	B (13.6)
Hwy 93/Buchanan Boulevard (signal)	B (16.1)	B (18.0)	B (17.0)
Nevada Way/Fir Street (NB Left)	B (13.6)	B (14.0)	B (13.8)
Nevada Way/Date Street (NB Left)	B (13.4)	B (13.9)	B (14.0)
PM Peak Hour			
Hwy 93/Colorado Street (WB Left)	C (21.1)	C (23.6)	D (29.6)
Hwy 93/Buchanan Boulevard (signal)	C (25.9)	C (31.1)	C (33.0)
Nevada Way/Fir Street (NB Left)	B (19.7)	C (21.0)	C (20.8)
Nevada Way/Date Street (NB Left)	D (28.3)	D (33.2)	D (33.5)

Delay is reported as an average number of seconds per vehicle.
Source: URS analysis with Highway Capacity Software (HCS)

Appendix: Traffic Analysis Software Output

Level of Service output is presented first, in order of scenario. Within each scenario, results for a.m. peak hour conditions are presented first, followed by results for p.m. peak hour conditions.

Warrant analysis is presented after LOS output.

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2009*
Analysis Time Period	*AM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Colorado St* | North/South Street: *Hwy 93*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*378*	*35*	*3*	*326*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*5*	*0*	*1*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*5*		*1*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*326*	*0*	*0*	*378*	*35*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*3*		*6*				
C (m) (veh/h)		*1121*		*466*				
v/c		*0.00*		*0.01*				
95% queue length		*0.01*		*0.04*				
Control Delay (s/veh)		*8.2*		*12.8*				
LOS		*A*		*B*				
Approach Delay	--	--	*12.8*					

(s/veh)				
Approach LOS	--	--	*B*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:39 PM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period	AM Peak Hour	Analysis Year	2009
		Project ID	*BOR - Date St Traffic Study*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	365	220	39	30	285	42	81	59	38	33	49	294
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	5	2	0	5	0	0	100
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 16.0	G = 5.2	G = 0.0	G = 0.0	G = 5.0	G = 15.8	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	365	254		30	322		81	59	33	33	49	194
Lane Group Capacity, c	833	1362		287	903		278	778	661	342	477	405
v/c Ratio, X	0.44	0.19		0.10	0.36		0.29	0.08	0.05	0.10	0.10	0.48
Total Green Ratio, g/C	0.40	0.40		0.27	0.27		0.08	0.43	0.43	0.26	0.26	0.26
Uniform Delay, d_1	14.4	11.5		16.6	17.8		25.8	10.1	10.0	16.7	16.7	18.6
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.11	0.11		0.11	0.11		0.11	0.11	0.11	0.11	0.11	0.11
Incremental Delay, d_2	0.4	0.1		0.2	0.2		0.6	0.0	0.0	0.1	0.1	0.9

Initial Queue Delay, d_3	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Control Delay	*14.8*	*11.6*		*16.8*	*18.1*		*26.4*	*10.1*	*10.0*	*16.8*	*16.8*	*19.5*
Lane Group LOS	*B*	*B*		*B*	*B*		*C*	*B*	*A*	*B*	*B*	*B*
Approach Delay	*13.5*			*18.0*			*17.7*			*18.7*		
Approach LOS	*B*			*B*			*B*			*B*		
Intersection Delay	*16.1*			X_C *= 0.54*			Intersection LOS			*B*		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 7:00 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*WFH*
Agency/Co.	*URS*
Date Performed	*6/16/2009*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Nevada Hwy & Date St*
Jurisdiction	*Boulder City, Nevada*
Analysis Year	*2009*

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*211*	*27*	*4*	*266*	*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*10*	*211*	*27*	*4*	*266*	*3*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*53*	*3*	*11*	*1*	*1*	*9*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*53*	*3*	*11*	*1*	*1*	*9*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*10*	*4*		*67*			*11*	
C (m) (veh/h)	*1277*	*1311*		*494*			*675*	
v/c	*0.01*	*0.00*		*0.14*			*0.02*	
95% queue length	*0.02*	*0.01*		*0.47*			*0.05*	
Control Delay (s/veh)	*7.8*	*7.8*		*13.4*			*10.4*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*13.4*			*10.4*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:10 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2009*
Analysis Time Period	*AM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Fir St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*52*	*245*	*1*	*0*	*324*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*52*	*245*	*1*	*0*	*324*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*2*	*0*	*0*	*3*	*0*	*10*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*0*	*3*	*0*	*10*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*52*	*0*		*2*			*13*	
C (m) (veh/h)	*1207*	*1295*		*419*			*613*	
v/c	*0.04*	*0.00*		*0.00*			*0.02*	
95% queue length	*0.14*	*0.00*		*0.01*			*0.06*	
Control Delay (s/veh)	*8.1*	*7.8*		*13.6*			*11.0*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*13.6*			*11.0*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:25 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2009*
Analysis Time Period	*PM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Colorado St* | North/South Street: *Hwy 93*

Intersection Orientation: *North-South* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*555*	*6*	*1*	*786*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*35*	*0*	*3*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*35*		*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*1*	*786*	*0*	*0*	*555*	*6*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*1*		*38*				
C (m) (veh/h)		*986*		*261*				
v/c		*0.00*		*0.15*				
95% queue length		*0.00*		*0.51*				
Control Delay (s/veh)		*8.7*		*21.1*				
LOS		*A*		*C*				
Approach Delay	--	--	*21.1*					

(s/veh)				
Approach LOS	--	--	*C*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:43 PM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period	PM Peak Hour	Analysis Year	2009
		Project ID	*BOR - Date St Traffic Study*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	353	376	65	93	353	43	111	103	61	57	107	853
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	3	2	0	5	0	0	300
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 16.0	G = 5.5	G = 0.0	G = 0.0	G = 5.0	G = 35.5	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 80.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	353	436		93	393		111	103	56	57	107	553
Lane Group Capacity, c	660	1033		123	679		209	1029	875	554	803	682
v/c Ratio, X	0.53	0.42		0.76	0.58		0.53	0.10	0.06	0.10	0.13	0.81
Total Green Ratio, g/C	0.31	0.31		0.20	0.20		0.06	0.57	0.57	0.44	0.44	0.44
Uniform Delay, d_1	26.5	22.1		30.2	29.0		36.4	7.9	7.7	13.0	13.2	19.3
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.14	0.11		0.31	0.17		0.13	0.11	0.11	0.11	0.11	0.35
Incremental Delay, d_2	0.9	0.3		26.5	1.2		2.6	0.0	0.0	0.1	0.1	7.8

Initial Queue Delay, d_3	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay	27.3	22.4		56.7	30.2		39.0	7.9	7.8	13.1	13.2	27.1
Lane Group LOS	C	C		E	C		D	A	A	B	B	C
Approach Delay	24.6			35.3			20.7			23.9		
Approach LOS	C			D			C			C		
Intersection Delay	26.2			X_C = 0.75			Intersection LOS			C		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 2:09 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Date St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2009*
Analysis Time Period	*PM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*444*	*128*	*23*	*465*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*10*	*444*	*128*	*23*	*465*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*61*	*3*	*12*	*3*	*6*	*24*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*61*	*3*	*12*	*3*	*6*	*24*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*10*	*23*		*76*			*33*	
C (m) (veh/h)	*1068*	*980*		*230*			*374*	
v/c	*0.01*	*0.02*		*0.33*			*0.09*	
95% queue length	*0.03*	*0.07*		*1.45*			*0.29*	
Control Delay (s/veh)	*8.4*	*8.8*		*28.3*			*15.6*	
LOS	*A*	*A*		*D*			*C*	
Approach Delay	--	--	*28.3*			*15.6*		

(s/veh)				
Approach LOS	--	--	*D*	*C*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:16 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2009*
Analysis Time Period	*PM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Fir St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*13*	*577*	*3*	*1*	*508*	*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*13*	*577*	*3*	*1*	*508*	*2*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*	*0*	*1*	*4*	*0*	*53*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*1*	*4*	*0*	*53*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*13*	*1*		*5*			*57*	
C (m) (veh/h)	*1031*	*970*		*250*			*584*	
v/c	*0.01*	*0.00*		*0.02*			*0.10*	
95% queue length	*0.04*	*0.00*		*0.06*			*0.32*	
Control Delay (s/veh)	*8.5*	*8.7*		*19.7*			*11.8*	
LOS	*A*	*A*		*C*			*B*	
Approach Delay	--	--	*19.7*			*11.8*		

(s/veh)				
Approach LOS	--	--	*C*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/16/2009 3:28 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 No Build*
Analysis Time Period	*AM Peak Hour*		

Project Description *BOR - Date St Traffic Study*	
East/West Street: *Colorado St*	North/South Street: *Hwy 93*
Intersection Orientation: *North-South*	Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*401*	*35*	*3*	*346*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*5*	*0*	*1*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*5*		*1*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*346*	*0*	*0*	*401*	*35*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*3*		*6*				
C (m) (veh/h)		*1099*		*445*				
v/c		*0.00*		*0.01*				
95% queue length		*0.01*		*0.04*				
Control Delay (s/veh)		*8.3*		*13.2*				
LOS		*A*		*B*				
Approach Delay	--	--	*13.2*					

(s/veh)				
Approach LOS	--	--	*B*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 6:41 AM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period	AM Peak Hour	Analysis Year	2011 No Build
		Project ID	*BOR - Date St Traffic Study*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	386	231	41	32	302	45	63	86	40	35	52	312
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	5	2	0	5	0	0	100
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 21.4	G = 11.2	G = 0.0	G = 0.0	G = 5.3	G = 14.1	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 70.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	386	267		32	342		63	86	35	35	52	212
Lane Group Capacity, c	1033	1717		325	1035		253	631	536	256	365	310
v/c Ratio, X	0.37	0.16		0.10	0.33		0.25	0.14	0.07	0.14	0.14	0.68
Total Green Ratio, g/C	0.51	0.51		0.31	0.31		0.08	0.35	0.35	0.20	0.20	0.20
Uniform Delay, d_1	12.8	9.2		17.4	18.8		30.5	15.6	15.2	23.0	23.0	25.9
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.11	0.11		0.11	0.11		0.11	0.11	0.11	0.11	0.11	0.25
Incremental Delay, d_2	0.2	0.0		0.1	0.2		0.5	0.1	0.1	0.2	0.2	6.3

Initial Queue Delay, d_3	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay	13.0	9.2		17.5	19.0		31.0	15.7	15.3	23.2	23.2	32.2
Lane Group LOS	B	A		B	B		C	B	B	C	C	C
Approach Delay	11.5			18.8			20.8			29.6		
Approach LOS	B			B			C			C		
Intersection Delay	18.0			X_C = 0.60			Intersection LOS			B		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 6:44 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*WFH*
Agency/Co.	*URS*
Date Performed	*6/16/2009*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Nevada Hwy & Date St*
Jurisdiction	*Boulder City, Nevada*
Analysis Year	*2011 No Build*

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*224*	*29*	*4*	*282*	*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*11*	*224*	*29*	*4*	*282*	*3*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*56*	*3*	*12*	*1*	*1*	*9*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*56*	*3*	*12*	*1*	*1*	*9*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*11*	*4*		*71*			*11*	
C (m) (veh/h)	*1260*	*1295*		*474*			*656*	
v/c	*0.01*	*0.00*		*0.15*			*0.02*	
95% queue length	*0.03*	*0.01*		*0.53*			*0.05*	
Control Delay (s/veh)	*7.9*	*7.8*		*13.9*			*10.6*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*13.9*			*10.6*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:06 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 No Build*
Analysis Time Period	*AM Peak Hour*		

Project Description *BOR - Date St Traffic Study*	
East/West Street: *Nevada Hwy*	North/South Street: *Fir St*
Intersection Orientation: *East-West*	Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*52*	*260*	*1*	*0*	*344*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*52*	*260*	*1*	*0*	*344*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*2*	*0*	*0*	*3*	*0*	*10*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*0*	*3*	*0*	*10*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*52*	*0*		*2*			*13*	
C (m) (veh/h)	*1186*	*1279*		*402*			*593*	
v/c	*0.04*	*0.00*		*0.00*			*0.02*	
95% queue length	*0.14*	*0.00*		*0.01*			*0.07*	
Control Delay (s/veh)	*8.2*	*7.8*		*14.0*			*11.2*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*14.0*			*11.2*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 7:04 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 No Build*
Analysis Time Period	*PM Peak Hour*		

Project Description *BOR - Date St Traffic Study*	
East/West Street: *Colorado St*	North/South Street: *Hwy 93*
Intersection Orientation: *North-South*	Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*589*	*6*	*1*	*884*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*35*	*0*	*3*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*35*		*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*1*	*884*	*0*	*0*	*589*	*6*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*1*		*38*				
C (m) (veh/h)		*957*		*231*				
v/c		*0.00*		*0.16*				
95% queue length		*0.00*		*0.59*				
Control Delay (s/veh)		*8.8*		*23.6*				
LOS		*A*		*C*				
Approach Delay	--	--	*23.6*					

(s/veh)				
Approach LOS	--	--	*C*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 6:49 AM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period	PM Peak Hour	Analysis Year	2011 No Build
		Project ID	*BOR - Date St Traffic Study*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	374	398	69	99	359	45	109	118	65	60	113	903
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	5	2	0	5	0	0	300
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 18.8	G = 5.4	G = 0.0	G = 0.0	G = 6.6	G = 41.2	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 90.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	374	462		99	399		109	118	60	60	113	603
Lane Group Capacity, c	594	1020		118	709		245	1062	902	564	829	704
v/c Ratio, X	0.63	0.45		0.84	0.56		0.44	0.11	0.07	0.11	0.14	0.86
Total Green Ratio, g/C	0.30	0.30		0.21	0.21		0.07	0.59	0.59	0.46	0.46	0.46
Uniform Delay, d_1	31.7	25.4		34.1	31.9		39.9	8.2	8.0	13.9	14.1	21.8
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.21	0.11		0.37	0.16		0.11	0.11	0.11	0.11	0.11	0.39
Incremental Delay, d_2	2.2	0.3		50.7	1.0		1.3	0.0	0.0	0.1	0.1	11.3

Initial Queue Delay, d_3	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay	33.9	25.7		84.8	33.0		41.2	8.3	8.0	14.0	14.2	33.1
Lane Group LOS	C	C		F	C		D	A	A	B	B	C
Approach Delay	29.4			43.3			20.7			28.9		
Approach LOS	C			D			C			C		
Intersection Delay	31.1			$X_C = 0.79$			Intersection LOS			C		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 6:53 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*WFH*
Agency/Co.	*URS*
Date Performed	*6/16/2009*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Nevada Hwy & Date St*
Jurisdiction	*Boulder City, Nevada*
Analysis Year	*2011 No Build*

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*471*	*136*	*24*	*493*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*11*	*471*	*136*	*24*	*493*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*65*	*3*	*13*	*3*	*6*	*25*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*65*	*3*	*13*	*3*	*6*	*25*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*11*	*24*		*81*			*34*	
C (m) (veh/h)	*1043*	*950*		*208*			*352*	
v/c	*0.01*	*0.03*		*0.39*			*0.10*	
95% queue length	*0.03*	*0.08*		*1.86*			*0.32*	
Control Delay (s/veh)	*8.5*	*8.9*		*33.2*			*16.3*	
LOS	*A*	*A*		*D*			*C*	
Approach Delay	--	--	*33.2*			*16.3*		

(s/veh)				
Approach LOS	--	--	*D*	*C*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:08 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 No Build*
Analysis Time Period	*PM Peak Hour*		

Project Description *BOR - Date St Traffic Study*

East/West Street: *Nevada Hwy* | North/South Street: *Fir St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*13*	*612*	*3*	*1*	*539*	*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*13*	*612*	*3*	*1*	*539*	*2*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*	*0*	*1*	*4*	*0*	*53*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*1*	*4*	*0*	*53*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*13*	*1*		*5*			*57*	
C (m) (veh/h)	*1003*	*940*		*230*			*557*	
v/c	*0.01*	*0.00*		*0.02*			*0.10*	
95% queue length	*0.04*	*0.00*		*0.07*			*0.34*	
Control Delay (s/veh)	*8.6*	*8.8*		*21.0*			*12.2*	
LOS	*A*	*A*		*C*			*B*	
Approach Delay	--	--	*21.0*			*12.2*		

(s/veh)				
Approach LOS	--	--	*C*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 7:06 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*AM Peak Hour*		

Project Description *22241052*

East/West Street: *Colorado St*	North/South Street: *Hwy 93*
Intersection Orientation: *North-South*	Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*402*	*78*	*6*	*349*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*9*	*0*	*2*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*9*		*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*6*	*349*	*0*	*0*	*402*	*78*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*6*		*11*				
C (m) (veh/h)		*1058*		*428*				
v/c		*0.01*		*0.03*				
95% queue length		*0.02*		*0.08*				
Control Delay (s/veh)		*8.4*		*13.6*				
LOS		*A*		*B*				
Approach Delay	--	--	*13.6*					

(s/veh)				
Approach LOS	--	--	*B*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:16 PM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period	AM Peak Hour	Analysis Year	2011 Build
		Project ID	*22241052*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	426	226	41	32	301	46	86	66	40	35	51	317
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	5	2	0	5	0	0	100
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 12.6	G = 10.0	G = 0.0	G = 0.0	G = 5.3	G = 14.1	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	426	262		32	342		86	66	35	35	51	217
Lane Group Capacity, c	1092	1440		224	710		295	736	625	304	425	361
v/c Ratio, X	0.39	0.18		0.14	0.48		0.29	0.09	0.06	0.12	0.12	0.60
Total Green Ratio, g/C	0.43	0.43		0.21	0.21		0.09	0.41	0.41	0.23	0.23	0.23
Uniform Delay, d_1	13.1	10.7		19.3	20.8		25.6	11.0	10.8	18.0	18.1	20.4
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.11	0.11		0.11	0.11		0.11	0.11	0.11	0.11	0.11	0.19
Incremental Delay, d_2	0.2	0.1		0.3	0.5		0.6	0.1	0.0	0.2	0.1	2.8

Initial Queue Delay, d_3	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Control Delay	*13.4*	*10.8*		*19.6*	*21.3*		*26.1*	*11.0*	*10.8*	*18.2*	*18.2*	*23.3*
Lane Group LOS	*B*	*B*		*B*	*C*		*C*	*B*	*B*	*B*	*B*	*C*
Approach Delay	*12.4*			*21.2*			*17.9*			*21.8*		
Approach LOS	*B*			*C*			*B*			*C*		
Intersection Delay	*17.0*			X_C *= 0.53*			Intersection LOS			*B*		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:18 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Date St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*AM Peak Hour*		

Project Description *22241052*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*224*	*28*	*4*	*282*	*3*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*11*	*224*	*28*	*4*	*282*	*3*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*55*	*5*	*12*	*1*	*2*	*9*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*55*	*5*	*12*	*1*	*2*	*9*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*11*	*4*		*72*			*12*	
C (m) (veh/h)	*1260*	*1296*		*472*			*627*	
v/c	*0.01*	*0.00*		*0.15*			*0.02*	
95% queue length	*0.03*	*0.01*		*0.54*			*0.06*	
Control Delay (s/veh)	*7.9*	*7.8*		*14.0*			*10.9*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*14.0*			*10.9*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:34 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*AM Peak Hour*		

Project Description *22241052*

East/West Street: *Nevada Hwy* | North/South Street: *Fir St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*47*	*260*	*1*	*0*	*344*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*47*	*260*	*1*	*0*	*344*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*2*	*0*	*0*	*2*	*0*	*10*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*2*	*0*	*0*	*2*	*0*	*10*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*47*	*0*		*2*			*12*	
C (m) (veh/h)	*1186*	*1279*		*410*			*649*	
v/c	*0.04*	*0.00*		*0.00*			*0.02*	
95% queue length	*0.12*	*0.00*		*0.01*			*0.06*	
Control Delay (s/veh)	*8.2*	*7.8*		*13.8*			*10.7*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay	--	--	*13.8*			*10.7*		

(s/veh)				
Approach LOS	--	--	*B*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:42 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Hwy 93 & Colorado St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*PM Peak Hour*		

Project Description *22241052*

East/West Street: *Colorado St*	North/South Street: *Hwy 93*
Intersection Orientation: *North-South*	Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*592*	*18*	*2*	*885*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*75*	*0*	*6*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*2*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*75*		*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*2*	*885*	*0*	*0*	*592*	*18*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*2*		*81*				
C (m) (veh/h)		*945*		*227*				
v/c		*0.00*		*0.36*				
95% queue length		*0.01*		*1.63*				
Control Delay (s/veh)		*8.8*		*29.6*				
LOS		*A*		*D*				
Approach Delay	--	--	*29.6*					

(s/veh)				
Approach LOS	--	--	*D*	

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:29 PM

HCS+™ DETAILED REPORT

General Information		***Site Information***	
Analyst	*WFH*	Intersection	*Hwy 93 & Nevada Hwy*
Agency or Co.	*URS*	Area Type	*All other areas*
Date Performed	*6/15/2009*	Jurisdiction	*Boulder City, NV*
Time Period		Analysis Year	
		Project ID	*22241052*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes, N_1	2	2	0	1	2	0	2	1	1	1	1	1
Lane Group	L	TR		L	TR		L	T	R	L	T	R
Volume, V (vph)	382	397	69	99	352	45	118	108	65	60	115	941
% Heavy Vehicles, %HV	5	5	5	5	5	5	5	5	5	5	5	5
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Pretimed (P) or Actuated (A)	A	A	A	A	A	A	A	A	A	A	A	A
Start-up Lost Time, l_1	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Extension of Effective Green, e	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Arrival Type, AT	3	3		3	3		3	3	3	3	3	3
Unit Extension, UE	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Filtering/Metering, I	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Initial Unmet Demand, Q_b	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR Volumes	0	0	5	0	0	5	2	0	5	0	0	300
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking Maneuvers, N_m												
Buses Stopping, N_B	0	0		0	0		0	0	0	0	0	0
Min. Time for Pedestrians, G_p	3.2			3.2			3.2			3.2		

Phasing	EW Perm	EB Only	03	04	NB Only	NS Perm	07	08
Timing	G = 19.0	G = 5.1	G = 0.0	G = 0.0	G = 6.5	G = 41.4	G = 0.0	G = 0.0
	Y = 3	Y = 5	Y = 0	Y = 0	Y = 5	Y = 5	Y = 0	Y = 0
Duration of Analysis, T = 1.00						Cycle Length, C = 90.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted Flow Rate, v	382	461		99	392		118	108	60	60	115	641
Lane Group Capacity, c	580	1016		120	716		241	1064	904	572	833	707
v/c Ratio, X	0.66	0.45		0.82	0.55		0.49	0.10	0.07	0.10	0.14	0.91
Total Green Ratio, g/C	0.30	0.30		0.21	0.21		0.07	0.59	0.59	0.46	0.46	0.46
Uniform Delay, d_1	32.0	25.5		33.9	31.7		40.2	8.1	8.0	13.8	14.0	22.5
Progression Factor, PF	1.000	1.000		1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000
Delay Calibration, k	0.23	0.11		0.36	0.15		0.11	0.11	0.11	0.11	0.11	0.43
Incremental Delay, d_2	2.8	0.3		45.0	0.9		1.6	0.0	0.0	0.1	0.1	19.0

Initial Queue Delay, d_3	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Control Delay	*34.8*	*25.8*		*78.9*	*32.6*		*41.7*	*8.2*	*8.0*	*13.9*	*14.1*	*41.5*
Lane Group LOS	*C*	*C*		*E*	*C*		*D*	*A*	*A*	*B*	*B*	*D*
Approach Delay	*29.9*			*41.9*			*22.0*			*35.6*		
Approach LOS	*C*			*D*			*C*			*D*		
Intersection Delay	*33.3*			$X_C = 0.83$			Intersection LOS			*C*		

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:30 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Date St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*PM Peak Hour*		

Project Description *22241052*

East/West Street: *Nevada Hwy* | North/South Street: *Date St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*471*	*135*	*24*	*493*	*4*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*11*	*471*	*135*	*24*	*493*	*4*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*64*	*3*	*13*	*3*	*8*	*25*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*64*	*3*	*13*	*3*	*8*	*25*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*Y*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*11*	*24*		*80*			*36*	
C (m) (veh/h)	*1043*	*951*		*206*			*335*	
v/c	*0.01*	*0.03*		*0.39*			*0.11*	
95% queue length	*0.03*	*0.08*		*1.85*			*0.36*	
Control Delay (s/veh)	*8.5*	*8.9*		*33.5*			*17.0*	
LOS	*A*	*A*		*D*			*C*	
Approach Delay	--	--	*33.5*			*17.0*		

(s/veh)				
Approach LOS	--	--	*D*	*C*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:38 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*WFH*	Intersection	*Nevada Hwy & Fir St*
Agency/Co.	*URS*	Jurisdiction	*Boulder City, Nevada*
Date Performed	*6/16/2009*	Analysis Year	*2011 Build*
Analysis Time Period	*PM Peak Hour*		

Project Description *22241052*

East/West Street: *Nevada Hwy* | North/South Street: *Fir St*

Intersection Orientation: *East-West* | Study Period (hrs): *1.00*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*612*	*3*	*1*	*539*	*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*12*	*612*	*3*	*1*	*539*	*2*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*2*	*0*
Configuration	*L*		*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*	*0*	*1*	*3*	*0*	*46*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*1*	*3*	*0*	*46*
Percent Heavy Vehicles	*5*	*5*	*5*	*5*	*5*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*12*	*1*		*5*			*49*	
C (m) (veh/h)	*1003*	*940*		*233*			*574*	
v/c	*0.01*	*0.00*		*0.02*			*0.09*	
95% queue length	*0.04*	*0.00*		*0.07*			*0.28*	
Control Delay (s/veh)	*8.6*	*8.8*		*20.8*			*11.9*	
LOS	*A*	*A*		*C*			*B*	
Approach Delay	--	--	*20.8*			*11.9*		

(s/veh)				
Approach LOS	--	--	*C*	*B*

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 2:45 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Hwy 93 & Colorado St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	Peak Hours
East/West Street	Colorado St	North/South Street	Hwy 93
File Name	Hwy 93 & Colorado St - Existing.xhy	Major Street	North-South

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	2450	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	3	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	0	0	0	0	0	0	1	0	1	2	0
Lane usage					LR			TR		L	T	
Vehicle Volume Averages (vph)	0	0	0	3	0	0	0	77	3	92	0	0
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 12:21 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Date St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Date St
File Name	Nevada Hwy & Date St - Existing.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1750	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	1	1	1	0	0	1	0	0	1	0
Lane usage	L	T	R	L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	1	54	12	2	60	0	9	0	1	0	0	2
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 12:28 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Fir St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Fir St
File Name	Nevada Hwy & Fir St - Existing.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	720	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	1	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	0	1	2	0	0	1	0	0	1	0
Lane usage	L	TR		L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	5	68	0	0	69	0	0	0	0	0	0	5
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 12:19 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Date St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Date St
File Name	Nevada Hwy & Date St - No Build.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1750	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	1	1	1	0	0	1	0	0	1	0
Lane usage	L	T	R	L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	1	57	13	2	64	0	10	0	2	0	0	2
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 1:27 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Hwy 93 & Colorado St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	Peak Hours
East/West Street	Colorado St	North/South Street	Hwy 93
File Name	Hwy 93 & Colorado St - No Build.xhy	Major Street	North-South

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	2450	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	3	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	0	0	0	0	0	0	1	0	1	2	0
Lane usage					LR			TR		L	T	
Vehicle Volume Averages (vph)	0	0	0	3	0	0	0	82	3	102	0	0
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 12:41 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Fir St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Fir St
File Name	Nevada Hwy & Fir St - No Build.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	720	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	1	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	0	1	2	0	0	1	0	0	1	0
Lane usage	L	TR		L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	5	72	0	0	73	0	0	0	0	0	0	5
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 1:30 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Date St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Date St
File Name	Nevada Hwy & Date St - Build.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	1750	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	1	1	1	0	0	1	0	0	1	0
Lane usage	L	T	R	L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	1	57	13	2	64	0	9	0	2	0	0	2
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 1:49 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Hwy 93 & Colorado St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	Peak Hours
East/West Street	Colorado St	North/South Street	Hwy 93
File Name	Hwy 93 & Colorado St - Build.xhy	Major Street	North-South

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	35	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	2450	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	3	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	0	0	0	0	0	0	0	1	0	1	2	0
Lane usage					LR			TR		L	T	
Vehicle Volume Averages (vph)	0	0	0	7	0	0	0	82	8	102	0	0
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 1:44 PM

Warrants Summary

Information			
Analyst	WFH	Intersection	Nevada Hwy & Fir St
Agency/Co	URS	Jurisdiction	Boulder City, NV
Date Performed	6/17/2009	Units	U.S. Customary
Project ID	22241052	Time Period Analyzed	
East/West Street	Nevada Hwy	North/South Street	Fir St
File Name	Nevada Hwy & Fir St - Build.xhy	Major Street	East-West

Project Description *22241052*

General				Roadway Network	
Major Street Speed (mph)	25	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	720	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	1	☑	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	1	0	1	2	0	0	1	0	0	1	0
Lane usage	L	TR		L	TR			LTR			LTR	
Vehicle Volume Averages (vph)	4	72	0	0	73	0	0	0	0	0	0	4
Peds (ped/h) / Gaps (gaps/h)	--	/	--	--	/	--	--	/	--	--	/	--
Delay (s/veh) / (veh-hr)	--	/	--	--	/	--	--	/	--	--	/	--

Warrant 1: Eight-Hour Vehicular Volume	☐
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☐
1 80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☐
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 3: Peak Hour	☐
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 4: Pedestrian Volume	☐
4 A. Pedestrian Volumes (Four hours --or-- one hour) --and--	☐
4 B. Gaps Same Period (Four hours --or-- one hour)	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☑
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐

7 C. 80% Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☐

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐

Copyright © 2005 University of Florida, All Rights Reserved *HCS+*™ Version 5.2 Generated: 6/17/2009 1:52 PM